OMNERA® 500A

Auto-Positioning Digital Radiographic System

Installation and Service Manual

Technical Publication: 1000-095-072-EN Rev. 2.1

Canon

CANON MEDICAL SYSTEMS USA, INC.

Disclaimer

The standard warranty is void if the product has been intentionally modified, or damaged by accident, abuse or misuse. Additionally, this warranty is void if untrained personnel service the OMNERA® 500A equipment.

Lost profits, downtime, goodwill, damage to or replacement of property, and any costs of repairing the OMNERA® 500A resulting from a breach of warranty are not the responsibility of Canon Medical Systems

Specifications are subject to change without notice. Not responsible for typographical errors.

Notices

Note: Photos and drawings used in this guide may be slightly different from the actual product.

Dispose of electronic equipment in accordance with local, state, and federal regulations.

Trademarks

Reason for change	Rev	Date
First release	1.1	2020-09
1.2 Identification Labels updated Added warning in **2.2 Precautions, Safety** **8 Function And Safety Checks** Updated **9.2.4.15 Display** in **9 Electrical Drawings** Added **11.2 Collimator** Added **11.1.2 Power line requirements** and **11.1.3 Radiographic Specification** Added AEC Accuracy in table Output Parameter and Loading Factor in **11.1.3 Radiographic Specification** Added **11.3 X-ray Tube** Added **12 Complying Standards**	2.1	2021-06

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1 Introduction

1.1 Document information

- It is important to keep this document for the life of the equipment, and pass the document on to any subsequent holder or user of the equipment.
- The original version of this manual is written in English.
- Training is provided by or via Canon Medical Systems. Training material consists of the Operator's Manual and the Installation and service manual.

1.1.1 System documentation

The following documentation is available for the system:

- Omnera 500A System installation and service manual
- Omnera 500A System operation manual
- Omnera 500A System planning guide
- Image system service manual
- Image system user manual
- Detector user's manual

1.1.2 Stylistic Conventions

All warning label texts are shown in *italic* style in this manual.

All references are shown in *italic* style in this manual.

1.1.3 Document Producer

This document has been produced by:

Arcoma AB
Annavägen 1
S–352 46 VÄXJÖ,
Sweden

www.arcoma.se

1.1.4 Copyright © 2021Arcoma Corporation All Rights Reserved

1.1.5 Text Emphasis

WARNING!

All texts labelled with "WARNING" call attention to potential risk to health or life.

CAUTION!

All texts labelled with "CAUTION" contain information about dangerous situations and measures to avoid risk.

Note!

All texts labelled with "NOTE" contain additional information regarding the work step, and is provided for a better understanding or as a warning about unnecessary and avoidable difficulties.

1.2 Identification Labels

The figure shows the location of the identification labels on the equipment.

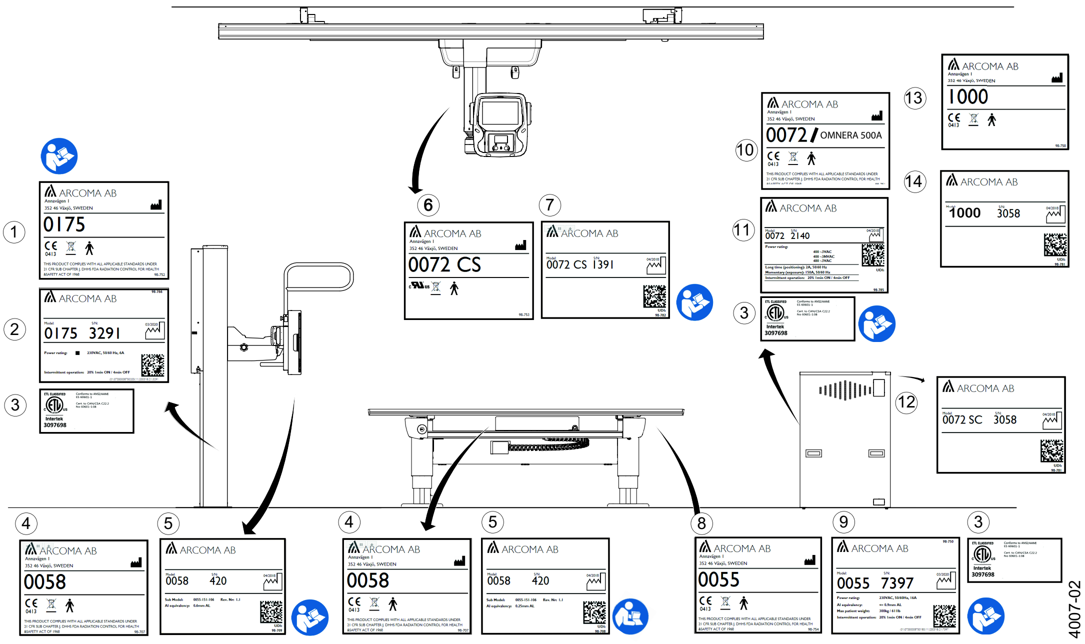


Fig. 1-1 Location of identification labels

Label 13 and label 14 apply for US market only.

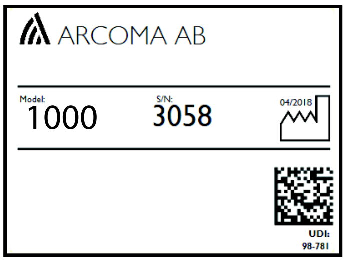
1
ARCOMA AB
Annavägen 1
352 46 Växjö, SWEDEN
0175
0413
THIS PRODUCT COMPLIES WITH ALL APPLICABLE STANDARDS UNDER 21 CFR SUB CHAPTER J. DHHS FDA RADIATION CONTROL FOR HEALTH &SAFETY ACT OF 1968
98-752
2
ARCOMA AB
98-766
Model: 0175
S/N: 3291
03/2020
Power rating: 230VAC, 50/60 Hz, 6A
Intermittent operation: 20% 1min ON / 4min OFF
3
ETL CLASSIFIED
Conforms to ANSI/AAMI ES 60601-1
Cert. to CAN/CSA C22.2 No 60601-1:08
Intertek
3097698
4
ARCOMA AB
Annavägen 1
352 46 Växjö, SWEDEN
0058
0413
THIS PRODUCT COMPLIES WITH ALL APPLICABLE STANDARDS UNDER 21 CFR SUB CHAPTER J. DHHS FDA RADIATION CONTROL FOR HEALTH &SAFETY ACT OF 1968
98-707
5
ARCOMA AB
Model: 0058
S/N: 420
04/2018
Sub Model: 0055-151-106
Rev. Nr: 1.1
Al equivalency: 0.6mm AL
UDI:
98-709
6
ARCOMA AB
Annavägen 1
352 46 Växjö, SWEDEN
0072 CS
98-753
8
ARCOMA AB
Annavägen 1
352 46 Växjö, SWEDEN
0055
0413
THIS PRODUCT COMPLIES WITH ALL APPLICABLE STANDARDS UNDER 21 CFR SUB CHAPTER J. DHHS FDA RADIATION CONTROL FOR HEALTH &SAFETY ACT OF 1968
98-754
9
ARCOMA AB
98-750
Model: 0055
S/N: 7397
03/2020
Power rating: 230VAC, 50/60Hz, 16A
Al equivalency: <= 0.9mm AL
Max patient weight: 300kg / 611lb
Intermittent operation: 20% 1min ON / 4min OFF
10
ARCOMA AB
Annavägen 1
352 46 Växjö, SWEDEN
0072 / OMNERA 500A
0413
THIS PRODUCT COMPLIES WITH ALL APPLICABLE STANDARDS UNDER 21 CFR SUB CHAPTER J. DHHS FDA RADIATION CONTROL FOR HEALTH &SAFETY ACT OF 1968
98-751
11
ARCOMA AB
Model: 0072
S/N: 2140
04/2018
Power rating:
400 ~3VAC
400 ~3NVAC
480 ~3VAC
Long time (positioning): 2A, 50/60 Hz
Momentary (exposure): 150A, 50/60 Hz
Intermittent operation: 20% 1min ON / 4min OFF
UDI:
98-785
12
ARCOMA AB
Model: 0072 SC
S/N: 3058
04/2018
UDI:
98-781
13
ARCOMA AB
Annavägen 1
352 46 Växjö, SWEDEN
1000
0413
4041

US only

7


ARCOMA AB
Model:
0072 CS
S/N:
1391
04/2018
UDI:
98-782

14


ARCOMA AB
Model:
1000
S/N:
3058
04/2018
UDI:
98-781

US only

1.3 System description

1.3.1 General

Omnera 500A includes:

- Overhead tube crane (OTC) with x-ray tube and collimator
- Table
- Wallstand
- System cabinet with a high voltage generator
- Image Acquisition system
- Flat panel detectors

1.3.2 Intended Use

The system is a stationary X-ray system intended for obtaining radiographic images of various portions of the human body in a clinical environment.

The system is not intended for mammography.

1.3.3 Configuration

The basic system consists of system Cabinet (including generator), Image acquisition system, Flat panel detectors, and Overhead tube crane. The basic system can be equipped with one of the following three configurations:

- Table and Wallstand
- Wallstand
- Table

1.3.3.1 Table Models and Designs

The table is prepared for different types of detectors, fixed or portable in different sizes.

1.3.3.2 Wallstand Models and Designs

The wallstand has different options:

- Tiltable detector holder wagon.
- Motorized Z movement
- Prepared for different types of detectors; fixed or portable in different sizes.
- The detector holder for the portable detector is available for either left-hand or right-hand loading.

1.3.4 System Overview

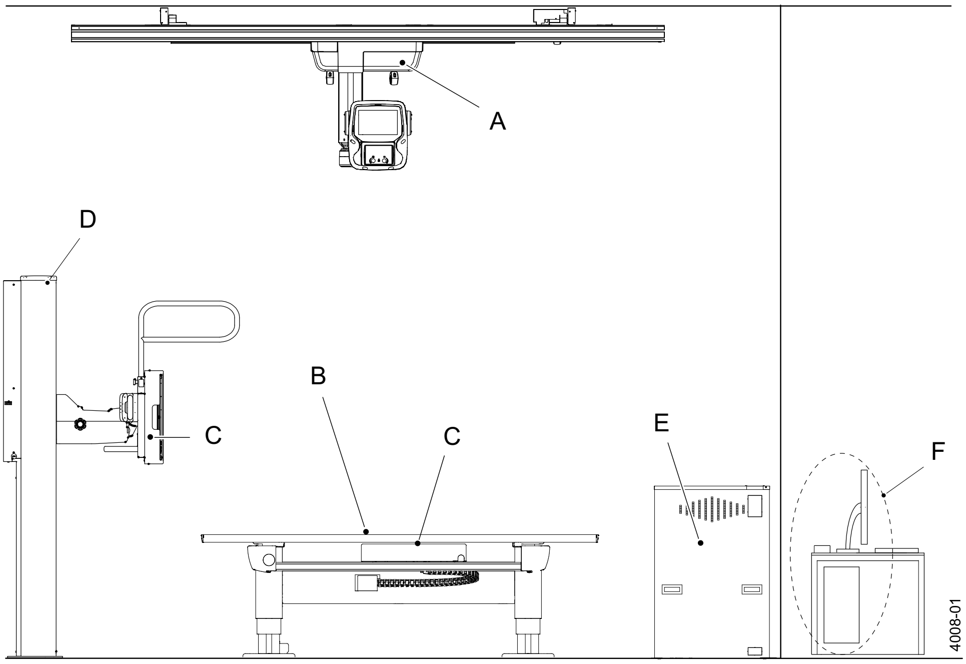


Fig. 1-2 System Overview

A Overhead tube crane
B Table
C Detector holder
D Wallstand
E System cabinet
F Computer and monitor

1.3.5 Overhead Tube Crane, Overview

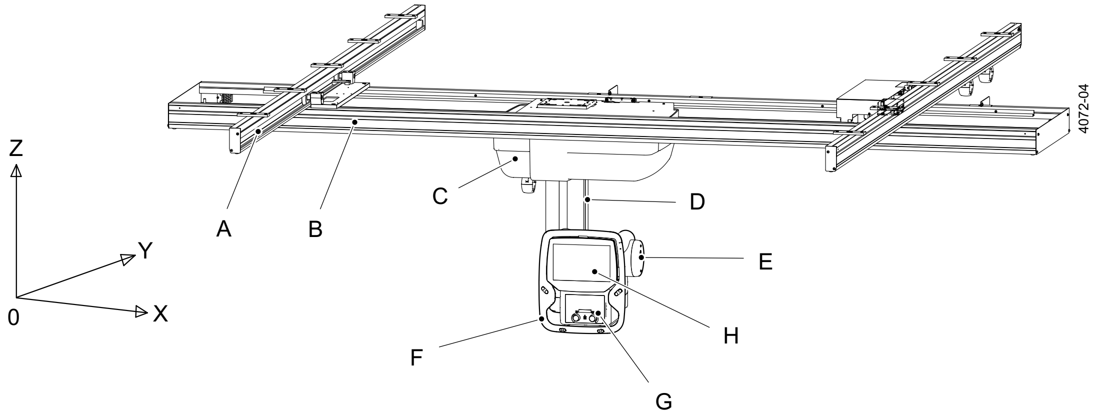


Fig. 1-3 Overhead Tube Crane

A Ceiling rail Y
B Traverse X
C Ceiling wagon
D Column (Z)
E X-ray tube
F Maneuver handle
G Collimator
H Display

1.3.6 Table Overview

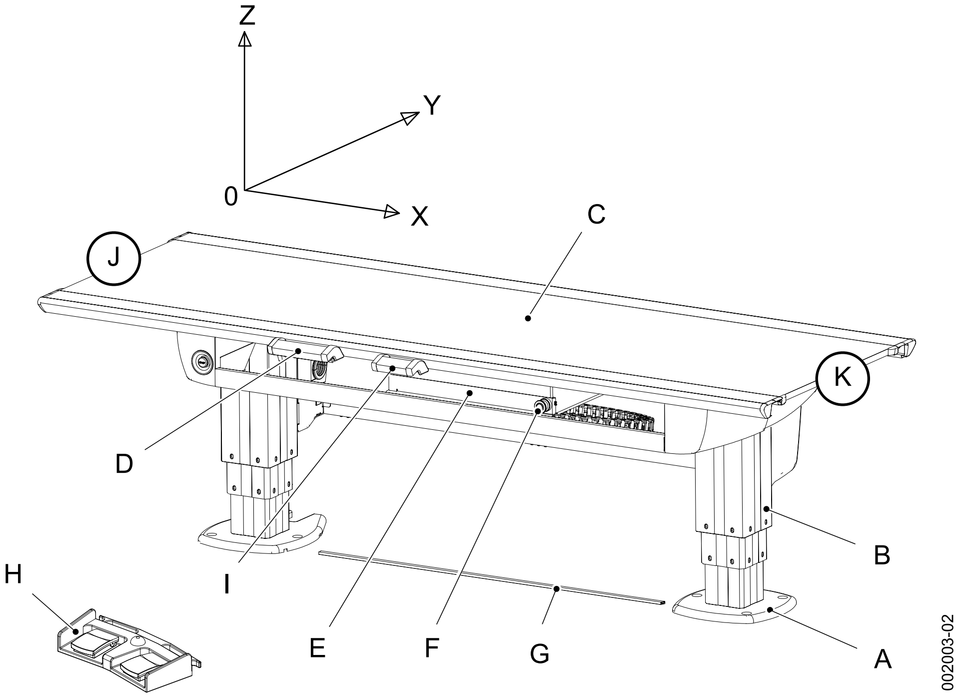


Fig. 1-4 Table overview

A Foot plate
B Column
C Table top
D Table hand control (X/Y/Z, Ceiling tube pendulum movement)
E Detector holder
F Brake release for detector holder
G XY foot control strip type (Option)
H Foot control table top (X/Y/Z) (Option)
I Collimator hand control (option)
J Head end
K Foot end

1.3.7 Wallstand Overview

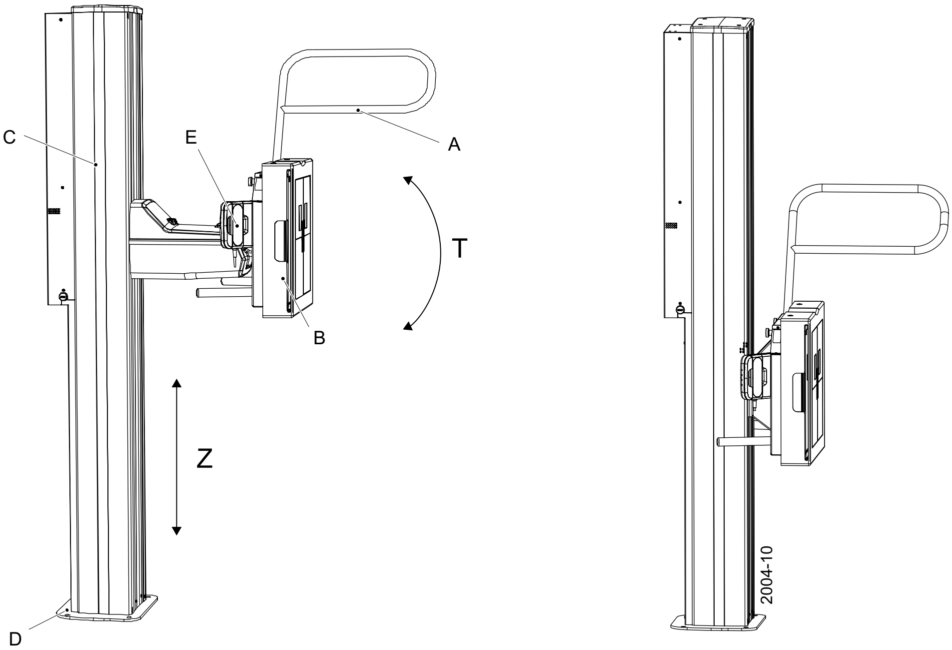


Fig. 1-5 Wallstand overview

Wallstand with tilt option

T= Tilt

A. *Lateral armrest*
B. *Detector holder*
C. *Column*
D. *Foot plate*

With non-tilt detector (standard)

E. *Hand control (Collimator and movement adjustments)*

2 Safety

2.1 Compliance

External equipment intended for connection to signal input, signal output or other connectors shall comply with the relevant product standard e.g. IEC 60950–1 for IT equipment and the IEC 60601–series for medical electrical equipment.

In addition, all such combinations – systems – shall comply with the safety requirements stated in the general standard IEC 60601–1, edition 3.1, clause 16. Any equipment not complying with the leakage current requirements in IEC 60601–1 shall be kept outside the patient environment, i.e. at least 1.5 m from the patient support.

Any person who connects external equipment to signal input, signal output or other connectors has formed a system and is therefore responsible for the system to comply with the requirements.

If in doubt, contact qualified medical technician or your local representative.

If external equipment is connected, an isolation device is needed to isolate the equipment located outside the patient environment from the equipment located inside the patient environment. In particular such a separation device is required when a network connection is made. The requirements on the separation device is defined in IEC 60601–1, edition 3.1, clause 16.

2.2 Precautions, Safety

WARNING!

No modification of this equipment is allowed.

WARNING!

The equipment is intended for use in radiographic examinations under the guidance of trained health care professionals. Operating personnel must be familiar with the equipment and the instructions given in this manual before using the equipment.

WARNING!

Safety devices must not be removed or modified. Any modification or removal will immediately impair the safety.

WARNING!

All motorized movements shall be supervised by trained personnel.

WARNING!

Only medical-approved products shall be in the X-ray room.

Risk of electric shock to patient or user.

- ***No non-medical electrical devices shall be used in the x-ray room.***
- ***Note that the monitor and the PC for the Image system, are non-medical approved products.***

WARNING!

Risk of electrical hazard or damage to the system.

- ***Before cleaning or disinfection, switch off the system to prevent electric shocks, for exceptions see section 6, Operation Manual 1000-095-071.***
- ***Do not spray or pour cleaning liquid on any part of the system.***

  Use a lint-free cloth moistened with a moderate amount of liquid to avoid that cleaning liquids seep into the openings of the system, e.g., air openings, gaps between covers.
- ***Do not restart the system if cleaning liquids have leaked in.***

CAUTION!

Do not use any flammable or explosive gases near the device.

CAUTION!

Before using this device, read the manuals supplied with the devices in order to understand functions, operation, and performance. Follow the manuals for correct procedures.

CAUTION!

Before using the device again after a longer period of time, check the correct operation of the system.

CAUTION!

The system is provided with air intakes and outlets to prevent the equipment from overheating. Do not block these air intakes and outlets.

CAUTION!

Handle loose objects with care, so they will not fall down on patient or at the surrounding articles.

CAUTION!

When using this device, be sure to observe the installation environment requirements regarding temperature, humidity, and power rating conditions, or restriction of use near a device generating strong magnetic or electromagnetic waves.

CAUTION!

The installation environment and location, device configuration, network, power supply, and other conditions are optimized for this device. If you want to change any condition, contact your nearest service representative. Otherwise, the functions and performance of this device may be impaired.

CAUTION!

No objects shall be positioned within the working area. If necessary, they must be removable.

CAUTION!

Do not put liquids, or foreign objects such as pins and clips into the equipment.

Otherwise, fires, electric shocks, or malfunctions may result.

Turn OFF the power source breaker immediately and unplug the equipment if any foreign objects have fallen into the equipment. Contact your nearest service representative.

Never disassemble the device.

CAUTION!

The display must not be used for diagnostic purposes.

CAUTION!

When references are made to a sub-manual, always make sure to read the Safety Chapter, Warnings and Cautions carefully in both the System Manual and the sub-manuals.

CAUTION!

Federal law restricts this device to be sold by or on the order of a physician. (US market only.)

Note!

Radio interference standard Federal Communications Commission (FCC) Part 15 Class B applies to this equipment.

Note!

The equipment may only be used as intended.

2.3 Qualifications of Personnel

CAUTION!

This equipment is intended for use in radiographic examinations under the guidance of trained health care professionals.

2.3.1 Operating Personnel

WARNING!

Failure to follow the instructions given in this Manual could result in serious injury to the service person, patient and operator.

Before using the system it is required that the operating personnel is thoroughly familiar with the system and its operating instructions, in particular:

- Safety
- Function and Safety Checks

Note!

It is the responsibility of the owner to ensure that the system is operated only by trained radiologist, service technicians or product specialists.

2.3.2 Service Personnel

WARNING!

Before working with service and maintenance, always turn off the power and make sure to lock it, so it cannot be mistakenly turned on.

The equipment shall be serviced only by service technicians who:

- are completely familiar with the System
- have read and understood *Operator's Manual* and *Installation and Service Manual*.
- know how to remove power to the unit in case of an emergency
- are trained in the use of equipment and procedures of this type.

Note!

It is the responsibility of the owner to ensure that the technicians have the correct training and knowledge to perform service and maintenance.

2.4 Service and Maintenance

WARNING!

Risk of electrical shock.

If covers are removed, live parts are exposed.

WARNING!

When service or maintenance is to be performed, the service technician shall lock the equipment from all energy sources.

There are live parts for some time after having switched off the mains.

Always wait at least 15 seconds before working on the System.

WARNING!

The equipment must not be serviced or maintained while in use with the patient.

- ***Risk for personal injury.***

Service and maintenance shall only be performed when no patient is present.

The equipment must be checked according to the **8 Function And Safety Checks** *Function And Safety Checks* in the Operation Manual to maintain reliability and serviceability, and to ensure the safety of the patients, the operator, and third parties.

If national rules or regulations specify more frequent checks and/or maintenance, such regulations must be observed.

2.5 Installation and Repair

WARNING!

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

CAUTION!

Only service technicians are allowed to open the covers.

CAUTION!

Do not remove, disassemble, change, modify, repair, or add any part.

CAUTION!

When installing this equipment in a different location, contact the manufacturer or the designated dealer.

Note!

For exchange of the collimator light field lamp, see the Collimator manual.

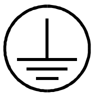
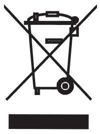
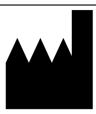
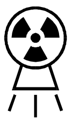
Modifications of, or additions to, the system must be made in accordance with the legal regulations and generally accepted engineering standards.

The manufacturer cannot assume responsibility for the safety features and for the reliability and performance of the equipment, if:

- installation of equipment expansions or modification are not approved by the manufacturer.
- installation of equipment expansions or modification are not carried out by persons authorized by the manufacturer.
- components are not replaced by original spare parts in case of a malfunction.
- the electrical installation of the room concerned does not meet the requirements or the corresponding national regulations.
- the system is not used in accordance with the operating instructions.

2.6 Safety and Warning Symbols

The following symbols are used for the system.

	Attention consult accompanying documents.
	To signify a general warning. This symbol is used in various places throughout the Manual where special precaution shall be observed.
	Type B applied part.
	Protective earth terminal.
	Earth terminal.
N	Connection point for the neutral conductor on permanently installed equipment.
	Squeezing hazard.
	This symbol indicates compliance of the equipment with Directive 93/42/EEC.
	Separate collection for electrical and electronic equipment.
	Manufacturer
	Date of manufacture
	To indicate the emission or the imminent emission of X-radiation.
	Marking on the emergency stop button. Activation of the actuator interrupts all mechanical movements and prohibits exposures.

2.7 Safety and Warning Labels on the Equipment

The figure shows the location of the safety and warning labels.

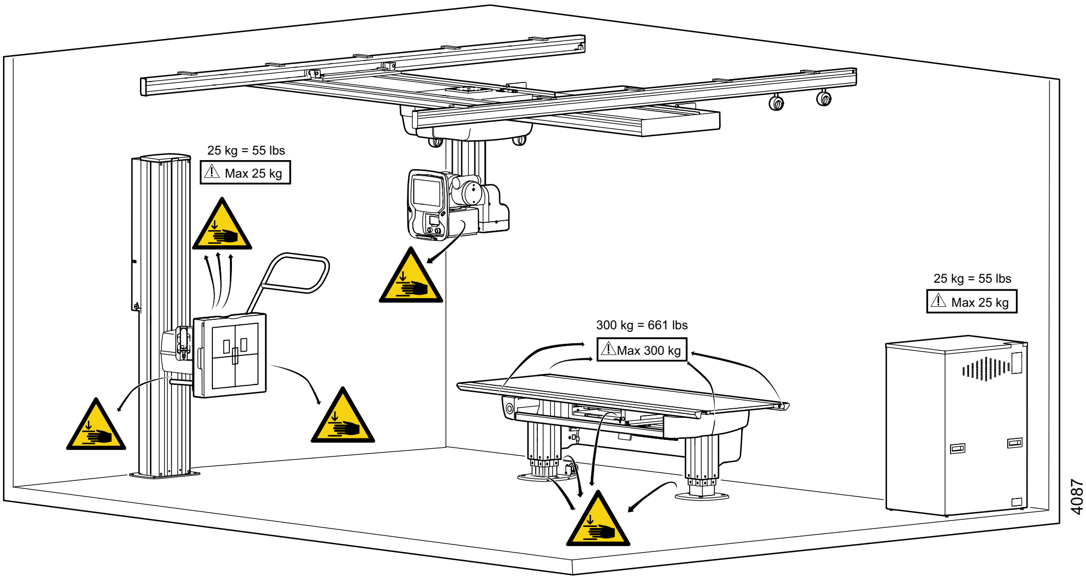


Fig. 2-1 Locations of safety and warning labels

2.8 Applied Parts

Applied parts are intended for the patient to touch.

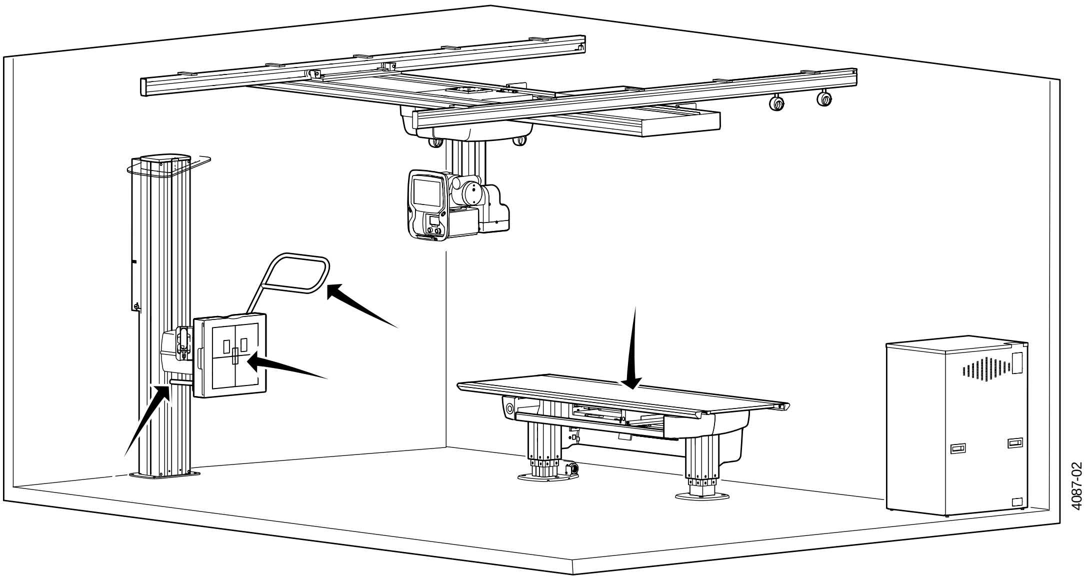


Fig. 2-2 Applied parts, System

2.9 Essential Performance and Basic Safety

The essential performance of the system is defined in the particular standard 60601-2-54, clause 201.4

- Accuracy of LOADING FACTORS
- Reproducibility of the RADIATION output
- AUTOMATIC CONTROL SYSTEM
- Imaging performance

These Essential Performances summarize together the functions necessary to obtain the Radiographic Image.

The equipment shall maintain basic safety while performing normal operations. The following degradations associated with basic safety shall not be allowed:

- Initiation of an unintended **non user initiated** motorized movement.
- Initiation and performing a **non user initiated** x-ray exposure.
- A **non user initiated** change of any loading parameter.

The equipment may exhibit temporally functional degradation of performance that does not affect essential performance or basic safety. Examples of such temporally functional degradation “degradation can be:

- Error or warning messages warning for a state that does not affect essential performance or basic safety.
- The system can prevent a **user initiated** xray exposure to start if an error is detected that can affect essential performance or basic safety.
- A termination of a **user generated** motorized movement.

2.10 Emergency Stop

Note!

It is recommended to train the operator regularly in the use of the emergency stop function so the operator feels confident in using it.

The System has six internal emergency stops; one connected to the overhead tube crane and one on the servo button, one on each side of the table (at the head end) and two on the wallstand.

Pressing one of the emergency stop buttons immediately cuts the power to all motorized movements. The emergency stop is also connected to the generator. The emergency stop prevents a new exposure and terminates an ongoing exposure.

A system message is displayed on the overhead tube crane display when the button is activated.

To reset the emergency stop position, turn the emergency stop button clockwise. The button is released and the system is ready for use again.

When the emergency stop is activated, lift the overhead tube crane up and push or pull sideways to change the position of the tube/collimator manually.

There are additional external emergency stops as option.

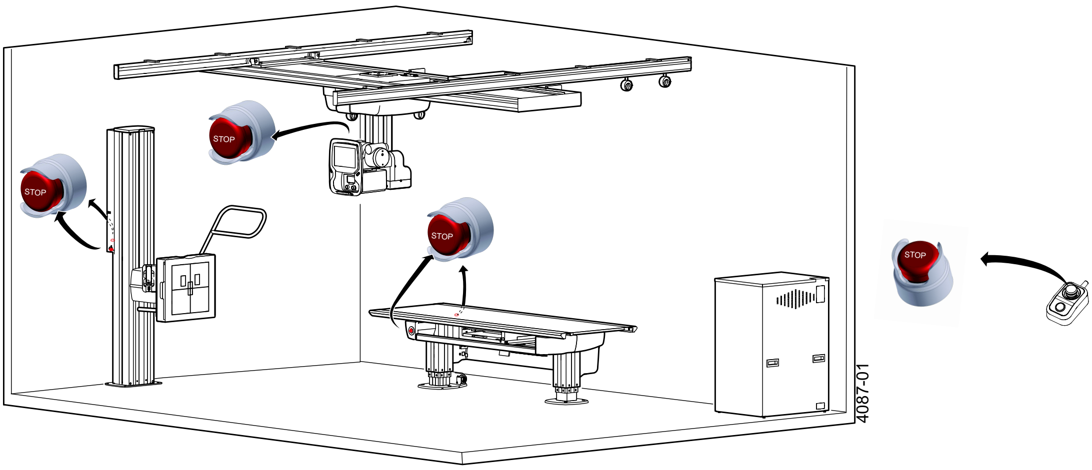


Fig. 2-3 Emergency stop buttons

2.11 Radiation and X-Ray Tube

WARNING!

The patients, the operators and third parties must be protected against unnecessary X-ray radiation according to the local regulations.

WARNING!

The surfaces on the collimator and the X-ray tube can be warm.

The X-ray tube may be up to 85 °C, the collimator will not reach 60 °C.

WARNING!

Verify that correct collimator filter is used during exposure.

CAUTION!

To minimize the X-ray dose, keep the distance between the focal spot and patient as large as possible.

The beam size should be as small as possible.

Note!

Audio and visual communication must be possible between the operator and the patient when exposure is performed.

Note!

The X-ray beam should not be outside the boundaries of the detector holder.

2.11.1 Radiation Protection

Because of the ionizing nature of x-ray radiation, precautions have to be taken to minimize the harmful effects to patients and operators/staff during exposures. The aim is to achieve dose levels “as low as reasonable achievable”. National regulatory dose limitation requirements have to be followed.

Following four main factors control the amount (dose) of radiation received from a source:

Patient and operator dose:

Loading factors: Reducing the loading factors reduces the effective dose proportionally. Lower values will give more noise in the image.

Distance: Increasing the distance reduces dose levels according to the inverse square law.

Beam size: Keep the beam size as small as possible.

Shielding: Whenever possible/necessary protective shielding should be used to limit dose levels.

2.11.1.1 Protection Against Primary Radiation (Patient)

Following measures should to be taken to limit patient dose.

- Observe national dose limit regulations.
- Exposure parameters (time/mA) should be set as low as possible with an acceptable image noise level.
- Set focus to skin distance as large as possible.
- Always collimate the exposure field to the area of interest. This will both decrease the dose level and improve the image quality (less scattered radiation).
- If possible/necessary use protective shielding.

2.11.1.2 Protection Against Secondary Radiation

As the patient is the most significant source of scattered radiation during an x-ray exam, the staff and/or operator will unavoidable be exposed to ionizing radiation when inside the x-ray room during an exposure. Radiation doses from scattered radiation can be significantly high. The following safety measures should be taken to minimize scattered radiation to the staff.

- Increase the distance to the central beam to reduce dose levels according to the inverse square law.
- Use protective clothing, e.g. lead apron.
- Set the exposure parameters (time/mA) as low as possible.
- Use high kV and low mA to produce less scatter.
- Collimate the exposure field to the area of interest.
- Add collimator filter to reduce the scatter.
- Compression of patient.

Profile of Stray Radiation For Table

The diagram below, **Fig. 2-4**, shows the dependency of the scattered radiation on the distance from the central beam, height above the floor and kV potential. The decrease of the scattered radiation is expressed in percent of the central beam exposure rate (100%). The diagram also shows the decrease of scattered radiation when using protective clothing, also this expressed in percent of the central beam dose rate.

Fig. 2-4, shows that a higher kV increases the scattered radiation slightly. The diagram also shows that the best way to minimize the effect of the scattered radiation is an increased distance to the patient and by using a lead apron.

Central beam exposure parameters used:

KVP: 70, 100, 120 kV

Tube current: 100 mA

Exposure time: 100 ms

Field size: 43x43 cm

Film-Focus distance: 1 m

Patient simulation: 150 mm PMMA

Filter: 0 mm

Central beam dose rate measured on top of PMMA (750 mm from focus).

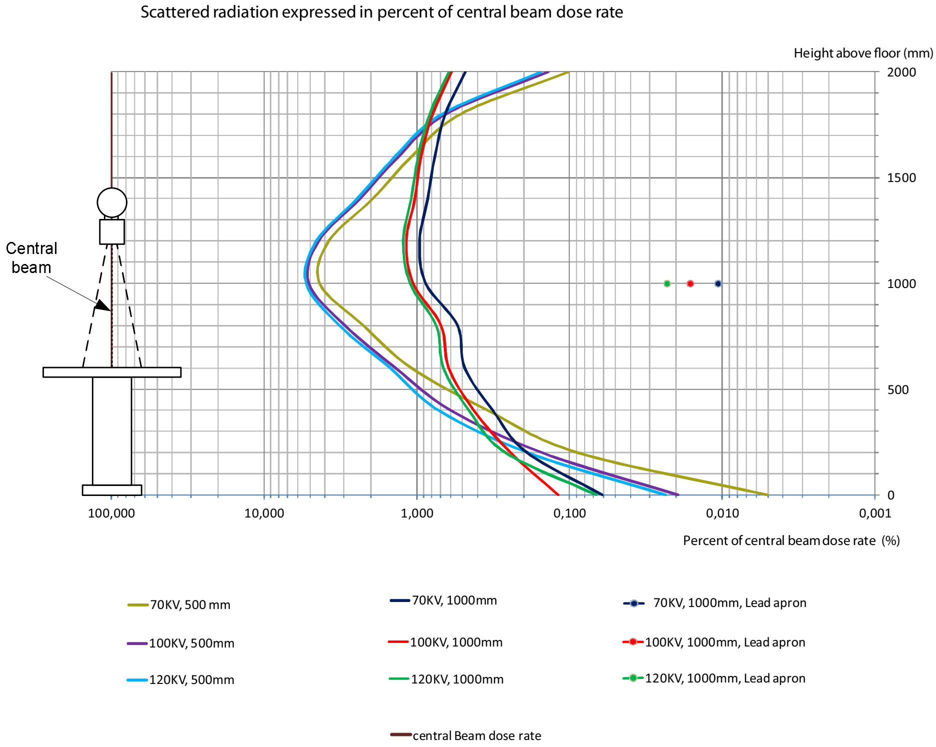


Fig. 2-4 Scattered radiation rate expressed in percent of central beam dose rate, with and without shielding

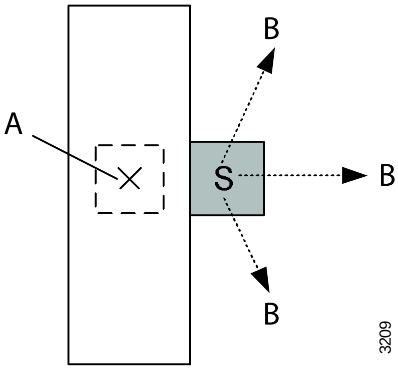


Fig. 2-5 S = Significant zone of occupancy

A Central beam
B Decreasing

Fig. 2-5 shows a top view of the table and the zone of occupancy, where the arrows B show the direction of decreasing scatter radiation levels.

Profile of Stray Radiation For Wallstand

The diagram below, **Fig. 2-6**, shows the dependency of the scattered radiation on the distance from the central beam, height above the floor and kV potential. The decrease of the scattered radiation is expressed in percent of the central beam exposure rate (100%). The diagram also shows the decrease of scattered radiation when using protective clothing, also this expressed in percent of the central beam dose rate.

Fig. 2-6 shows that a higher kV increases the scattered radiation slightly. The diagram also shows that the best way to minimize the effect of the scattered radiation is with an increased distance to the patient and by using a lead apron.

Central beam exposure parameters:

KVP: 70, 100, 120 kV

Tube current: 100 mA

Exposure time: 100 ms

Field size: 40x40 cm

Film-Focus distance: 1,5 m

Patient simulation: 150 mm PMMA

Filter: 0 mm

Central beam dose rate measured on top of PMMA (1250 mm from focus)

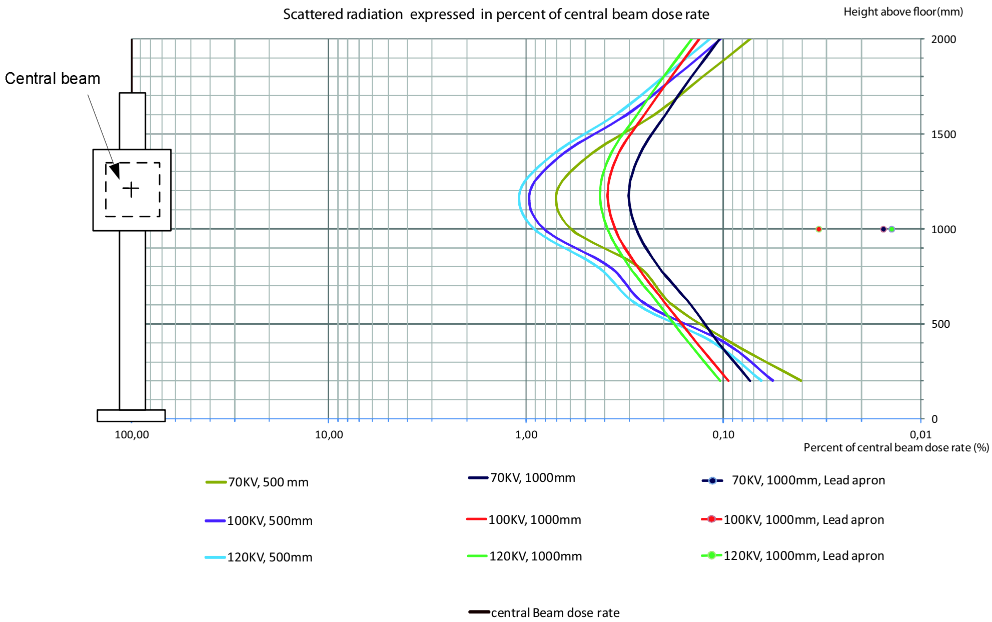


Fig. 2-6 Scattered radiation rate expressed in percent of central beam dose rate, with and without shielding

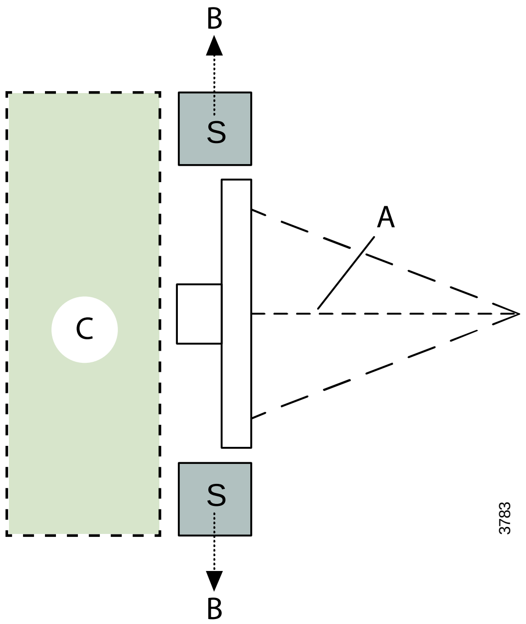


Fig. 2-7 S = Significant zone of occupancy

A Central beam
B Decreasing
C Residual radiation area

Fig. 2-7 shows a top view of the wallstand and the zone of occupancy, where the arrows B show the direction of decreasing scatter radiation levels.

2.11.1.3 Protection Against Residual Radiation

The remaining part of the X-ray beam after having passed the plane of the image reception area (detector and detector holder) can be significantly high. Never stand behind the wallstand during an exposure, see **Fig. 2-7**.

2.12 Mechanical Safety

2.12.1 General

WARNING!

All motorized movements shall be supervised by trained personnel.

WARNING!

Tracking shall be supervised by trained personnel.

WARNING!

Wheelchair patients shall always be placed outside the working area, when operating any motorized movement.

Note!

Surrounding equipment is not subject of the collision warning.

It is the operator's duty, before any movements are activated, to ensure that any danger to the patient and/or third person is prevented.

2.12.2 Overhead Tube Crane

WARNING!

Squeezing hazard between the wallstand and the table.

The operator should be beside the patient for support to avoid any risk of injury when handling the overhead tube crane.

WARNING!

Squeezing hazard can occur between column segments and beta rotational assembly interface.

WARNING!

Squeezing hazard can occur between the column and the plastic corner around the alpha movement.

WARNING!

Squeezing hazard can occur between support arm and high tension cable inlet to the tube.

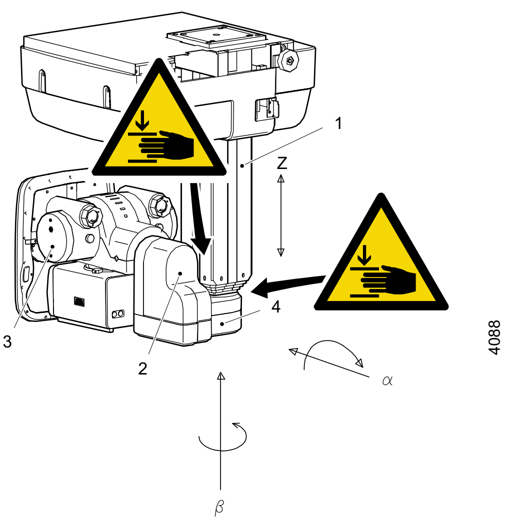


Fig. 2-8 Overhead tube crane, mechanical safety

Possible squeezing hazard areas and placement of warning label:

Squeezing hazard can occur between the:

- Column (**1**) and the column bottom plate (**4**) when the column is moving upward (Z-direction).
- Cover (**2**) and the column (**Z**) when the X-ray tube (**3**) is moving in beta (**β**) direction.

1. Column (Z)
2. Cover
3. X-ray tube
4. Column bottom plate

2.12.3 Cabinet

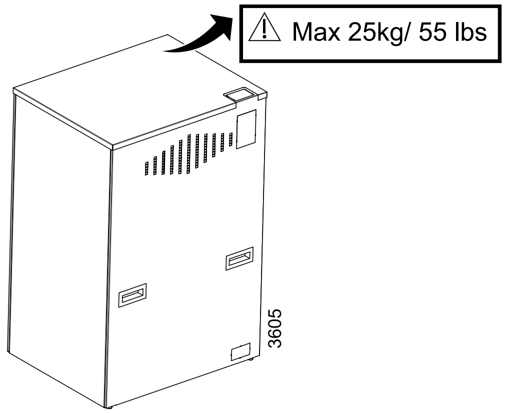


Fig. 2-9 Placement of warning and safety label.

Cabinet, mechanical safety

Max 25 kg/ 55 lbs

2.12.4 Table

WARNING!

Squeezing hazard can occur between the:

- ***table top (1) and the top of the imaging unit (4); when the table top (1) is in the outer position (Y-direction) or moving in a longitudinal direction (X-direction).***
- ***table top (1) and the imaging unit rail (6); when the table top (1) is in the outer position (Y-direction).***
- ***imaging unit (4) and the cover (5); when the imaging unit is moving in a longitudinal direction (X-direction).***
- ***column (7) and the footplate (8); when the column (7) is moving downwards (Z-direction).***
- ***cover (2) and the column cover foot (3); when the column (7) is moving downwards (Z-direction).***

Possible squeezing hazard areas and placement of warning labels:

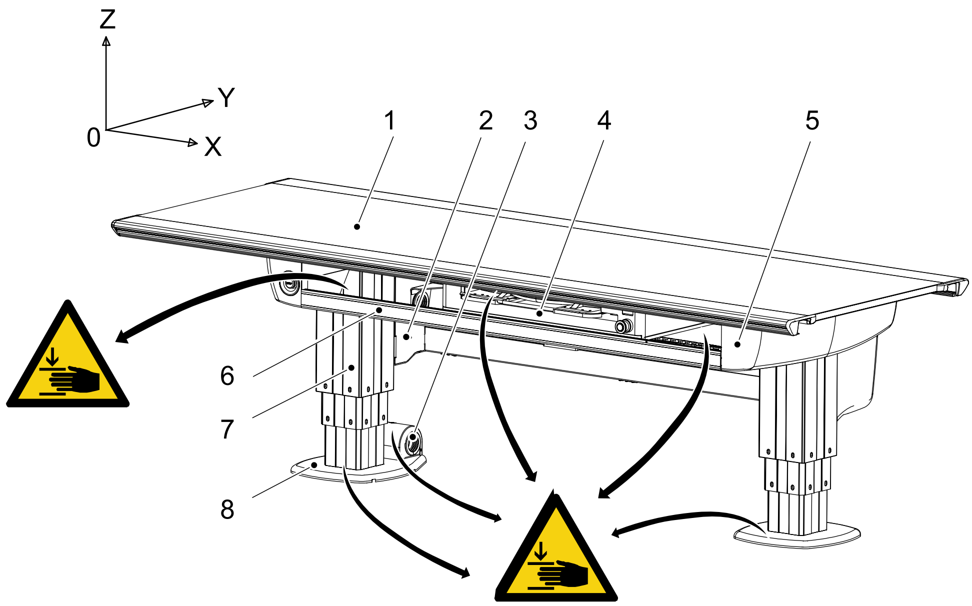


Fig. 2-10 Squeeze hazard

1. *Table top (X/Y/Z)*
2. *Cover*
3. *Column cover foot*
4. *Imaging unit (X)*
5. *Cover*
6. *Imaging unit rail*
7. *Column (Z)*
8. *Footplate*

2.12.4.1 Safety Issues When Positioning a Patient

WARNING!

Be aware of unwanted motion when releasing the brakes.

WARNING!

Risk of injury during transfer of the patient between the hospital bed and the table.

The hospital bed shall be placed in direct contact with and at the same height as the table.

The table top shall be locked.

WARNING!

Risk of squeezing hazards.

The patients shall always have their extremities placed over the table top.

Note!

Do not lean against the floating table top.

WARNING!

Wheelchair patients shall always be placed outside the working area, when operating any motorized movement.

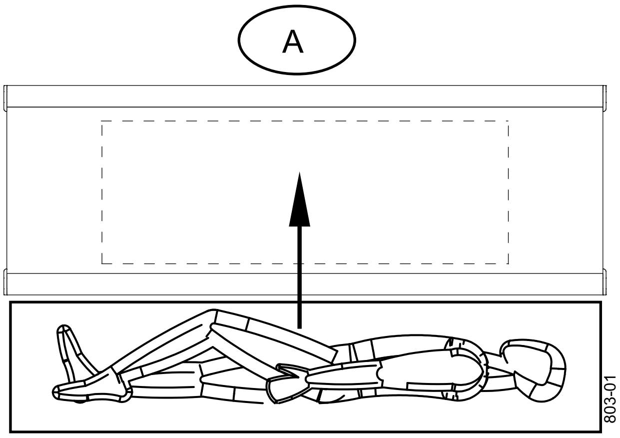


Fig. 2-11 Transfer patient to table by operator A

Lock and center the table top when transferring the patient to the table.

The hospital bed shall always be placed in direct contact and in the same height as the table.

To reduce the lateral forces on the table the operator should be placed on the opposite longitudinal side of the patient and the hospital bed. The operator (**A**) should drag the mattress with the patient from the hospital bed to the table.

Patient Weight Restrictions

The following figures show the maximum load at different positions of the table.

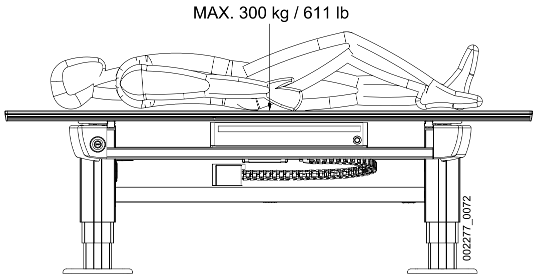


Fig. 2-12 Table top centered

Table top centered over the table frame

- Maximum load of a patient lying or sitting
  - 300 kg, see **Fig. 2-12**.

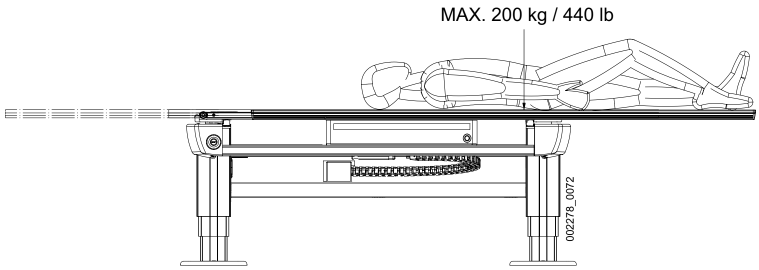


Fig. 2-13 Table top outside table frame

Table top positioned outside the table frame

- Maximum load of a patient lying on the table top:
  - 200 kg, see **Fig. 2-13**.
- Maximum load of at patient sitting on the table top:
  - 150 kg.

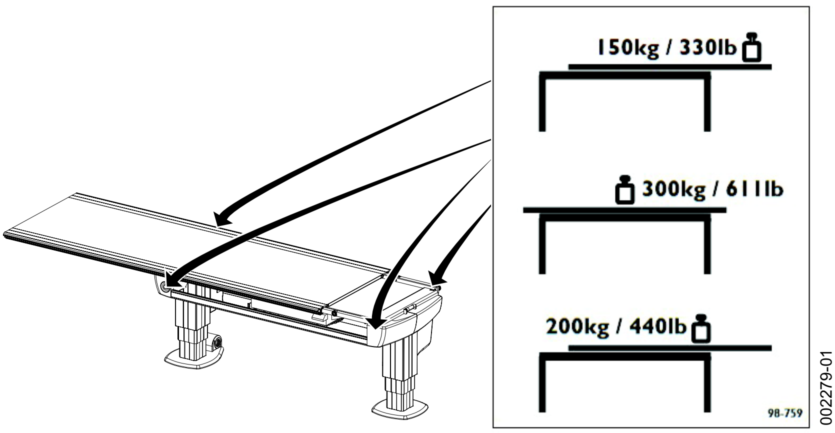


Fig. 2-14 Maximum patient weight label

The table frame is marked on the upper side with the maximum weight when positioning in outer positions, see **Fig. 2-14**.

2.12.4.2 Working Area, Table

WARNING!

Risk of squeezing hazard.

Patients shall be outside the working area or placed on the table, when operating any motorized movement.

WARNING!

Risk of squeezing hazard.

All obstacles placed within the working area, must be moveable for easy patient release.

CAUTION!

To avoid any injuries to patient, user or damage to system, peripherals should always be placed outside the working area.

The working area comprises the table top including the stroke length of the table top in the X- and Y-direction. The measurements in the figure show the length of stroke in the X- and Y-direction. The dimensions have some tolerances and can differ from the manufacturer’s.

Two Column Table

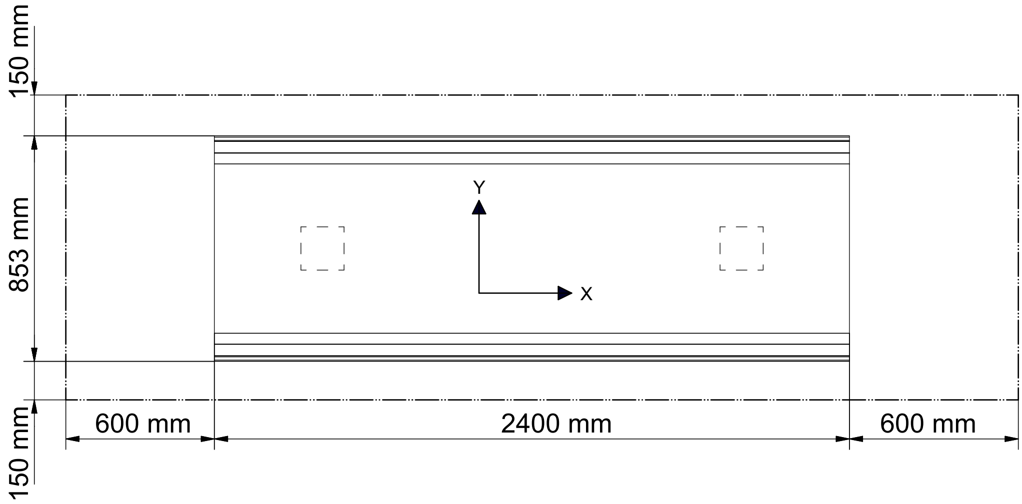


Fig. 2-15 Table top stroke length

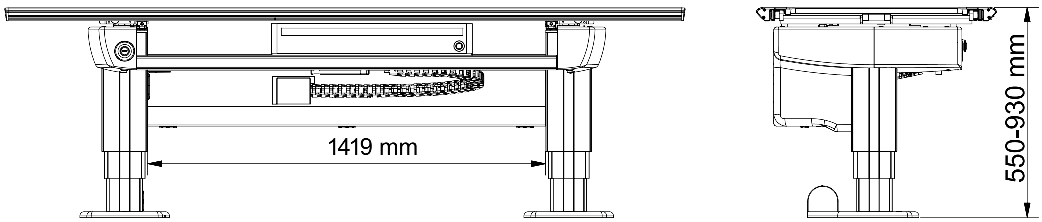


Fig. 2-16 Working area underneath table

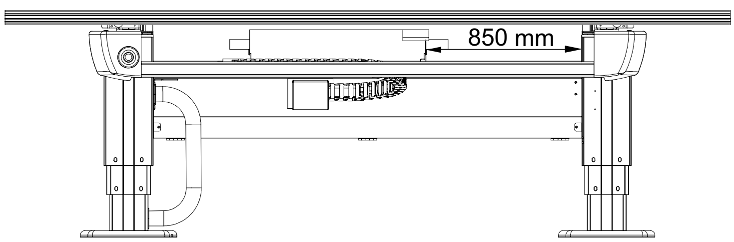


Fig. 2-17 Detector movement

The detector movement is up to 850 mm, depending on detector type.

2.12.5 Wallstand

2.12.5.1 Safety Issues When Positioning Patient

WARNING!

Be aware of unwanted motion when releasing the brakes.

Note!

Maximum weight on the wallstand lateral armrest is 25 kg/ 55 lbs.

2.12.5.2 Working Area, Wallstand

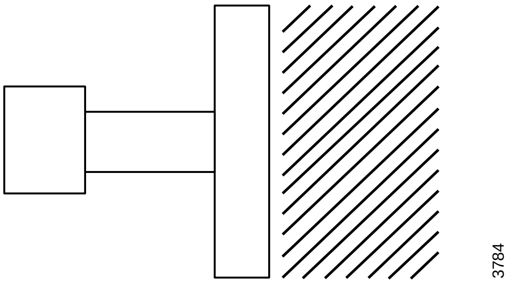


Fig. 2-18 Working area, wallstand

The working area of the wallstand is the area in front of the detector holder.

2.12.5.3 Standard Version

WARNING!

Risk of squeezing between the tilted image receptor holder and the floor.

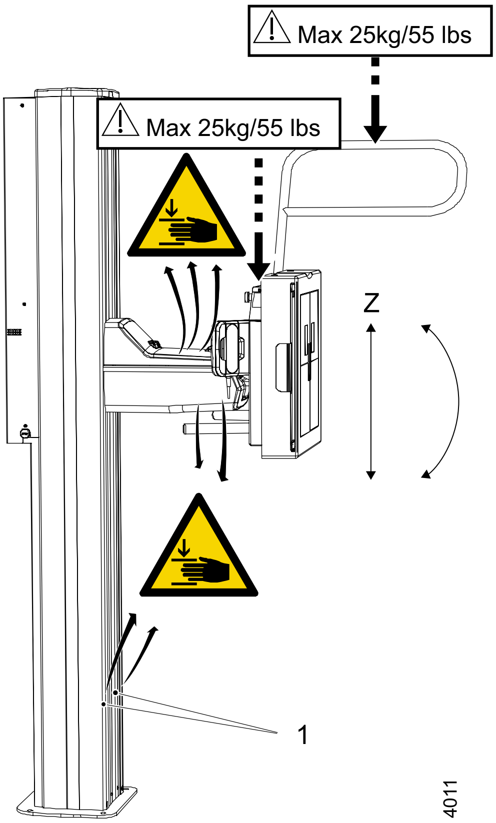


Fig. 2-19 Possible squeeze hazards

1. *Slide opening of detector wagon*

Getting stuck in the slide opening is a squeezing hazard when the detector holder is moving downward (Z-direction).

Possible squeeze hazard areas and placement of warnings and safety labels:

The system is balanced with counterweights and whenever any item is removed from the wallstand it becomes unbalanced. If the brake is released when the wallstand is unbalanced, the detector holder moves and can cause injury.

2.12.5.4 Motorized Wallstand

CAUTION!

Patients shall be outside the working area when operating any motorized movement.

2.13 Safety Functions

2.13.1 System

2.13.1.1 Collision detection

Input Check

To secure that the system is operational and fully functional the system performs a self test at start up. The system checks that no inputs are activated during start up. In that case the system takes actions to inhibit the function to be used. If a safety related input, such a switch in the foot control or in the handle is active, the system stops sending the watchdog signal to the trig relay and the power to the motor is cut.

Motorized Movements

Motorized movements are performed using a PID-controller with position feed-back. An absolute encoder or a potentiometer or both a potentiometer and a quadrature encoder may be used as position transducer. The speed of the movement follows a trapezoid shaped curve.

The movement is stopped when a collision or a faulty position transducer is detected. A collision is detected if the control error is too large. The control error is defined as the difference between the set point and the actual position. The set point is given by the ramp generation and the actual position is given from the position transducer. The maximum allowed difference is set by a parameter.

Z Column

A guard plate, installed on top of the column, registers vertical pressure on the column, for instance a vertical impact.

When the pressure exceeds the trig level vertically, all movements are stopped and a warning message is displayed. To release the pressure, a movement in the opposite direction is allowed. When the pressure on the column has returned to normal, see **Fig. 2-20**, the warning message is removed and motorized movements are allowed again.

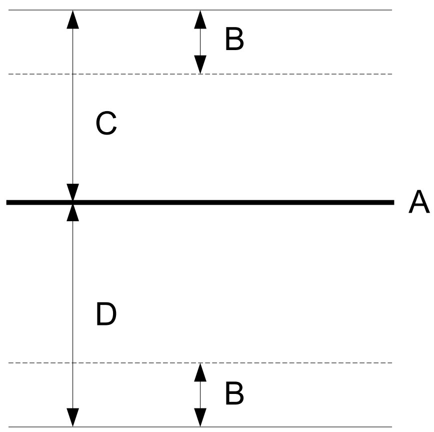


Fig. 2-20 Collision detection

A Zero force level
B Hysteresis
C Upper trig level
D Lower trig level

Note!

In some situations it is possible to force a false detection of a collision. This can occur if the column is affected by a pressure at the time the movement starts. This could be for example the case if the collimator rests on the Table, when the operator moves the column upward, a collision is detected.

The reason for the collision detection is that, when the movement starts, the zero force level is calculated based on the actual pressure affecting the column at that moment. As soon as the movement starts and the collimator is no longer resting on the Table, the guard plate catch a change in pressure and a collision is detected.

To solve the problem the operator must affect pressure on the column, for example manually pull the column up or down. The System will take this as a sign that the operator has removed the obstacle and that no collision exists any more. If the problem is yet not solved, the System must be restarted.

Motor Node

Every motor node has a collision detection on their own movements. A collision can be detected in different ways, for instance, if:

- The control error in the motor node’s regulator is too large.
- The final position is not reached in time.
- The position transducer has not moved although the drive unit has had an output voltage for a given time.

  A detected collision makes the stand stop all movements and display an error message.

Quick Abortion of an Auto Positioning

When any of the buttons on the stand is pressed while the stand is moving toward its position, it has the same effect as when the servo button is released, all movements are stopped.

Opposite Buttons Pressed

If, at any time, two from each other opposite buttons are pressed, for example movements up and down, the movement is stopped. Both buttons must be released before any movement is allowed.

2.13.1.2 Malfunctioning Node

If any node stops functioning, all movements are stopped and the power to the motors in the System is removed.

2.13.1.3 Dead Man’s Grip

All movements require constant activation of the chosen button.

If the operator releases one of the buttons/controls, the system will immediately stop or engage the brakes (manual movements). The exposure operator console has the same functionality.

2.13.1.4 Watchdog

One important issue for the safety in the system is the node error handling e.g. transmission error, software error or irregular behaviour of a node. The system is built to prevent an uncontrolled movement.

The design relies on two different constructions to have a safe communication and safe error handling.

The first is the CAN bus itself. The CAN bus is a highly reliable bus, which take care of transmission errors and retransmissions on corrupted messages. If a message is sent and no errors are reported it is presumed to be guaranteed that the message is transferred and received correctly in all receiving nodes.

The other design is the watchdog handling between nodes. As soon as two nodes start to communicate with each other, each node must send a watchdog message to the other node within a defined time. If the message is not received within the time frame, the state for the node is then considered as disconnected.

With help of the above described constructions it is guaranteed, with a reasonable safety, that every message is transferred and received by the receiving node. If a message is not received or a node is removed it will be detected and measures will be taken.

A transmission error on the CAN bus will put the system in an ERROR state.

A missing watchdog message from a node on the internal bus will put the system in an ERROR state.

A missing watchdog from a node will stop all motors.

The watchdog mechanism is also used for inhibiting uncommanded movements in case of software failure in the master node. The master node continuously sends a watchdog command (signal) to a trig relay (time relay). If the relay does not receive the signal within a defined time, the power (36 V) to the drivers will be cut.

Note!

It is only the 36 V that is blocked, i.e. the logic (24 V) is still live, hence the system as such is still active.

2.13.1.5 PID Controller

The control loop is implemented as a PID-controller with both acceleration and velocity feed forward. The function of the anti-windup is to prevent any increase of the integration part when the driver board limits the output voltage to a value less than the desired output voltage.

2.13.1.6 Two Column Table

Table Top Guard (option)

The table has a collision detection system that protects the table. It activates if a collision is detected and all movement is stopped.

Sensors are placed in each corner of the table frame. The sensors register vertical pressure on the frame, for instance a vertical impact. When the pressure exceeds the trig level in any direction all movements are stopped and the motors are short circuited (the short circuiting of the motors provides a quick and solid stop). To be able to release the pressure, a movement in the opposite direction is allowed. When the pressure has returned to normal, see **Fig. 2-21**, the movement is allowed again. The guard is active during downward and upward movement. A command is sent from the master node when the movement is activated and deactivated. During this period the response on changes of the pressure is received from the sensors. The reason for this design is that by only allowing the guard to be active during movements the temperature deviation is inhibited.

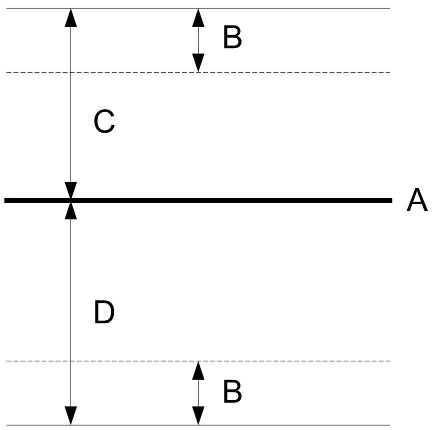


Fig. 2-21 Collision detection

A Zero force level
B Hysteresis
C Upper trig level
D Lower trig level

Table Top Crash Guard

The table top crash guard shall only be primarily used as a safety precaution for the system, but will as well limit the risk of personal injury, although the crash guard does not guarantee patient protection.

To be able to detect a collision, four micro switches are placed between the table and the table top. If the table crashes into an object, the micro switches will stop the movement in the on-going direction, but it will allow the movement in the opposite direction. When the object is removed, the table can move in both directions again.

At power-up, the table will detect if a button is activated, and then disable all movements. If that is the case, switch off the power and remove the obstacle/replace the broken switch.

Ramp Generation

The set point speed of the ramp is generated as an integration of the ramp acceleration (deceleration); the set point position of the ramp is generated as an integration of the ramp speed. The acceleration, deceleration and the maximum speed of the ramp are set as parameters.

The speed of the ramp is increased until the maximum speed is reached. For this increase in speed, the acceleration parameter is used. This is independent of the direction of the acceleration. This maximum speed is maintained until it is time to start the deceleration. This deceleration point is given by the current speed, the rate of the deceleration and the desired final position of the ramp.

The dynamic calculation of the ramp makes it possible to change direction of an active ramp generation. In this case the ramp will first decelerate, using the deceleration value until zero speed is reached, then the acceleration in the other direction will commence.

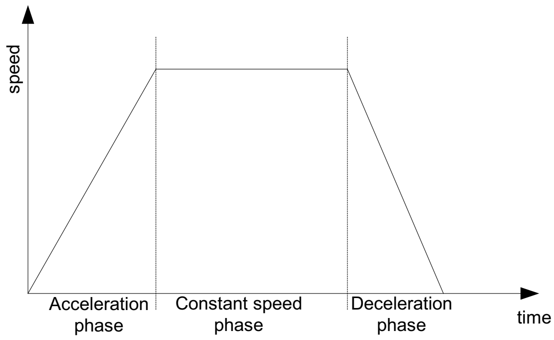


Fig. 2-22 Speed profile of a motorized movement

2.14 Safety Zone, Definition

2.14.1 Table Safety Zone

There is a safety zone over and around the table.

The safety zone reaches from the table top surface and vertical up 500 mm and from the table top edge and horizontal out 120 mm. Inside the zone, the table moves downwards with reduced speed.

WARNING!

When the stand has passed the table top level, on its way downwards, the speed increases to normal speed again.

2.14.2 Two Column Table

There is a squeezing risk when driving the table to a low position.

Within the safety zone, the table moves at a low speed to increase the possibility for the user to react in case of a collision (squeezing). The safety zone appears 120 mm above the floor, according to IEC 60601-1. The safety zone automatically stops the two column table 120 mm above the floor. The user must then activate the foot control again to make the table move farther down.

2.15 Electromagnetic Compatibility (EMC)

The system complies with the requirements of IEC 60601-1-2:2014 regarding electromagnetic compatibility. Surrounding equipment shall follow the standard IEC 60601-1-2:2014.

WARNING!

Do not use this equipment adjacent to or stacked with other equipment.

Such use could lead to improper operation.

Verify that the equipment is operating normally, if such use is necessary.

WARNING!

Do not use other accessories, transducers and cables than those specified or provided by the manufacturer.

Such use could lead to increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

WARNING!

Do not use portable RF communications equipment (including peripherals such as antenna cables and external antennas) closer than 30 cm (12 inches) to any part of the system, including cables specified by the manufacturer.

Such use could lead to degradation of the performance of this equipment.

CAUTION!

Do not place the system near MRI equipment or other equipment that generates a strong magnetic field.

CAUTION!

Mobile telephones and other radiating equipment can interfere with the function of the system and can therefore cause safety hazards.

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

Guidance and manufacturer's declaration - electromagnetic emissions		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The system is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purpose. For information purpose the system complies with IEC61000-3-11 and is suitable for connection to public mains network if the impedance is 0.32 Ohm or lower
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Not applicable	

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

Guidance and manufacturer's declaration - electromagnetic emissions			
Emissions test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Radiated emissions CISPR 16-2-3	30 MHz to 230 MHz: QP 40 230 MHz to 1 GHz: QP 47	30 MHz to 230 MHz: QP 40 230 MHz to 1 GHz: QP 47	
Conducted emissions CISPR 16-2-1	150 kHz to 500 kHz: QP 100+20, average 90 500 kHz to 5 MHz: QP 86+20, average 76 5 MHz to 30 MHz: QP 90+20 (at 5 MHz) decreasing linearly to 73+20 (at 30 MHz) average 80 (at 5 MHz) decreasing linearly to 60 (at 30 MHz)	150 kHz to 500 kHz: QP 100+20, average 90 500 kHz to 5 MHz: QP 86+20, average 76 5 MHz to 30 MHz: QP 90+20 (at 5 MHz) decreasing linearly to 73+20 (at 30 MHz) average 80 (at 5 MHz) decreasing linearly to 60 (at 30 MHz)	
	Note: These limits apply to equipment with a rated power > 20 kVA and intended to be connected to a dedicated power transformer or generator, and which is not connected to low voltage (LV) overhead power lines. 20 dB relaxation for Quasi-Peak (QP) is allowed for Radiography and pulsed Radiography (Intermittent Mode).		

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

Guidance and manufacturer's declaration - electromagnetic immunity			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharger (ESD) IEC 61000-4-2	± 8 kV contact ±15 kV air	± 8 kV contact ± 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines + 1 kV for input/ output lines 100 kHz repetitive frequency	± 2 kV for power supply lines + 1 kV for input/ output lines 100 kHz repetitive frequency	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	1.0 kV 1.2 kV 2.0 kV 0,90, 180, 270 degree phase angle	1.0 kV 1.2 kV 2.0 kV 0,90, 180, 270 degree phase angle	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0.5 cycle (0, 45, 90, 135, 180, 255, 270, and 315 degrees phase angle) <5% U_T (>95% dip in U_T for 1 cycle) 70% (30 % dip in U_T for 25/30 cycles) <5 % U_T (>95 % voltage dip in U_T for 250/300 cycles)	<5 % U_T (>95 % dip in U_T) for 0.5 cycle (0, 45, 90, 135, 180, 255, 270, and 315 degrees phase angle) <5% U_T (>95% dip in U_T for 1 cycle) 70% (30 % dip in U_T for 25/30 cycles) <5 % U_T (>95 % voltage dip in U_T for 250/300 cycles)	Mains power quality should be that of a typical commercial or hospital environment. If the user of the system requires continued operation during power mains interruptions, it is recommended that the system should be powered from an uninterrupted power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Guidance and manufacturer's declaration - electromagnetic immunity			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Note! *U_T is the AC mains voltage prior to application of the test level.*			
			Portable and mobile RF communications equipment should be used no closer to any part of the system, including cables, than the recommended separation distance, calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance:
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms (ISM and amateur radio bands)	3 Vrms 150 kHz to 80 MHz 6 Vrms (ISM and amateur radio bands)	$d = 1.2 \sqrt{p}$
Radiated RF IEC 61000-4-3	3 V/m 10 V/m 80 MHz to 2.7 GHz	3 V/m 10 V/m 80 MHz to 2.7 GHz	$d = 1.2 \sqrt{p}$ 80 MHz to 800 MHz $d = 2.3 \sqrt{p}$ 800 MHz to 2.7 GHz where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m).
Proximity field from wireless transmitters 61000-4-3	9 V/m to 28 V/m 15 specific frequencies	9 V/m to 28 V/m 15 specific frequencies	
			Interference may occur in the vicinity of equipment marked with the following symbol: 
Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

Recommended separation distances between portable and mobile RF communications equipment and system			
The system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the system as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter**		
	150 kHz to 80 MHz $d = 1.17 \sqrt{p}$	80 MHz to 800 MHz $d = 0.35 \sqrt{p}$	800 MHz to 2.7 GHz $d = 0.7 \sqrt{p}$
0.01	0.12	0.04	0.07
0.1	0.37	0.11	0.22
1	1.17	0.35	0.7
10	3.69	1.11	2.21
100	11.67	3.5	7
For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *p* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption as reflection from structures, objects and people.			

3 Theory of Operation

3.1 User Interface Description

The system is operated from the user interface controls, inside the examination room and from the operating room.

The exposure controls are placed in the operating room whereas the positioning controls are placed in the examination room (lab). The basic idea is that the functions shall be operated from the position where they are needed, which will enhance the workflow and increase the efficiency.

All position controls use a continuous activation technique which basically means that the operator must press and hold the key to activate the function. On release, the function will be deactivated. An extra external servo button can be ordered for the operation room.

3.2 Basic Concepts

System 1000 is built with a number of separate subsystems, acting as individual units in the System.

The different subsystems are:

- High voltage generator

  Responsible for the emission of X-rays.
- Cabinet

  The interface between the image system and the generator
- Overhead tube crane, OTC

  Responsible for handling of the X-ray tube ceiling support. Important functions for this subsystem are, moving Z up/down, X, Y, Alpha and Beta, tracking of table and wallstand, and as a last function to inform the user about system status.
- Wallstand

  Responsible for holding the detector for chest examinations. Also possible to move the detector in Z and tilt direction.
- Table

  Holding the detector, support patient. Moving the table up/down, detector and handling of a brake for the table top.
- Image system

3.3 Overhead Tube Crane

3.3.1 General User Interface

The controls of the overhead tube crane are placed at the handlebar in front of the X-ray tube. The controls are used for enabling and disabling functions concerning the overhead tube crane.

The following information is always displayed on the system display.

- Alpha angle
- Beta angle
- Distance, or the distance to the floor (depending on modes)
- Mode
- Position
- X-ray field size
- Added filter
- Automatic/manual collimator

See Operator’s Manual for user description of the controls.

3.3.1.1 Direction of Movement

The figure below shows the movements of the OTC.

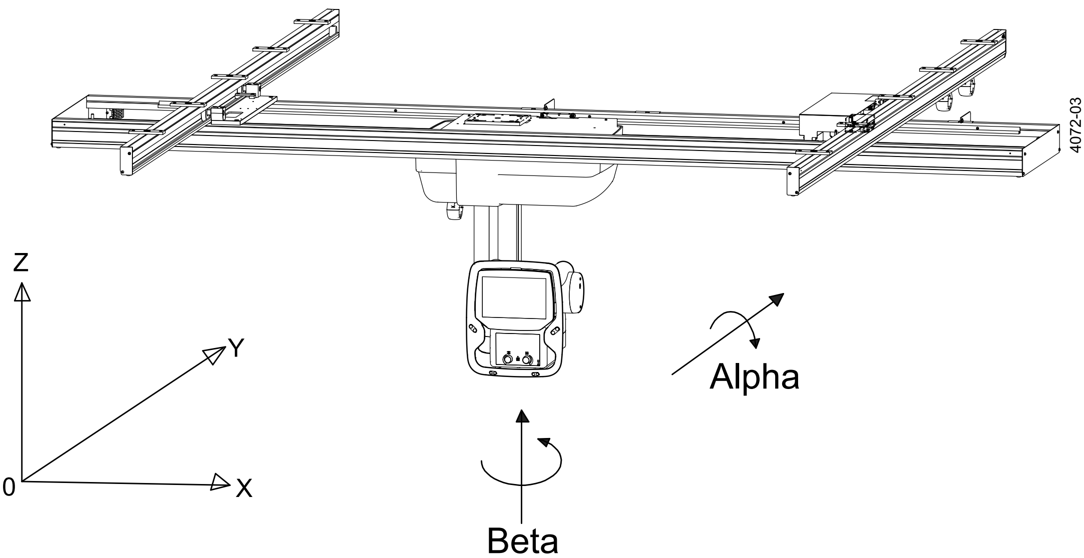


Fig. 3-1 OTC direction of movement

Z	*Vertical movement*	*Motorized*
Y	*Lateral movement*	*Motorized and manual*
X	*Longitudinal movement*	*Motorized and manual*

3.3.1.2 Sound Signal

- One sound signal means that the overhead tube crane is in position and ready for exposure.
- Two sound signals, in rapid succession, indicates a fault and the display shows an error message, for example after a collision. The error message shows the corrective action.

3.3.2 System Display Overview

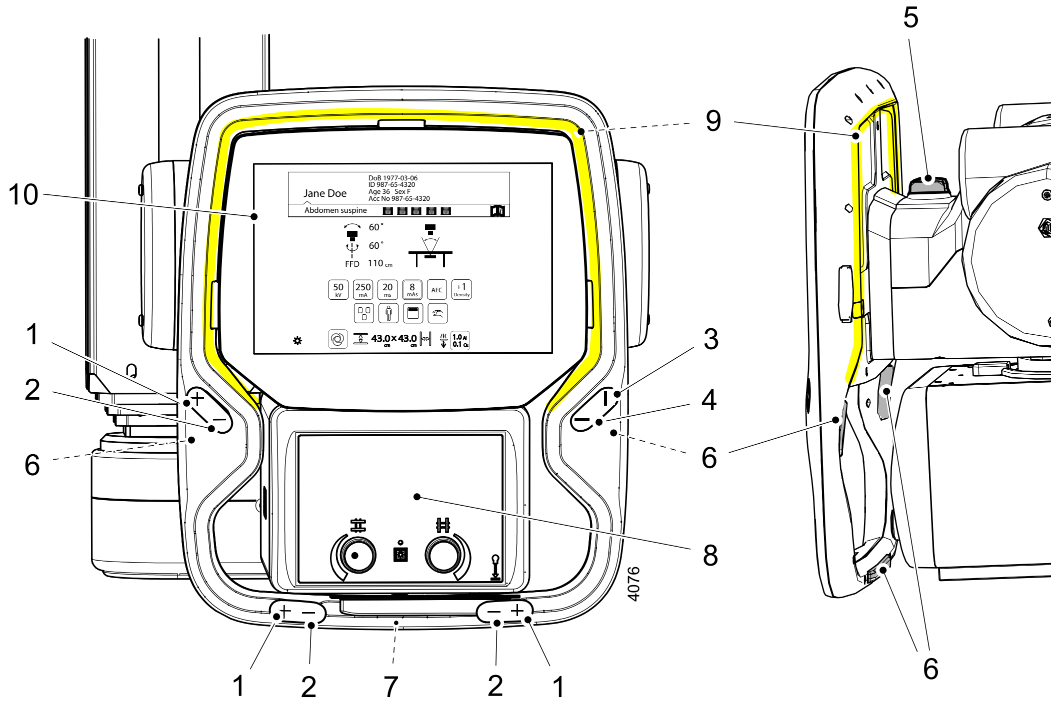


Fig. 3-2 System Display Overview

1. *Up*
2. *Down*
3. *Y direction*
4. *X direction*
5. *Emergency brake (rear side)*
6. *Release X-Y-direction and rotation (alpha/beta) (rear side)*
7. *Release in X-Y direction (rear side)*
8. *Automatic collimator, see* ***3.3.3.1 Automatic Collimator***
9. *Light indication, see* ***3.3.3.14 Light Indication***
10. *Display user interface, see* ***3.3.3.2 Display User Interface***

3.3.3 Automatic Collimator Control

The collimator is used to adjust the size of the x-ray field to cover the area of interest of the patient by adjusting the collimator light field size. The collimator light field size / x-ray field size and the collimator filtration can be predefined in the anatomical protocols and is then set automatically when the protocol is selected. The size of the light / x-ray field and the filtration can then be adjusted when needed to adapt to the patient.

The collimator can be operated from the collimator interface at the Overhead tube crane, from the hand control at the wall stand or from the control handle at the table (option).

The following figure shows the functions of the automatic collimator.

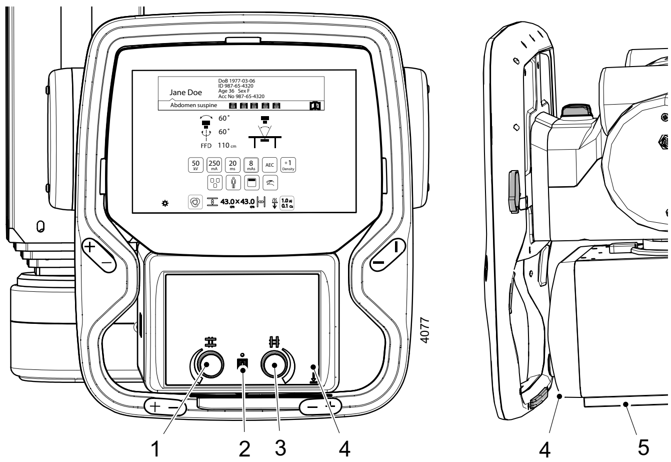


Fig. 3-3 Display, automatic collimator

1. *Knob for adjusting collimator light/x-ray field height*
2. *Collimator light and laser light on/off.*
   Automatic off after predefined time.
3. *Knob for adjusting collimator light/x-ray field width*
4. *Measuring tape grip for SID measurement, graduation in cm/inch - Take reading at bottom edge of multi-leaf collimator.*
5. *Accessory rail*

The collimator can rotate around the central beam axis +/-90°.

3.3.3.1 Automatic Collimator

Fig. 3-4 Automatic collimator

1. *Select Automatic or Manual mode of the collimator.*

   Note!

   If there is no new examination and the System is in Manual mode, the collimator ignores the instructions of sent collimator area from the Imaging system. This can be useful if the collimator area is intended to be kept for the next examination.

2. *Collimator light/x-ray field height x width*
3. *Collimator filter selection*

Collimator Mode

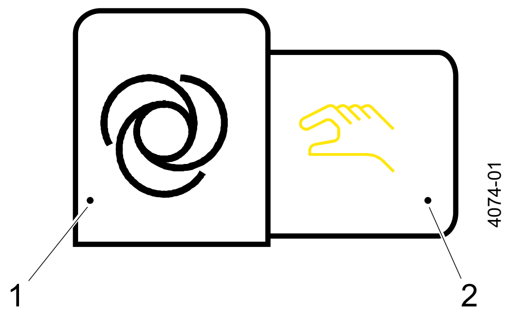


Fig. 3-5 Collimator mode

In automatic mode, the collimator light height and width is set from the anatomical program. The collimator light size can still be changed manually. In manual mode the collimator light height and width is not set from the anatomical program.

1. Automatic mode
2. Manual mode

When Automatic mode is selected, the predefined values of the collimator light / x-ray field size and the filter selection are set automatically when the anatomical protocol is selected. Both the light / x-ray field size and the filter can be changed when needed. In automatic mode the maximum light / x-ray field size is restricted to the maximum active area of the imaging unit.

When manual mode is selected the size of the collimator light / x-ray field size can be adjusted outside of the maximum active area of the imaging unit. When a new anatomical protocol is selected (for the same patient) the collimator light / x-ray field size or the filtration is not changed even if size and filtration is defined different in the protocol.

When changing from Manual mode to Automatic mode the collimator light / x-ray field size and filtration is restored to the values that were selected when changing from automatic to manual mode. Example:

- Automatic mode: Size: 30 cm x 10 cm; filter 1.
- Changes to Manual mode. Changes: Size: 30 cm x 20 cm, filter 2.
- Changes back to Automatic mode: Size 30 cm x 10 cm, filter 1.

When a new patient is selected Automatic mode is automatically activated.

Collimator Filtration Selection

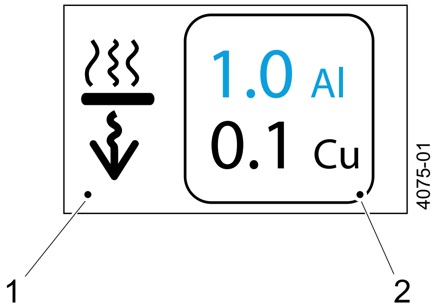


Fig. 3-6 Collimator filtration selection

The user can change the selected value from the display.

1. Collimator filtration selection icon
2. Collimator filtration selection values

Collimator Filters

The collimator filter options are:

- No added filtration
- Filter 1 =1 mm Al + 0.1 mm Cu
- Filter 2 =1 mm Al + 0.2 mm Cu
- Combined: 2 mm Al + 0.3 mm Cu

The filters can be predefined in the anatomical protocol and also be changed if needed

Laser

The laser can be switched off by applying a mechanical cover over the laser. The cover is available underneath the collimator.

Collimator Functionality - System

When the overhead tube crane moves in a direction that changes the SID, the collimator starts to compensate the field size. The collimator light field size on the imaging unit is held constant with changing SID.

When the overhead tube crane is tracking against the Wallstand or when the table top is released, the collimator light automatically is turned on. This is make it easier to directly find the correct stand and patient position.

In *Free* mode/*Auto position* mode the position of the detector is unknown for the System. The indicated size of the light field is correct at the shown SID.

Collimator Control Handle, Table (option)

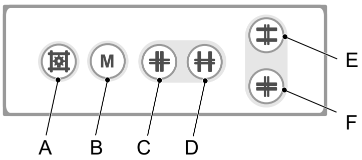


Fig. 3-7 Table collimator control handle

A. Button for switching the light and the laser line on/off. The light and laser line is automatically switched off via a time switch.
B. Button for changing between *Automatic mode* and *Manual mode*.

   A long activation of the *M button* sets the light field to max image size, based on the pre-programmed SID value and the selected receptor.
C. Button for closing the format height collimation.
D. Button for opening the format height collimation.
E. Button for opening the format width collimation.
F. Button for closing the format width collimation.

Hand Control, Wallstand – Collimator Adjustment

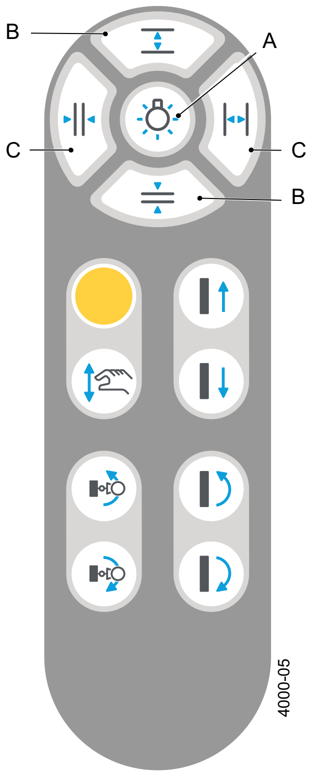


Fig. 3-8 Hand control

A. Collimator light on/off
B. Adjustment height collimation
C. Adjustment width collimation

3.3.3.2 Display User Interface

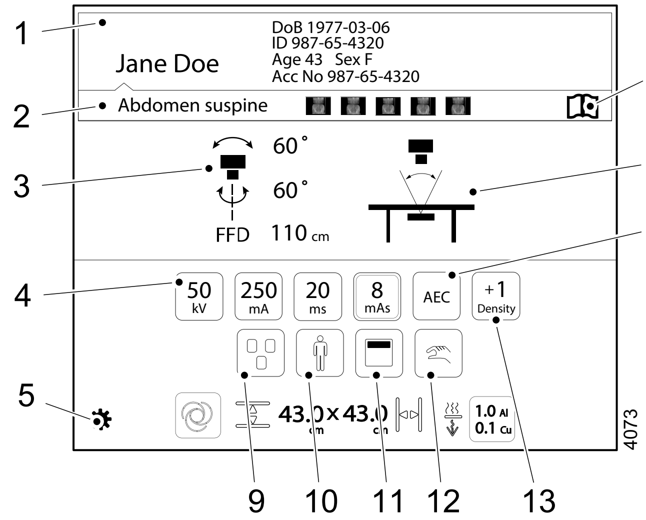


Fig. 3-9 Display user interface

1. *Patient information*
2. *Active protocol*
3. *Position information*
4. *Adjustment of generator parameters: kV, mA, ms, mAs*
5. *Select the settings menu*
6. *Hospital method book*
7. *Active System mode*
8. *Selection of Technique mode*
9. *Selection of active AEC field (AEC mode only)*
10. *Patient size*
11. *Collimator centering*
12. *Manual or Servo mode*
13. *Density*

See the following pages for detailed description of the functions.

3.3.3.3 Patient Information

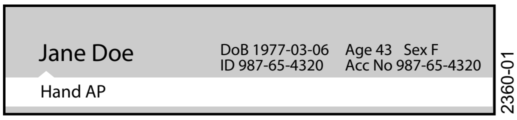


Fig. 3-10 Patient information always shown

The following information can be shown in the Patient Information field:

- *Patient Name*
- *Patient ID*
- *Date of Birth*
- *Age, Sex*
- *Accession number*

The information shown is defined in the *Setting menu*. In the *Setting menu* it is also possible to decide if the *Patient information* shall be shown always as in **Fig. 3-10** or on demand as in **Fig. 3-11**.

Fig. 3-11 Patient information shown on demand

When the button is shown on demand, the *Patient information* can be obtained by pushing the “i” on the black bar.

The *Patient information* closes automatically, or when the bar is pushed once again.

3.3.3.4 Position Information

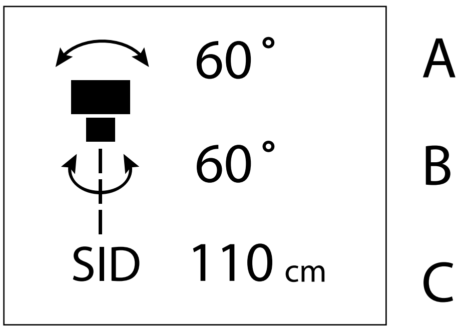


Fig. 3-12 Position information

A Alpha angle (°)
B Beta angle (°)
C Source Image Distance (SID), or
Height to floor (H) in Free or Auto Position Mode (cm/inch)

The height to floor (H) is shown in *Free mode* and *Auto position mode*. In all other modes the source image distance (SID) is shown.

The unit for the distance can be either cm or inch, and is set in the *Setting menu*, see **Fig. 3-21**.

3.3.3.5 Adjustment of Generator Parameters (kV, mA, ms, mAs, Density)

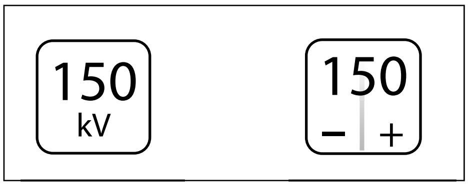


Fig. 3-13 Adjustment of generator parameters

- Push the button with the parameter that shall be changed to change the exposure values.
- Select to increase or decrease the value.

Note!

The Operator/User is always responsible for checking and validating the exposure parameters in the Image system before performing exposure.

3.3.3.6 Settings

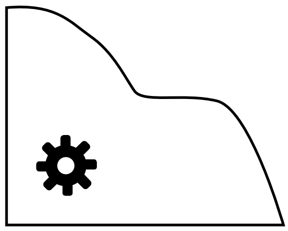


Fig. 3-14 Setting button

- Press the *Setting* button for 1 second to reach the Settings menu.

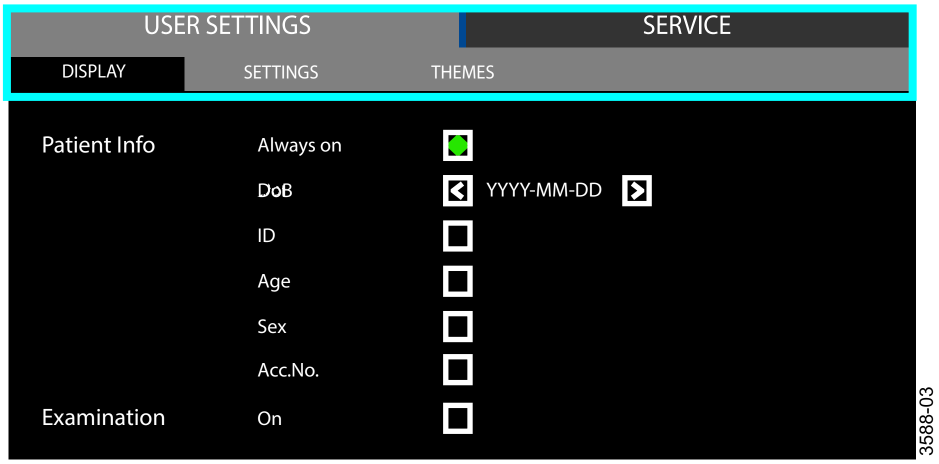


Fig. 3-15 Settings menu

The Settings menu has the following tabs:

- `USER SETTINGS`
- `SERVICE`

The `USER SETTINGS` menu has the following tabs:

- `DISPLAY`
- `SETTINGS`
- `THEMES`

The `SERVICE` menu has the following tabs:

- `LOG`
- `SETTINGS`
- `DISPLAY`

User Settings – Display

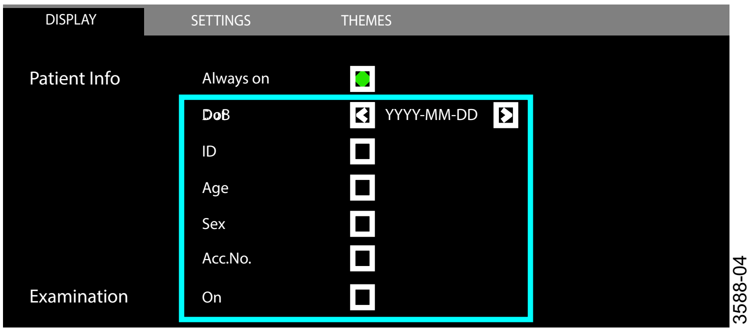


Fig. 3-16 Tab `DISPLAY` — `Patient info`

It is possible to select which patient information to show on the display. The following parameters can be selected:

- `DoB`; Date of Birth, where the following formats are selectable:
  - YYYY-MM-DD
  - DD-MM-YYYY
  - MM-DD-YYYY
- `ID`; the identity of the patient
- `Age`; the age of the patient
- `Sex`: the sex of the patient
- `Acc.No`; Accession number
- `Examination – On`; Examination/Active Protocol

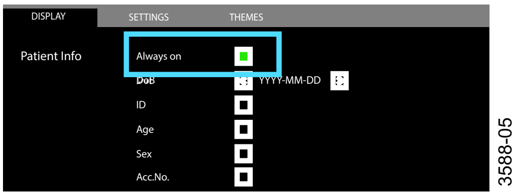


Fig. 3-17 Selection of Always on/off

The first line in `USER SETTINGS` menu, tab `DISPLAY`, refers to the selection if Patient information shall be shown (`Always on`) or not on the OTC display.

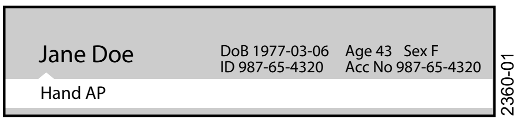


Fig. 3-18 `Always on` selected

When `Always on` is marked, patient information is shown as soon as the patient is selected.

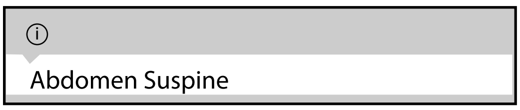


Fig. 3-19 `Always on` not selected.

When `Always on` is **not** marked, the `Patient info` is shown when pushing the black field with the ⓘ

The `Patient info` closes automatically or by pushing the black field with the ⓘ again.

User Settings – Settings

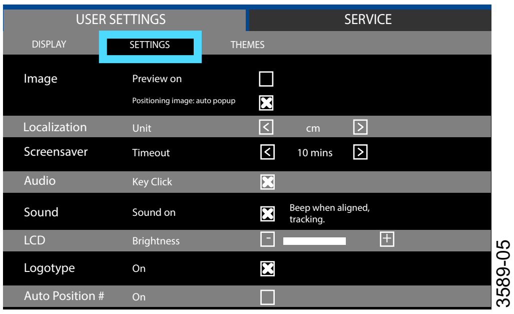


Fig. 3-20 Menu `USER SETTINGS` – tab `SETTINGS`

In the `SETTINGS` tab it is possible to adjust the following:

- Preview Image
- Localization, unit selection
- Screensaver, set time for activation
- Audio key click, On/Off
- Sound, On/Off
- LCD brightness, Plus/Minus
- Logotype in display, On/Off
- Autoposition, On/Off

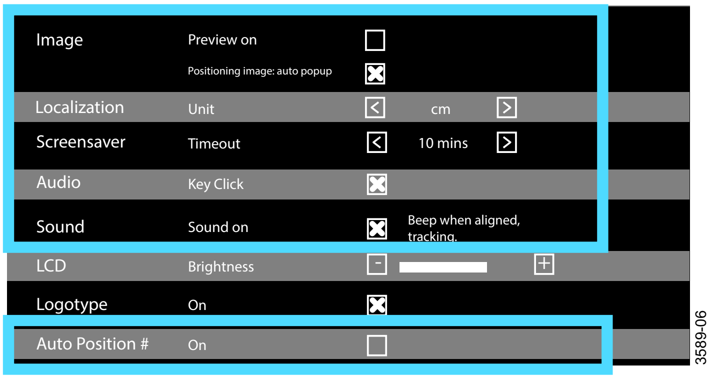


Fig. 3-21 Menu `USER SETTINGS` – tab SETTINGS

– `Image – Preview on`
`Position image: auto popup`

By selecting `Preview on` a small preview image is shown next to the Active Protocol name, see **Fig. 3-22**.

– `Localization – Unit`

`Unit` changes between cm and inch, for collimator light width and height values and SID/H.

– `Screensaver – Timeout`

Select `Screensaver – Timeout` to activate screensaver and set the time (Off — 10 mins — I hour) for activation using < or > .

– `Audio – Key Click`

By selecting `Key Click` a key click is heard when touching the System display.

– `Sound – Sound on`

By selecting `Sound – Sound on` a beep is heard when overhead tube crane is aligned with the detector, at tracking.

– `Auto Position #`

By selecting `Auto Position #` the auto position # is shown in the OTC display.

Preview Image

WARNING!

The preview image must not be used for diagnostics or positioning.

It is possible to select if a preview image shall be shown on the touchscreen display or not by selecting `Image – Preview on`, see **Fig. 3-21**.

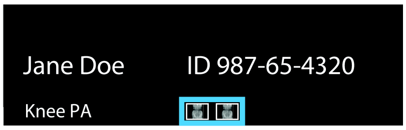


Fig. 3-22 Preview image displayed

If preview is selected, a small preview image, see **Fig. 3-22**, is shown on the touchscreen display when an exposure is performed.

Touch the small image on the display, and the image is shown as a large image.

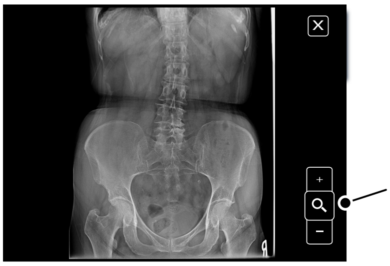


Fig. 3-23 Preview image enlarged

Touch the zoom button +/- to zoom in and out in the image.

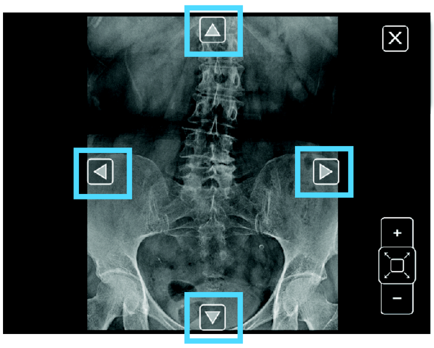


Fig. 3-24 Zooming In/Out

Use the arrows appearing in the image to pan in the image.

LCD and Logotype

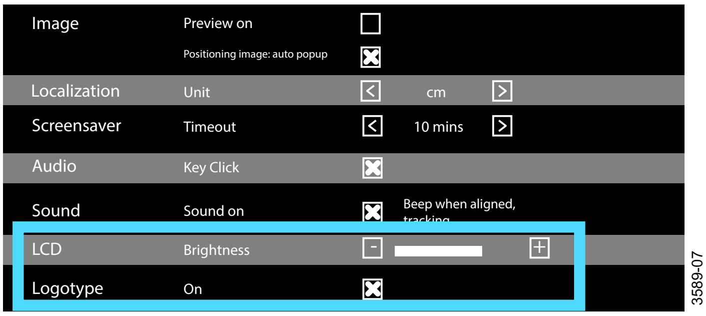


Fig. 3-25 Menu `USER SETTINGS` – tab `SETTINGS`

- Use `LCD` to adjust the display brightness.
- Use `Logotype` to set if the logo shall be shown or not.

User Settings – Themes

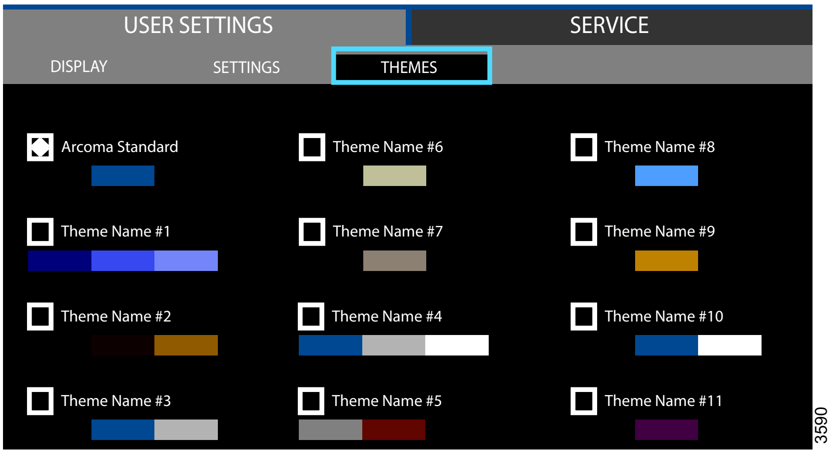


Fig. 3-26 Menu `USER SETTINGS` – tab `Themes`

Select a pre-set theme in tab `Themes`, see **Fig. 3-26**.

The selection changes the colours of the graphical user interface on the display of the overhead tube crane (OTC) according to the shown colour scheme.

Service

The Service tag is meant to be used by the service technician.

Service – Log

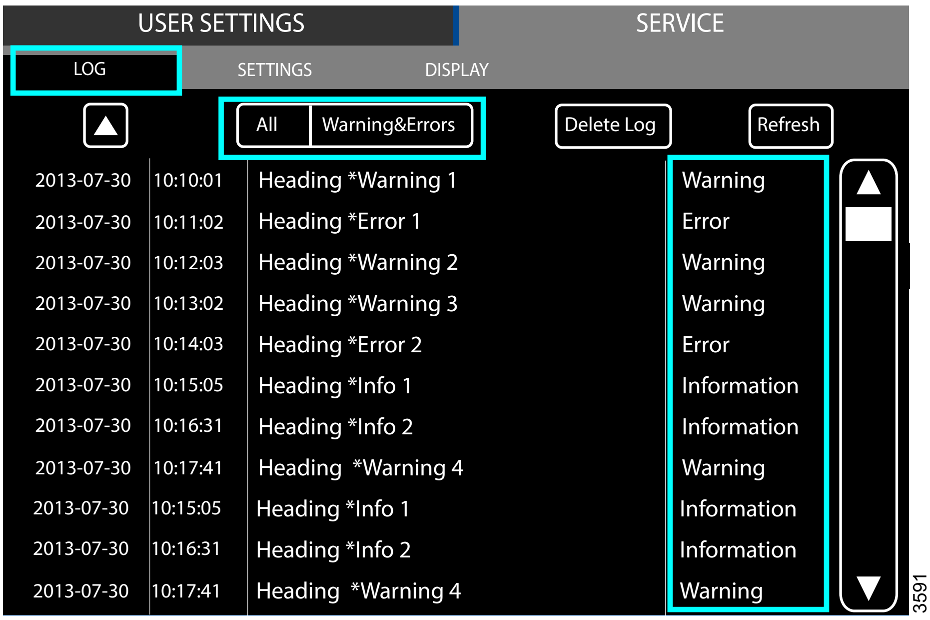


Fig. 3-27 Menu `SERVICE` – tab `LOG`

The log file shows warnings, errors and events that have occurred in the system. The log file can be filtered to show all information, `All`, or just warnings and errors, `Warnings & Errors`. By selecting `Warning`, `Error`, or `Information` in the right column, more information concerning the issue is shown.

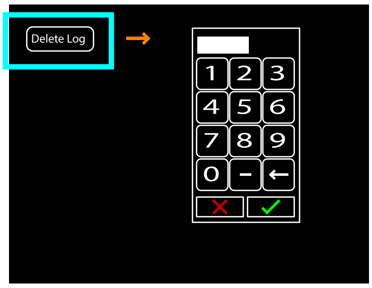
The log file may be used for troubleshooting.

It is possible for service personnel to delete the log file which can be helpful when fault tracing. The refresh button retrieves the latest events.

Delete Log File

Note!

This procedure shall only be performed by service personnel.



Select `Delete Log` and enter a four digit access code to delete a log file.

Fig. 3-28 `Delete log` *file*

Service – Settings

The Service menu shows system set up and system software versions.

A code is required for access to `Settings`.

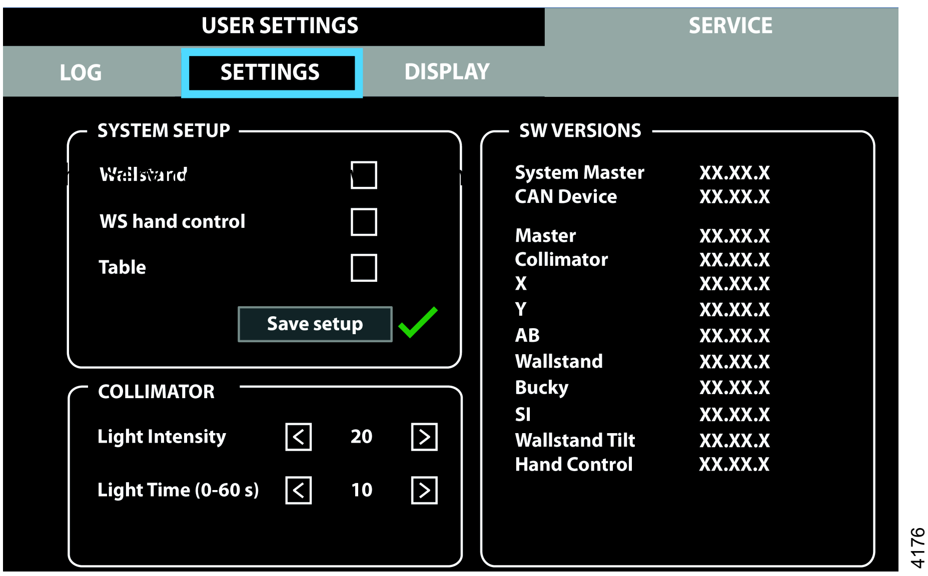


Fig. 3-29 Menu `SERVICE` *– tab* `SETTINGS`

Service – Display

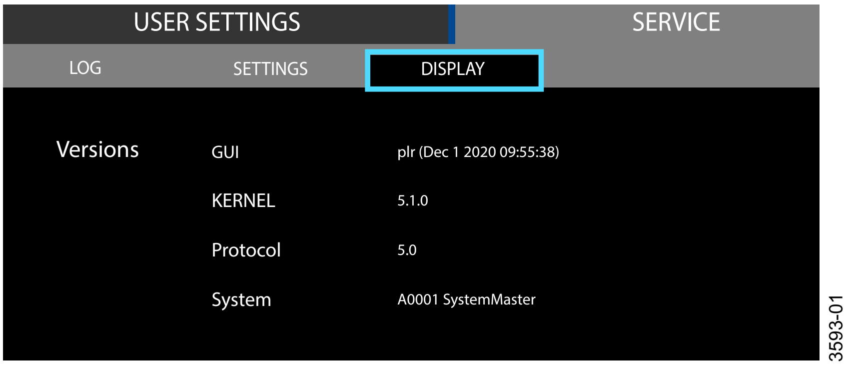


Fig. 3-30 Menu `SERVICE` – tab `DISPLAY`

Information of the display software versions.

3.3.3.7 System Mode

The System has a number of different modes. All modes are described below with their special functionalities and features.

Note that depending on the particular System, different modes and actual configurations are available.

- *Free mode*
- *Auto position mode*
- *Wall flexible mode*
- *Table flexible mode*
- *Film tracking mode*
- *Pendulum mode*, Table
- *Stitching mode* (toward the table and wallstand)

Free Mode

General Description

The *Free mode* is the most basic mode in the System.

The mode holds no special features or functionality. It is intended as a manual mode with a lot of freedom in positioning and exposure, e.g. for emergency examinations or examinations with the patient in a wheel chair or lying in a bed. This mode is available in all Systems.

The distance shown in display for *Free mode* is the distance to the floor.

Exposure Validation

Exposure is allowed if the stand is not moving and operating properly (not in an error state).

Auto Positioning Mode

General Description

The *Auto position mode* functions as the *Free mode* with the added functionality of automatic positioning in the room.

Automatic positions are a number of positions that can be programmed and saved into the System. The stand moves upon activation of the servo button to the programmed position chosen from the imaging unit.

The mode is intended as a flexible, easy to use mode. The mode can also be used as a parking mode.

The distance (H) shown in display for *Auto position mode* is the distance to the floor.

Exposure Validation

Exposure is allowed if the stand is not moving and operating properly (not in an error state). The chosen position must have been reached successfully.

Wall Flexible Mode

General Description

The *Wall Flexible mode* is intended for examinations toward a wallstand.

The wallstand detector angle is controlled from the APR.

The overhead tube crane moves upon activation of the servo button to the programmed position associated with *Wall mode*. The stand stops at the transport height and waits for a change in position of the wallstand (detector height). When a change in position is detected (the user moves/runs the wallstand up or down) the overhead tube crane moves downward and start tracking the position of the detector.

The SID value is constantly updated as soon as the wallstand/overhead tube crane is moved. It is possible for an operator to change the position so the SID value cannot be calculated or would be incorrect; in those situations the display does not show a SID value.

No Wait

At the installation of the System it is possible to select, that the overhead tube crane shall not wait for the user to move the wallstand before tracking starts. The overhead tube crane then starts the tracking as soon as it reaches its final position.

Exposure Validation

Exposure is allowed if the stand is not moving, operating properly (not in an error state) and the servo button is activated.

Table Flexible Mode

General Description

The *Table flexible mode* is equal to *Auto positioning mode* with functionality added for tracking the height of the Table (compare with Wall flexible mode). The mode is intended for Table examinations.

The stand moves upon activation of the servo button to the programmed *Table mode* position and starts tracking the Table height, thereby keeping the film focus distance constant. The *Film focus distance* shown in the display is the actual distance to the detector. The Table position in the room is set during the installation of the System.

Exposure Validation

Exposure is allowed if the stand is not moving, operating properly (not in an error state) and the servo button is activated. Movement is allowed in X and alpha direction.

Film Tracking Mode

General Description

The *Film Tracking mode* functions as the *Table mode* with added functionality for controlling the position of the detector in one direction. The mode is intended for fast and easy positioning with the X-ray tube always aimed at the center of the detector.

The motorized detector holder moves the detector to the right position. The stand moves upon activation of the servo button to the pre-programmed *Film-tracking position* and start tracking the Table height, thereby keeping the film focus distance constant. The film focus distance shown in the display is the actual distance to the detector. When *Film Tracking mode* is chosen, all buttons except X and alpha-brake buttons are deactivated. The tube stand is operated manually by releasing one or both of the brakes. The position of the detector is changed according to the change in X and or alpha position of the tube. That is the X and alpha positions can be changed independently.

Exposure Validation

Exposure is allowed if the stand is not moving, operating properly (not in an error state), the X-ray tube is aimed to the center of the detector and the servo button is activated.

Pendulum Mode, Table

General Description

The *Pendulum mode* can be seen as a variation of film tracking.

The X-ray tube is always aimed at the center of the detector. The alpha angle of the tube and the position of the detector changes according to the change in X-position of the tube stand. Also *Pendulum mode* incorporates all the functionality of the more simple Table mode. The mode is intended for fast and easy positioning with the X-ray tube always aimed at the center of the detector.

For moving and controlling the position of the detector, a motorized detector holder is required. The stand moves upon activation of the servo button to the programmed position associated with the *Pendulum mode* and start tracking the Table height, thereby keeping the film focus distance constant.

All table handle bar buttons, except (move left) and (move right) buttons, are deactivated when the *Pendulum mode* is activated. The X-position of the stand is controlled by these two buttons and thereby also the detector and the alpha angle of the tube.

Exposure Validation

Exposure is allowed if the stand is not moving, operating properly (not in an error state), the X-ray tube is aimed to the center of the detector and the servo button is activated.

Stitching Mode

Stitching, schematic description

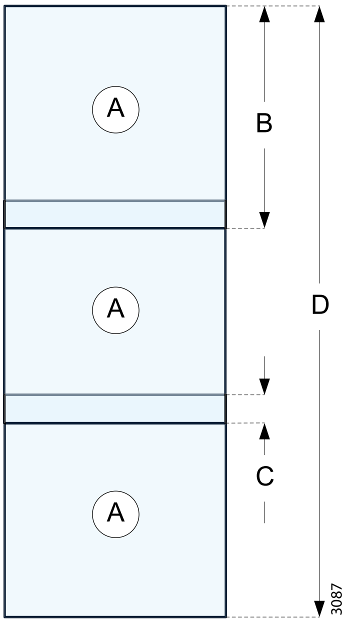


Fig. 3-31 Composite Image

A Partial Image
B Partial Image Height
C Overlap
D Composite Image Height

Stitching is the process of combining multiple images with overlapping fields of view to produce a larger image.

When imaging long parts of the human body, there is need for an image with extended length. In digital radiography the image size is limited due to the sensitive area of flat-panel detectors. In order to produce a large image, images are assembled from multiple exposures with a small, spatial overlap.

Stitching is possible at both table and wallstand.

Wallstand/TableStitching

The user must define the area that shall be captured in the stitching sequence.

When choosing *Stitching mode*, new information is present on the manoeuver handle:

- high (left) position
- low (right) position
- total length
- number of exposures

The tube support moves to the pre-defined position for X, Y, Alpha, Beta, and Wallstand (detector holder for TableStitching). Z moves to the position received from the Image system (*SID value for TableStitching*).

To start the stitching procedure, press `Start exam`.

The movement for stitching is:

- From head to foot, for both wallstand and table.

The operator sets the size of the stitching area (the composite image) by positioning the light field.

Note!

A patient protection shall always be used at wallstand examinations when performing stitching examinations.

For detailed information about the stitching operation, see the Operator’s Manual.

Exposure Validation

It is only possible to perform an exposure when the System is ready:

- indication light is fixed
- generator is enabled.

The exposure is blocked and the user needs to activate the start button once more if:

- a new parameter setting is received,
- the System is moved out from the start position,
- a collision when moving,
- the patient position removed, or
- the collimator size is changed.

3.3.3.8 Hospital method book

The Hospital method book is reached by a activating the *Hospital method book* button for 1 second.

The Hospital method book is selectable when a method book has been loaded to the display (performed by a service technician).

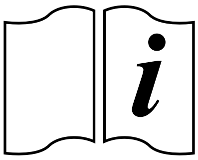


Fig. 3-32 Hospital method book button

3.3.3.9 Selection of Technique Mode

There are three different technique modes available that are selected by pushing the *Technique mode selection* button. The selected mode is highlighted and the pop-up window closes automatically.

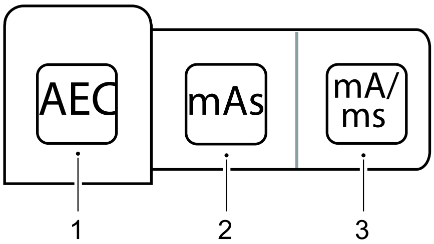


Fig. 3-33 Technique mode selection

1. AEC mode
2. mAs mode
3. mA/ms mode

Depending on what mode is active, different parameters are available. Parameters not available for selection are grayed out, see the *mAs selection* button in **Fig. 3-34**, below.

In *AEC mode*, the value used as back-up value (ms, mAs or fixed) is indicated with the text *AEC Backup*.

CAUTION!

To avoid unnecessary radiation, make sure that the AEC back-up values are properly defined.

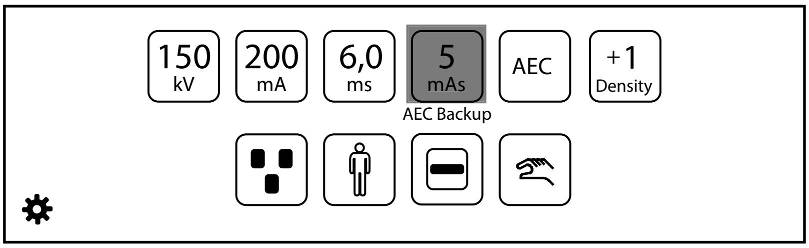


Fig. 3-34 mAs selection button grayed out

For more detailed information about the different technique modes, please see Operator's Manual for Canon single console CXDI NE.

Selection of Active AEC Field (AEC Mode Only)

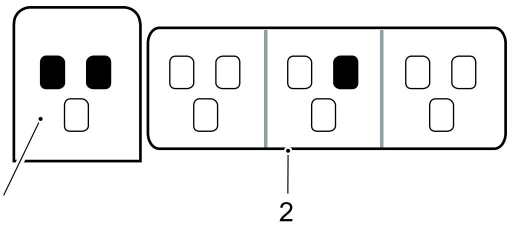


Fig. 3-35 AEC field selection

1. *Activated AEC fields*
2. *Pop-up window for selecting AEC fields*

The *AEC field selection* button is available in *AEC mode*.

When selecting the *AEC field* button, a pop-up-window with the different AEC fields appears, see **Fig. 3-35**.

The AEC fields are activated by selecting them in the pop-up window **2** to the right.

All activated AEC fields are shown at **1**.

AEC fields are deactivated by selecting them again in the pop-up window **2**.

3.3.3.10 Patient Size

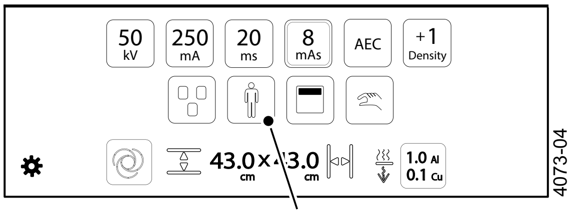


Fig. 3-36 Patient size selection button

The *Patient size setting* is used for a quick setting of the generator parameters to suit the physique of the patient.

Adjust *Patient size* by pressing the *Patient size selection* button, see **Fig. 3-36**. A pop-up window, according to **Fig. 3-37**, opens and shows available patient sizes.

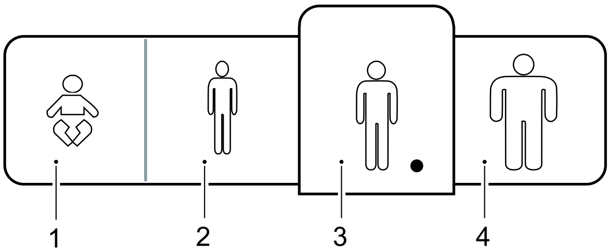


Fig. 3-37 Patient size selection

A Paediatric
B Small
C Medium
D Large

Select the desired *Patient size*. The pop-up window automatically closes shortly after the selection.

Note!

The generator parameters and the collimator settings (field size and filter) change to the defined values for the new Patient size.

If no generator parameters or collimator settings are defined for the new Patient size (defined in APR), the current values are kept.

3.3.3.11 Collimator Centering

The collimator light field size can be top or bottom centered against the maximum image area.

This means that the upper border of the collimator light field is aligned with the top of the maximum image area, or that the lower of the collimator light field is aligned with the bottom of the maximum image area. The stand moves automatically to keep the alignment of the top or bottom of the maximum image area when the collimator light field is increased or decreased.

The functionality of top and bottom centering is only available in *Wall mode* or *Wall Flexible mode*.

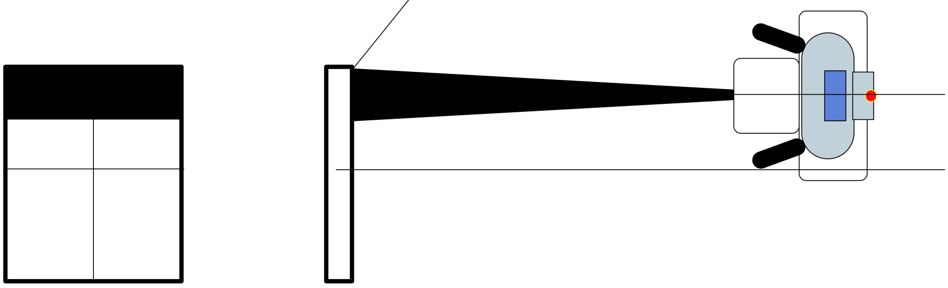


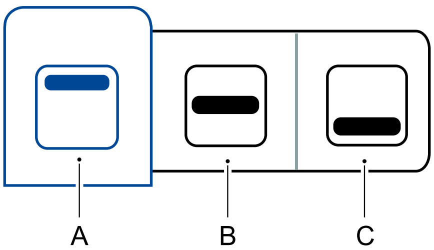
Fig. 3-38 Top and bottom centering of the collimator light field

With top centering active the light field is always aligned with the top of the detector.

The collimator centering is adjusted by pressing the *Collimator centering* button.

A pop-up window according to **Fig. 3-39** appears with the alternatives *Top centering* and *Bottom centering*. Select the desired collimator centering.

The pop-up window closes automatically short after the selection and the light field is accordingly adjusted.



A. *Top*
B. *Center*
C. *Bottom*

Fig. 3-39 Collimator centering selection

3.3.3.12 Servo State Mode

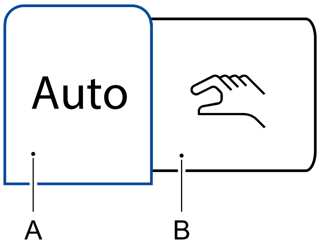


Fig. 3-40 Servo state mode

A Automatic mode
B Manual mode

The Servo state can be either *Automatic mode* **A** or *Manual mode* **B**.

A pop-up window according to **Fig. 3-40** appears with two alternatives. When the System is in *Manual mode* all movements are allowed and exposure can be performed in any position, also outside the detector.

For further information about *Manual mode*, see corresponding section.

3.3.3.13 Grid Status

Settings in Arcoma Service SW are pre-defined. This manual describes settings needed in Canon NE.

The grid status is indicated in the overhead tube crane display and in the Canon NE user interface for guidance, see **Table 3-1** below. There is also a pop-up window appearing in the Canon NE user interface if grid status needs to be adjusted.

It is possible to perform exposure without adjusting the grid status according to the information in the pop up window. Please note that performing exposure with incorrect grid status might affect the image quality negative.

The grid status is shown in the upper right corner of the Canon NE user interface.

When the correct grid is attached the grid name is written with black letters, see Fig. **Fig. 3-42**.

When a grid is not needed for the examination "Removed" is shown with black letters in the same location, see Fig. **Fig. 3-42**.

When a correction of grid status is needed this is indicated with red text in the Canon interface, see detailed description in **Table 3-1**.

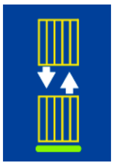
Fig. 3-41 Canon NE user interface. Grid data displayed.

Fig. 3-42 Canon NE user interface. Grid removed.

Grid Identification Settings

The user will get information about grid status both in the OTC display and in the Canon NE user interface, **Table 3-1** below. This document describes settings needed in Canon NE. Settings in Arcoma Service SW are pre-defined.

Table 3-1 Grid information in OTC display and image system user interface.

Display	Message image system user interface	Description	User Action
 4081	Removed	INSERT GRID Pop up window in the image system user interface guides to insert the correct grid defined for the selected protocol.	Insert grid. Grid shall be used for this examination.
 4080	Example: 180cm_10:1_52 lp/cm	REMOVE THE GRID Pop up window in the image system user interface guides to remove the grid.	Remove the grid. No grid shall be used for this examination.
 4082	Example: 115cm_10:1_52 lp/cm	CHANGE GRID Pop up window in the image system user interface guides to exchange the grid inserted to the requested grid according to the protocol.	Wrong grid inserted (name of the attached grid shown in the image system user interface). Change to the correct grid

Canon Service program – Define Grids included in the system

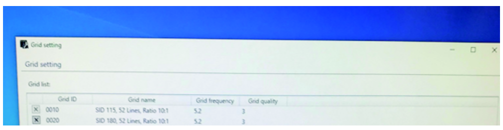

4122

Fig. 3-43 Canon NE Service Tool, Grid settings

Login to Canon Service Tool. Select Grid Settings and define the grids that are included in the system. See example below in **Fig. 3-43**

- 0010 = Grid 1
- 0020 = Grid 2
- 0030 = Grid 3

When the grids are defined, they are selectable when setting up the Anatomical protocols, see
Define Anatomical protocols – Grid setting

Define Anatomical protocols – Grid setting

The grid that shall be used for the specific Anatomical protocol needs to be set in the Protocol Workspace Settings 1 and in the APR Editor. See more information below.

1. Grid setting 1 – Protocol Workspace Settings 1

   The protocols are set up with *no grid* or the *grid type* to use. The grids are selected from a drop-down menu, see **Fig. 3-44**

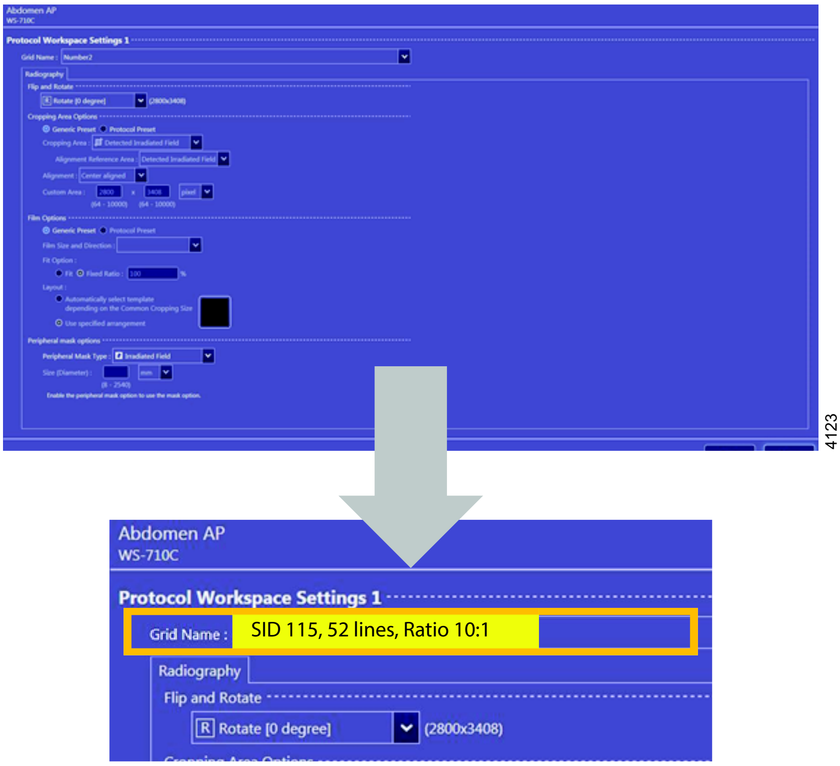


Fig. 3-44 Grid definition in Anatomical Protocol

2. Grid setting 2 – APR Editor
   The same grid shall also be set in the APR Editor window, GridInfo field.
   GridInfo setting, options:
   - No Grid
   - Grid 1 (= 0010 in Canon Service program)
   - Grid 2 (= 0020 in Canon Service program)
   - Grid 3 (= 0030 in Canon Service program)

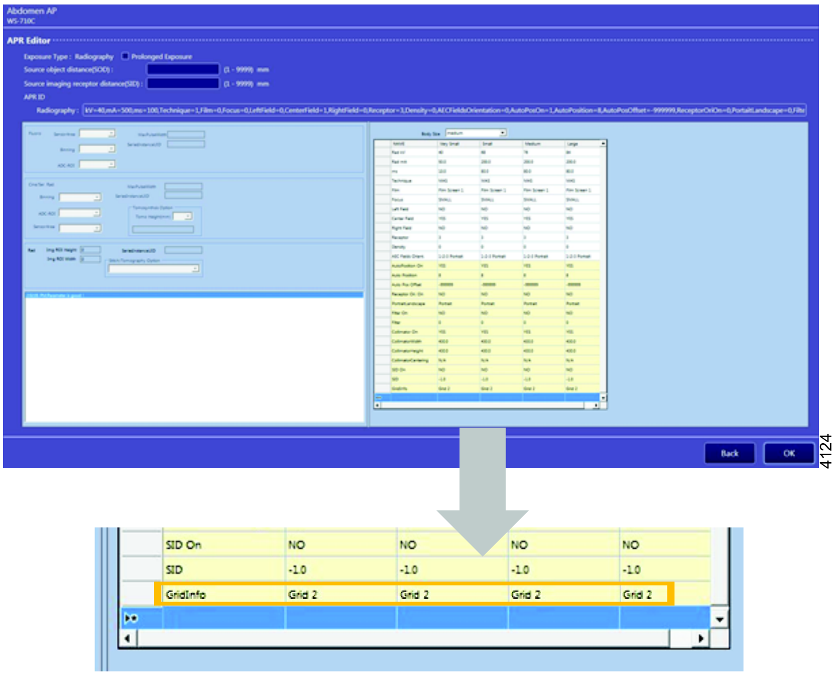


Fig. 3-45 Grid setting

3.3.3.14 Light Indication

Fig. 3-46 Light indication

There is a light indication available around the overhead tube display.

- No light — Between examinations
- Yellow flashing — Action needed by the user or system is moving
- Green flashing — System is ready for exposure
- Green fixed — Preparation (before exposure)
- Yellow fixed — Exposure

3.3.4 Information Field

3.3.4.1 Detector Information, Wallstand

Detector Tray Out of Position

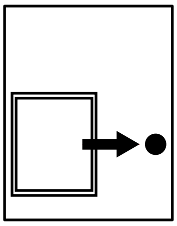


Fig. 3-47 Detector tray out of position

Detector Not Present

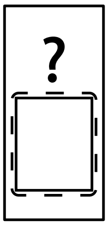


Fig. 3-48 Detector not present in detector tray/holder

Detector Position Needs Correction

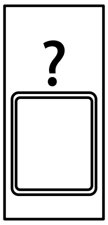


Fig. 3-49 Position of detector in detector holder needs to be corrected

3.4 Perform Examination

3.4.1 Select Patient

1. Select [Exam] and [Worklist].

Fig. 3-50 Worklist

2. Sort the list in [Search For Study List] and select patient.

CAUTION!

The user shall always assure that the Patient info and the type of examination is corresponding to the one in HIS and RIS.

3.4.2 Start Examination

1. Select [Start Exam].
   Predefined protocols are activated automatically.
   Patient data can also be added manually, see Canon Operator's Manual.

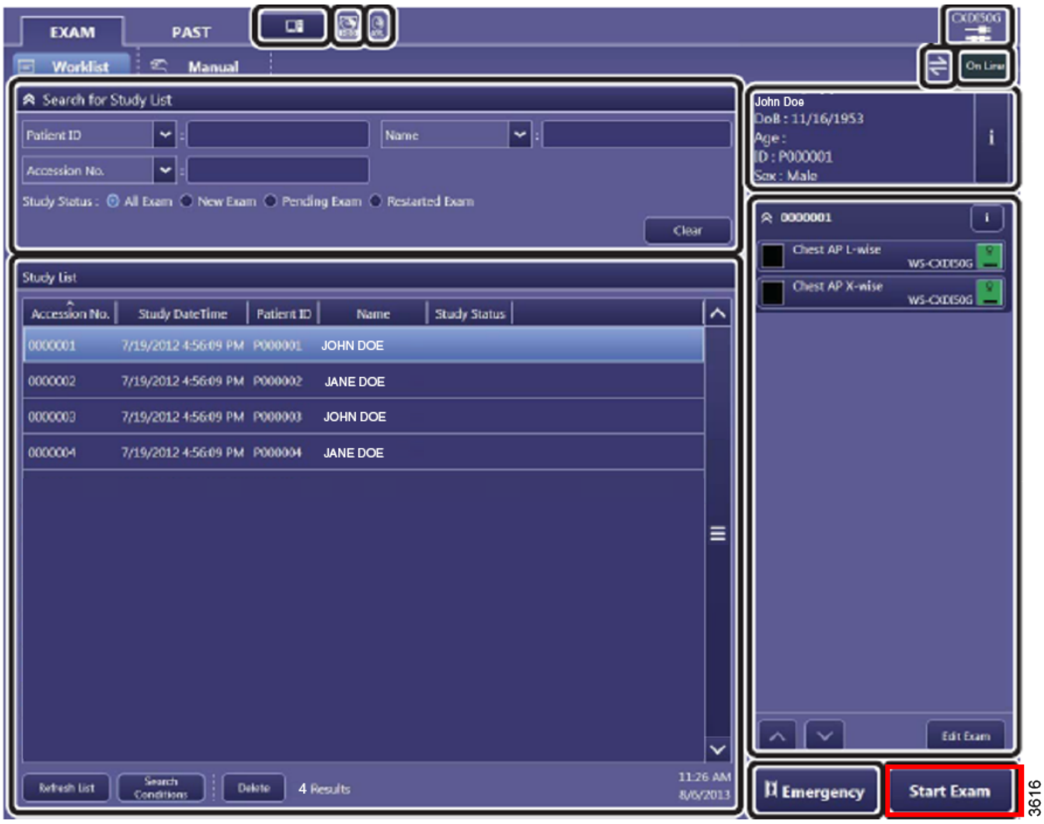


Fig. 3-51 Start Exam

2. The indication light will be lit on the selected workstation.

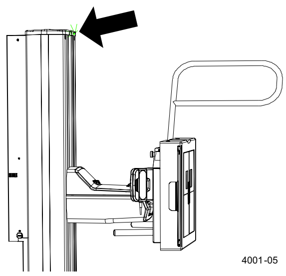


Fig. 3-52 Wallstand indication light

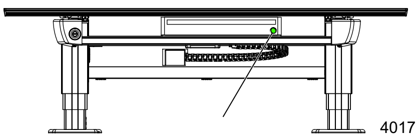


Fig. 3-53 Table indication light

3.4.3 Position the System

1. Activate the servo button to position the system.

   The servo button is activated on the console, the remote control, or wallstand hand control.
2. The indication light around the overhead tube crane display indicates with a green flashing light that the sytem reached correct position.

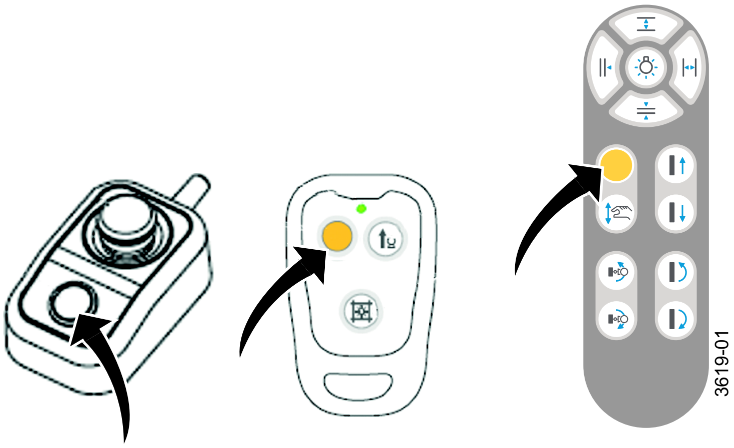


Fig. 3-54 Indication light

3.4.4 Adjust Position and Collimator For Chosen Examination and Patient

Adjust the position of the overhead tube crane, table top or wallstand according to:

- *Direction of Movement* in Operator Manual
- *Table Control elements* in Operator Manual
- *Wallstand Control Elements* in Operator Manual

The light field should be reduced to the examination area. Adjust the collimator according to:

- **3.3.3 Automatic Collimator Control, Page 57**

3.4.5 Exposure

WARNING!

Check that the settings of the SID (Source Image Distance) are accurate before the exposure.

WARNING!

Check that the selected workstation (wallstand, table) is connected and linked properly at the Examination Check screen of the image system before the exposure.

WARNING!

Check that the X-ray tube is set at correct position before the exposure.

CAUTION!

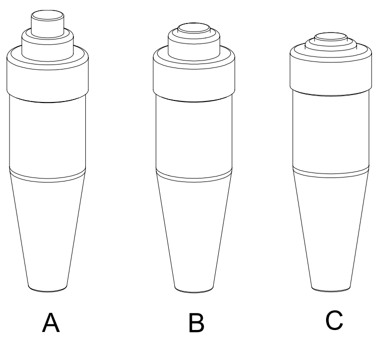
It is the responsibility of the user to ensure that the X-ray field is within the active detector area when exposing.

Note!

The operator is responsible for verifying the exposure parameters before exposure.

Check that the examination conditions are displayed on the image system without failure.

Exposures are done using either the hand control or the prep. and X-ray buttons on the operator console.



Exposure operator console in

A. normal position
B. preparation position
C. exposure position

Fig. 3-55 Exposure operator console

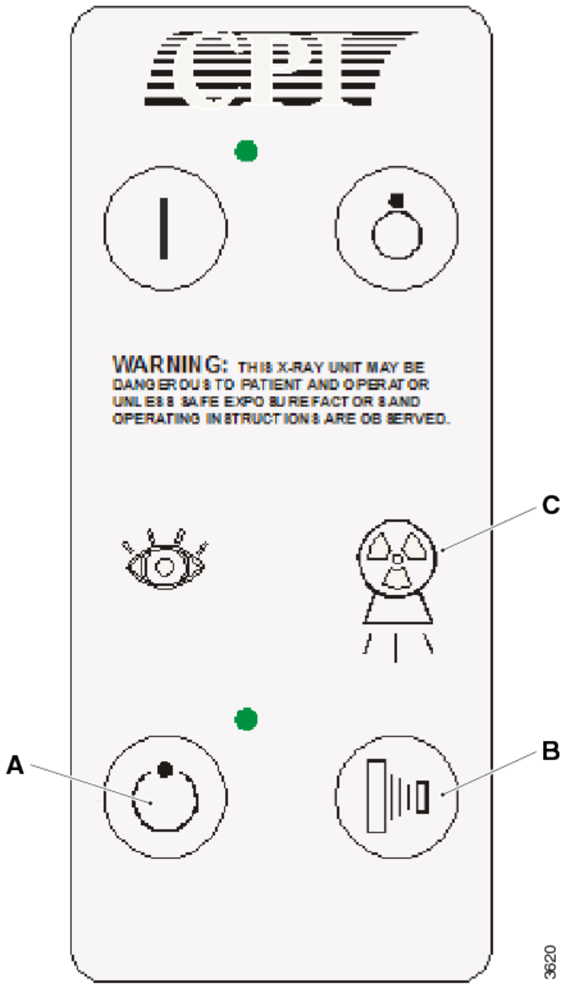


Fig. 3-56 Operator console

3.4.6 Review Image

- If the image is correct, select `End Exam` or continue the examination if more images are planned.
- If the image is not correct, select `Retake`.
- Type reject reason and retake image.

3.4.7 Change Work Space

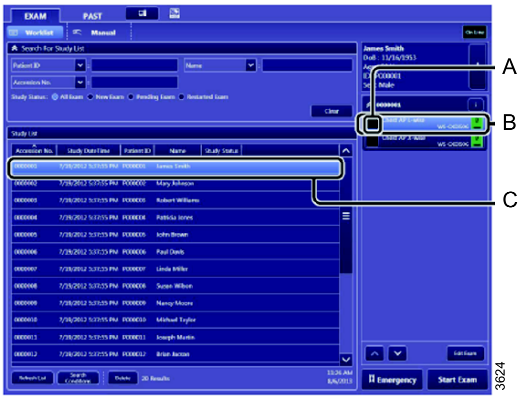


Fig. 3-57 Protocol

1. Select [Protocol].

A. *Thumbnail*
B. *Protocol*
C. *Highlighted selected study order*

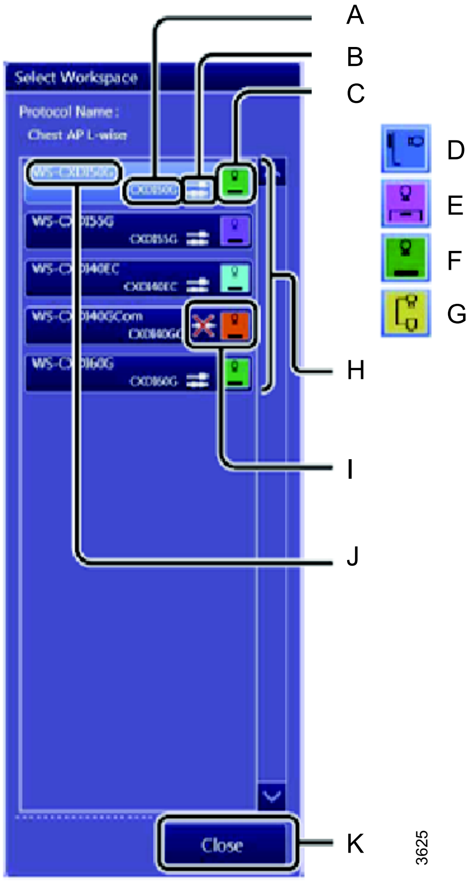


Fig. 3-58 Detector or workspace

2. Select detector or workspace.

A. *Detector name*
B. *Detector connection information*
C. *Patient posture (detector setup)*
D. *Stand*
E. *Table*
F. *Cassette*
G. *Universal*
H. *Available workspaces*
I. *Incomplete detector connection or turned off power box*
J. *Workspace name*
K. `Close`

3.4.8 Basic Exposure Error Handling

Exposure not possible	**Check**	**Measure**
The small detector is selected (Green)	Is the small detector in the docking station?	Remove the small detector from the docking station.
Table examination	If the table is equipped with a wireless detector and charging the detector in the holder - check if the connector is correctly connected to the detector.	Connect the connector correctly to the wireless detector.
Table or wallstand	Is the indication light lit (yellow LED in the control room or green light on the overhead tube crane)?	Position the system correct by pressing the servo button on the remote control, the operators console or on the overhead tube crane. or Change from Auto to Manual on the overhead tube crane display if the patient/light field is in position (and you don´t want to reposition the overhead tube crane).
Table examination	Is the detector in the table detector holder?	Place the detector in the table detector holder, make sure to connect the connector correctly.
Wallstand examination	Is the detector in the wallstand detector holder?	Place the detector in the wallstand detector holder, make sure to connect the connector correctly.

3.5 Mechanical Design

3.5.1 Table

The table is designed to cover all kind of examinations and patient types.

It is operational with a load up to 300 kg. The table Z-movement is motorized whereas the floating table top is manually manoeuverable. The table top brakes are electrical, allowing the operator to control them with a simple press of a button.

Note that the table is customized for the Omnera 500A Subsystem.

3.5.2 Wallstand

The up and down movement of the wallstand is both manually and motorized controlled. The movement is counter-weighted, allowing a manual movement with a very limited applied force. For motorized movement the motor is connected to the shaft with a clutch, this is also to reduce the force for manual movement.

The tilting function is motor driven. With a tilting function the imaging unit can be set in any angles within a range of -20° to 90°.

3.6 Table

3.6.1 Controls

The controls concerning the table are situated at the handlebar, mounted on the table top and/or at the floor, in form of a foot control (option) or a strip-tape switch (option). The control for the detector brake is placed on the right side of the detector holder. The controls are used for enabling and disabling functions concerning the table. These functions are:

A. Move down
B. Release/engage brakes of the table top (X- and Y-direction)
C. Move up
D. Release/Engage button for bucky movement brake and table indication light
E. Emergency stop

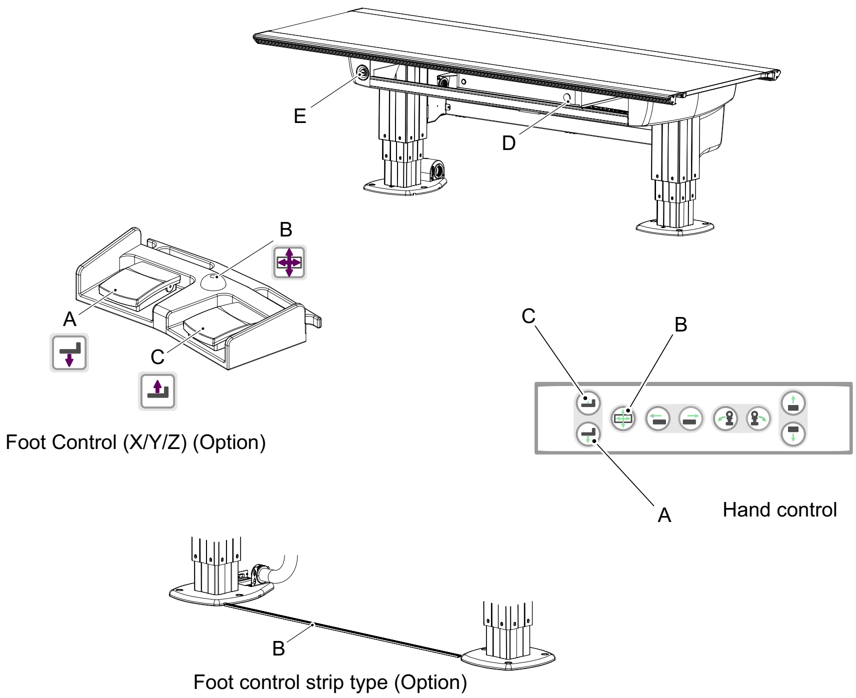


Fig. 3-59 Controls

The table top release key (B) automatically switches on the collimator lamp on activation. The collimator lamp is automatically switched off after a pre-defined time, when the table top release key has been deactivated (released).

Note!

The collimator light is not switched on during vertical movement. The idea is that light is only needed for the positioning of the patient and/or the radiation beam.

3.6.2 Motorized Imaging Unit Movement

The table imaging unit can be moved in X-direction motorized. The motorized movement is maneuvered from the table hand control. The function can synchronize the imaging unit and follow the movement of the overhead tube crane.

3.6.2.1 Synchronization Function

A mechanical solution enables the detector holder to be moved manually. The synchronization function finds the detector holder, moves to end position and lights up the green indicator. The imaging unit then follows the movement of the overhead tube crane during the synchronization.

If the user moves the imaging unit (motorized) using the hand control, the synchronization is performed as described above, also when auto position is activated in following modes:

- *Pendel* (pendulum)
- *Film tracking*

In *Table flexible* and *Auto position* mode, the system does not synchronize the imaging unit if the detector holder is not in its cradle. The user can select if the imaging unit should synchronize and follow the movement of the overhead tube crane or not, by moving the imaging unit manually into or from the cradle.

Note!

It is the user’s responsibility to verify that the imaging unit is in position when exposing.

3.6.2.2 Synchronization Function

In *Auto position* mode and in *Table flexible* mode, the detector holder may be moved in X-direction using the motor, via the table handle or manually by activating the green button at the detector holder. There is no synchronization between the tube and the table detector.

In Film tracking and Pendulum mode the detector holder may be moved manually in X-direction. If this is done, the servo button will be deactivated and exposure is no longer possible. To return to an activated servo button, the detector holder shall be moved to the correct position. The correct position will be indicated by the lightning of the green detector holder button.

3.7 Wallstand

3.7.1 Motorized Movement

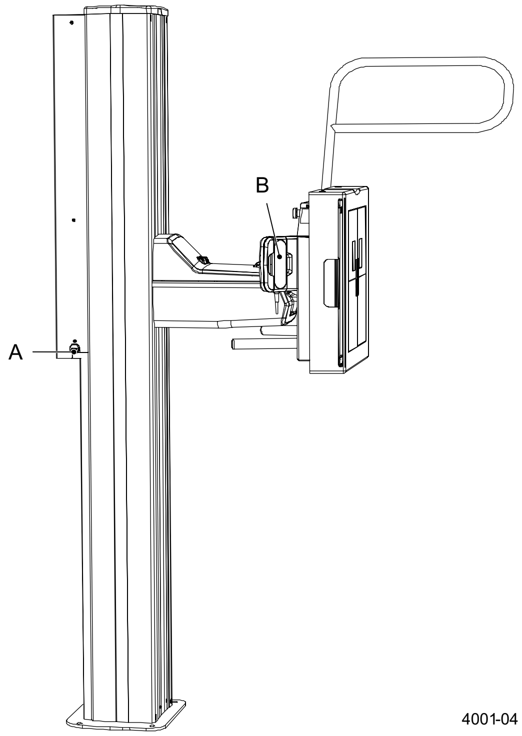


Fig. 3-60 Wallstand

The wallstand is controlled by the wallstand hand control unit and foot pedal.

A Emergency stop

B Hand control:
For adjustment of the automatic collimator, vertical movement of the detector, rotation of the detector and activation of pendulum mode.

The collimator lamp on the hand control (B) is activated when motorized or manual movement is performed, if *Wall flexible mode* is selected, se fig **Fig. 3-8**.

The Break release button (E), see fig **Fig. 3-8**, automatically lights the collimator lamp on activation, if *Wall flexible mode* is selected and the detector is moved. The collimator is automatically switched off after a pre-defined time when the Break release button (E) has been deactivated (released).

The Detector up/down button (G), see fig **Fig. 3-8**, is also used for enabling movement of the overhead tube crane (Z-direction). On activation of the Break release button (E), an automatic movement of the overhead tube crane is allowed. The automatic movement is used for tracking the movement of the detector and to synchronize (align) the X-ray tube and the imaging unit.

At auto-positioning the wallstand, the wallstand detector unit will move into a basic position.

Hand Control

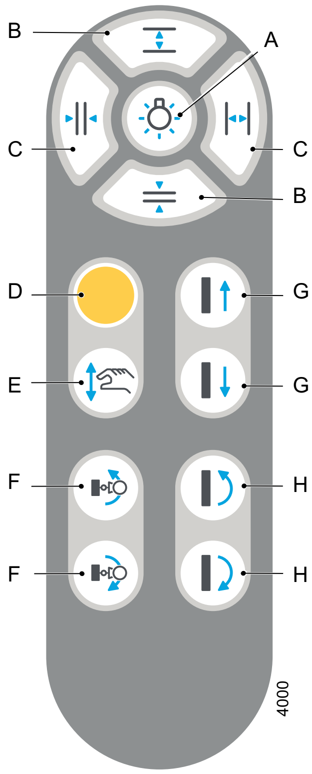


Fig. 3-61 Hand control

A. Collimator light on/off
B. Adjustment height collimation
C. Adjustment width collimation
D. Servo button
E. Break release for manual movement of detector
F. Pendulum mode wallstand
G. Detector up/down, Motorized
H. Detector tilt and overhead tube crane tracking, -20 to 90°

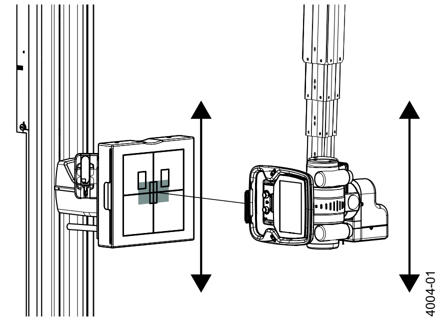


Fig. 3-62 Up/down

Up/down

- Button G, Motorized
  Overhead tube crane tracking wallstand detector when auto-position active
- Button E, Manual

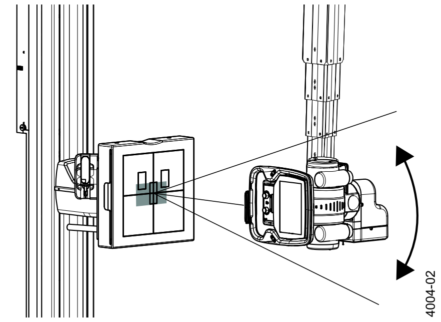


Fig. 3-63 Pendulum mode

Pendulum mode wallstand

- Button F
  The overhead tube crane performs a pendulum movement in order to find correct angulation of the central X-ray

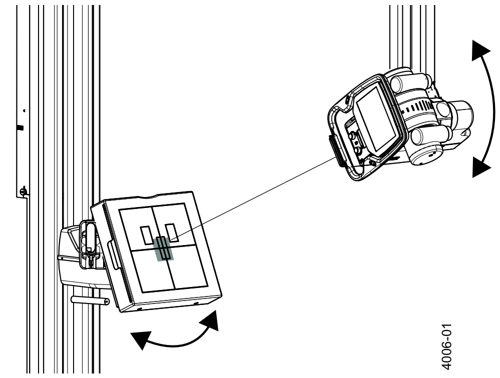


Fig. 3-64 Tilting

Tilting -20° to 90°

- Button H, Motorized Tilt
  Overhead tube crane tracking wallstand detector when auto-position active
- Button E, Manual

Note!

Armrest has to be removed to allow tilt movement.

3.8 Remote Control (option)

WARNING!

The System must always be supervised when activated.

Note!

The remote control shall only be used inside the examination room.

Note!

Always mark up the remote controls with, for example, the room number or the system number. Use the enclosed labels to distinguish different system remotes, from each other.

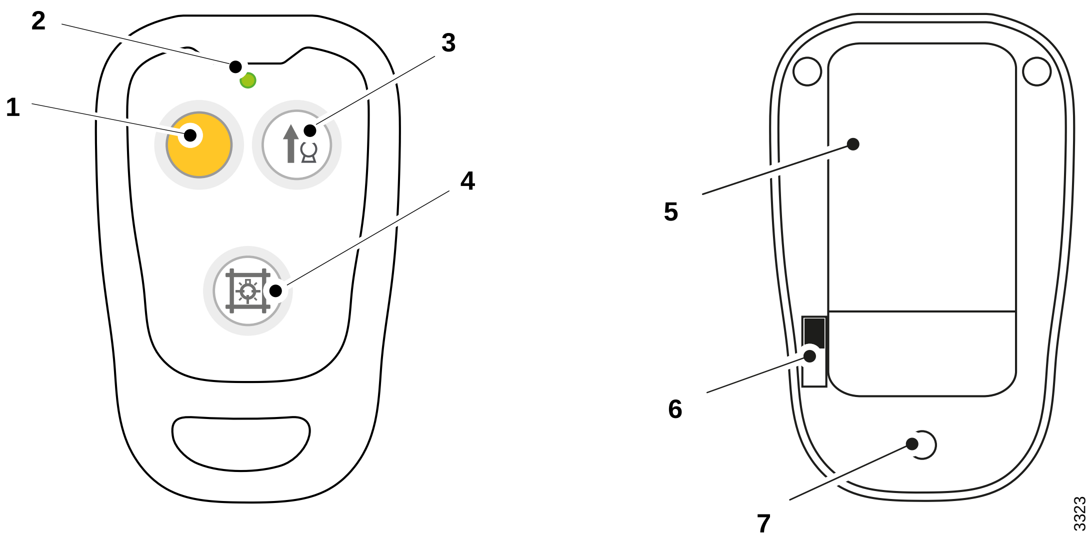


Fig. 3-65 Remote control, front and back

Front

1 Servo button – (yellow)

2 Indication diode (green)

3 Tube up

4 Switch On/Off Collimator light

Back

5 Fastening clip

6 On/Off switch

7 Battery changing slot

Servo button

The servo button is yellow with a little peg, making it easy to recognize the button.

When activating the yellow servo button, the overhead tube crane moves to auto-position.

Indication diode

The diode shows a green light, when the remote control button is activated. When the diode turns red, the batteries shall be exchanged.

Tube up

When the *Tube up* button is activated, the overhead tube crane moves upward. The movement stops when the button is released or when the highest possible position is reached.

Switch On/Off collimator light

The button turns the X-ray field illumination and linear light localizer on/off.

Automatic switch-off via a time switch.

On/Off switch

There is an On/Off switch for the remote control at the back of the remote control. When the control is switched off, all buttons are disabled.

Battery changing slot

When the indication diode lights red, changing of battery is needed.

The remote control uses 2 LR03, 1.5V, AAA batteries. To change batteries, loosen the 3 screws and open the slot at the back of the remote control.

Note!

The batteries shall be recycled.

4 Installation

4.1 Before Installation

Note!

Surrounding equipment, not supplied by the manufacturer, shall comply to the standard IEC 60601-1-2 regarding electromagnetic compatibility.

Note!

It is the responsibility of the one who combines the System with other equipment, to secure that the use of the combination is in compliance with MDD or other directives that may be mandatory on the market in question.

Note!

Refer to the Product Planning Guide for information about installation location, space and transfer.

4.1.1 Software Installation

The software is installed by the manufacturer.

4.1.2 Precautions

WARNING!

Do not switch on the power, before the cabling is checked for damage and the System completely installed and connected according to the Installation Chapter.

WARNING!

Electrical shock. Covers removed, exposure to electrical shock.

WARNING!

Remaining energy may exist when the equipment is switched off. Always wait at least 15 seconds before working on the System.

Note!

For a safe and reliable function of the System, it is crucial to follow the installation instructions regarding the insulation.

Note!

The insulation kit is designed to isolate System components, e.g. System cabinet, table, wallstand and ceiling suspended unit, from the hospital building.

The insulation kit will prevent stray currents from reaching the System e.g. via screw attachments. Stray currents can be present e.g. in reinforcement bars or in water pipes in a building. These currents can be of several hundred amperes and can affect the leakage current from the System to the patient and thereby the safety for patient and user. Stray currents in the building shall be regarded as a failure in the building but the insulation kit provides an extra safety barrier.

The insulation kit will also prevent unwanted ground loops due to e.g. electrical contact through the wall or floor lead X-ray shielding via screw attachments of the System components.

4.1.3 Installation Preparations

4.1.3.1 Tools Required

Standard Tools

- Standard hand tools and service tools
- Tools for unpacking
- Dynamometer (400N)
- Torque wrench (47Nm)
- Multimeter
- Dose probe
- Digital spirit level
- Rotation laser
- Allen keys (metric)
- Steel straight
- Hammer drill
- Lift
- Leakage current tester for measurements according to IEC 60601-1
- Assorted cable ties
- Protective ground wire tester for measurements according to IEC 60601-1
- Loctite 243
- Tape
- Service PC
- Service cable (See chapter)
- Standard serial cable
- Working gloves

4.1.4 Cable Marking

All cables and electronics are marked in accordance with the following:

1.xx — Overhead tube crane

2.xx — Table

3.xx — Wallstand

4.xx — Cabinet

5. xx Control Room

4.2 Installation

This chapter describes how to unpack and install the product.

CAUTION!

Always be at least two persons cooperating when unloading the equipment.

Before unloading the System, secure a proper equipment transfer route.

4.2.1 Shipping/Receiving

4.2.1.1 Receiving

1. Verify that the site is ready for installation.
2. Remove the crate's top and sides. Inspect the equipment for transport damage immediately upon arrival at its destination. If there is any damage, save the packing material and notify the transport company at once.
3. To determine whether the complete shipment has arrived, compare items received to those listed on the shippers packing list and the Manufacturer's order.

   Any discrepancies should be reported to:

   ARCOMA AB
   Annavägen 1
   SE-352 46 Växjö
   Sweden
   Phone +46 (0)470 70 69 70

4.2.1.2 Storage Precautions

CAUTION!

Store the machine in a place where the machine will not be exposed to water.

CAUTION!

Store the machine in a place where atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, salt, or air containing sulphur will not adversely affect the machine.

CAUTION!

Avoid placing on angled surfaces, and subjecting it to vibration, shock (including during transportation) and other factors that may impair stability.

4.2.1.3 Return Authorizations

Goods returned for credit, exchange or repair will not be accepted by the Manufacturer, unless written authorization has been issued.

Contact Manufacturer at the above address for return authorizations.

4.2.2 Mechanical Installation of Overhead Tube Crane

4.2.1 Ceiling Specification

The customer is responsible to meet the requirements of the ceiling suspension substructure. The maximum allowed ceiling load must not be exceeded.

Ceiling rails	**Traverse (X) [kg]**	**Rail (Y) [kg]**	**OTC [kg]**	**Dynamic load [kg]**	**Total load [kg]**
4x4	95	80	165	260	340
4x5	95	95	165	260	355
4x6	95	110	165	260	370
5x4	109	111	165	274	385
5x6	109	151	165	274	425

4.2.1.1 Installation Rails (Unistrut)

The described installation is performed with Unistruts, but other methods can also be used.

Check that necessary fixation points are present in the ceiling. Use Unistrut rails (**1**) or similar mounted according to **Fig. 4-1**.

- The Unistrut rails shall be parallel with the long side of the patient table.
- Vertical alignment shall be within +/- 1 mm.
- Every single attachment point, must be able to carry a vertical ceiling load of at least 5 kN.
  Vertical load also includes the dynamic loads. Each attachment point can handle the entire system load. Safety margin values are not included.
- The overhead tube crane with 4x4 m rails must have at least 10 brackets at the ceiling.
- +/- 1 mm deformation are allowed.

To install the cable carriage, see **Installing Cable Carriages, Page 117**. The distance between the wall and the ceiling rail Y must be at least 120 mm.

To install the ceiling wagon, see section **4.2.1.7 Ceiling Wagon, Page 124**. The distance between the wall and the ceiling rail X must be at least 1000 mm

The length of the traverse rails X, outside the ceiling rails Y must not exceed 628 mm, see **Fig. 4-1**. If the traverse rails are more than 4000 mm, a third rail must be used in the middle, for increased stability.

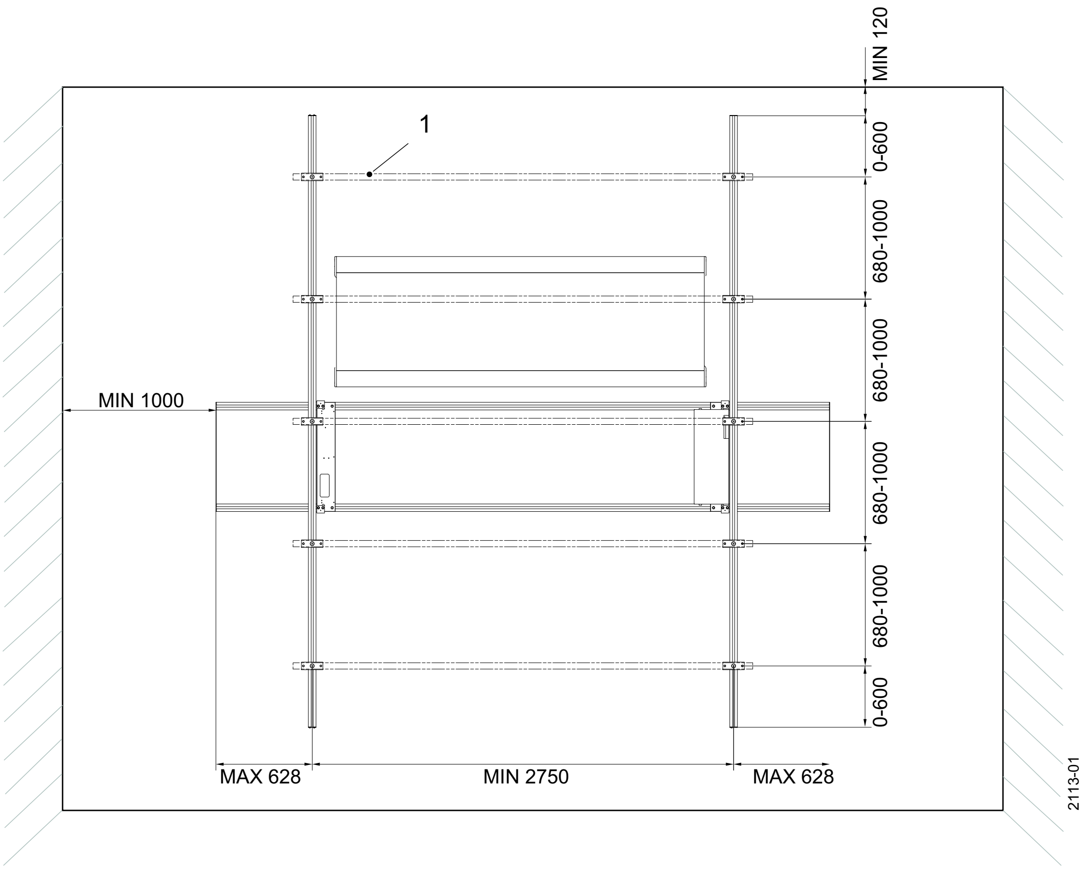


Fig. 4-1 Ceiling specification, units in mm

Rail X (mm)	Rail Y (mm)	Unistrut rails	Number of brackets	Number of Rails Y
3000	3000	4	8	2
3000	4000	5	10	2
3000	5000	7	14	2
3000	6000	8	16	2
4000	3000	4	8	2
4000	4000	5	10	2
4000	5000	7	14	2
4000	6000	8	16	2
5000	3000	4	12	3
5000	4000	5	15	3
5000	5000	7	21	3
5000	6000	8	24	3

Insulation

For a safe and reliable function of the System it is crucial to follow the Installation instructions regarding insulation.

Note!

The insulation kit is designed to isolate System components, e.g. System cabinet, table, wallstand and ceiling suspended unit, from the hospital building.

The insulation kit will prevent stray currents from reaching the System e.g. via screw attachments. Stray currents can be present e.g. in reinforcement bars or in water pipes in a building. These currents can be of several hundred amperes and can affect the leakage current from the System to the patient and thereby the safety for patient and user. Stray currents in the building shall be regarded as a failure in the building but the insulation kit provides an extra safety barrier.

The insulation kit will also prevent unwanted ground loops due to e.g. electrical contact through the wall, or floor lead X-ray shielding via screw attachments of the System components.

4.2.1.2 Traverse

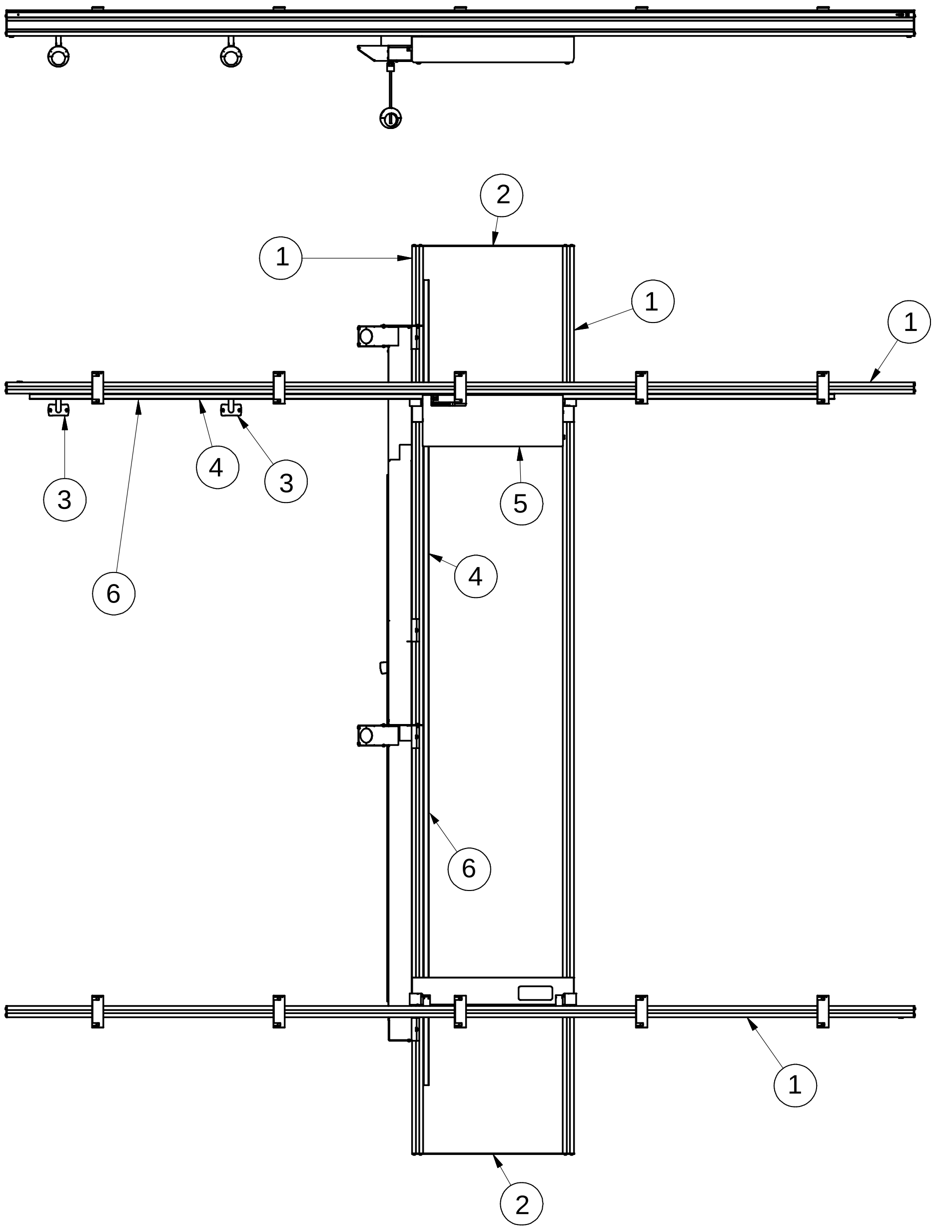


Fig. 4-2 Traverse 4x4 m

1. *Beam*
2. *End cover, large (0070–001–021)*
3. *Cable carriage (0070–099–001)*
4. *Tooth belt profile*
5. *Cover, electronics (0070–063–247)*
6. *Tooth belt*

1. Mount the traverse according to **Fig. 4-2**.

4.2.1.3 Tooth Belt

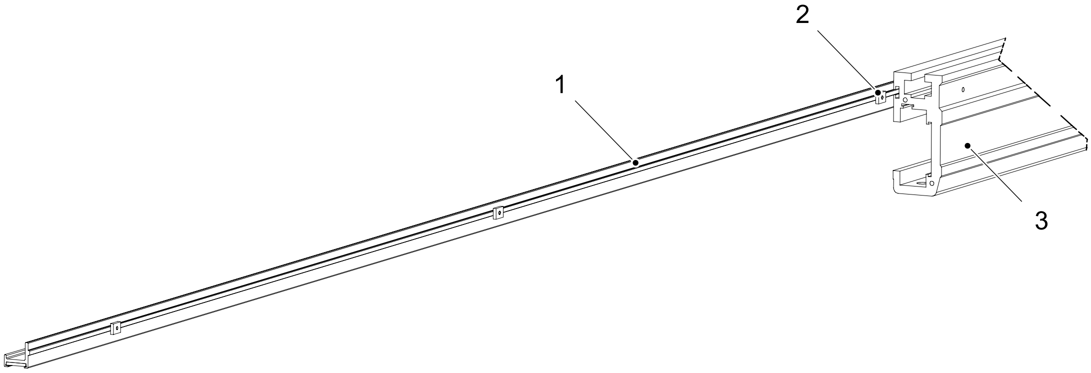
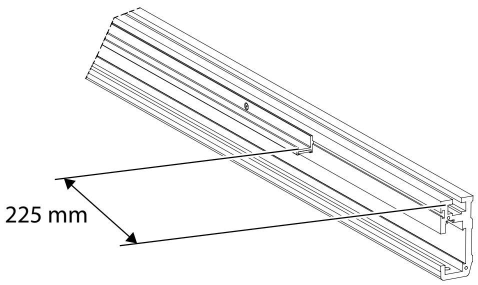


Fig. 4-3 Tooth belt profile

1. *Tooth belt, included in rail package*
2. *Installation nut M4*
3. *Ceiling rail Y or Traverse rail X*

Install the tooth belt profile on the ceiling rail Y and traverse rail X, see **Fig. 4-3** and **Fig. 4-4**. The screws and nuts are pre-assembled at the tooth belt profile.

1. Loosen the screws.
2. Slide the rail into ceiling rail Y and traverse rail X.
3. Tighten the screws again. Use Loctite 243 when tightening the screws.



For distances, see **Fig. 4-4**.

Fig. 4-4 Mounting distance

4.2.1.4 Ceiling Rails Y

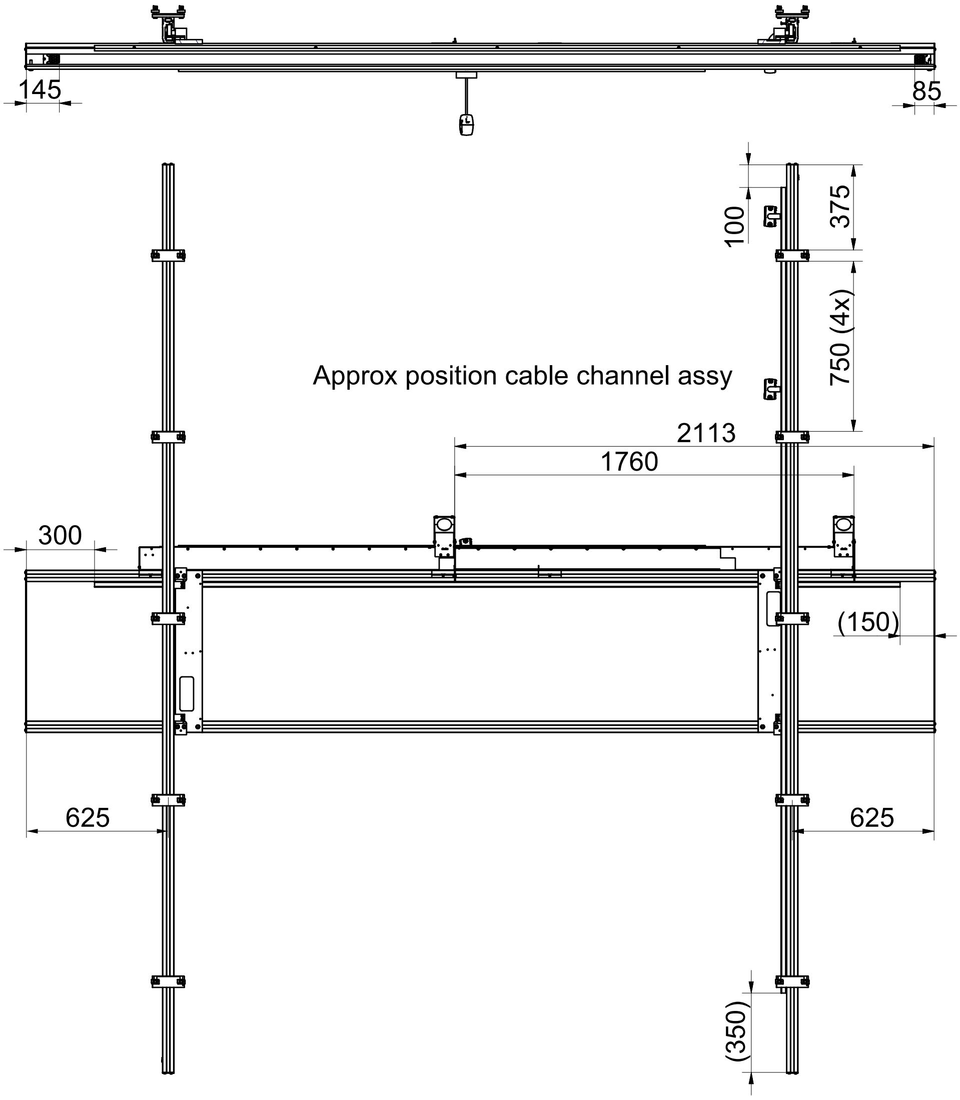


Fig. 4-5 Approximate position cable channel assembly

1. Open the pack box CS Box 1.
2. Take the ceiling rails Y, 1 with tooth belt and the other(s) without tooth belt (standard 4000 mm), and install the fixation blocks at the same distance as the Unistrut rails. Use the M12x30B and the installation nut M12.
3. For the position of the ceiling rail with tooth belt, see **Fig. 4-5**
4. Install the insulation plates and cases on the fixation blocks.

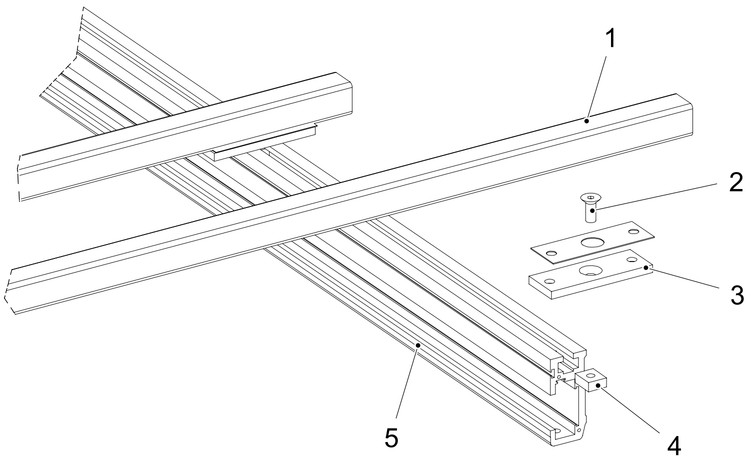


Fig. 4-6 Fixation block

1. *Unistrut rail*
2. *MF6S 10.9 M12X30B*
3. *Fixation blocks*
4. *Installation nut M12*
5. *Ceiling rail Y*

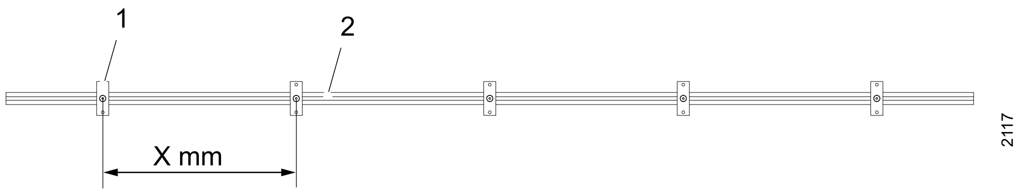


Fig. 4-7 Distance between fixation blocks

*For distance X, see **Fig. 4-1**.*

1. *Fixation block*
2. *Ceiling rail Y*

Note!

*For location of the tooth belts, see **Fig. 4-2**.*

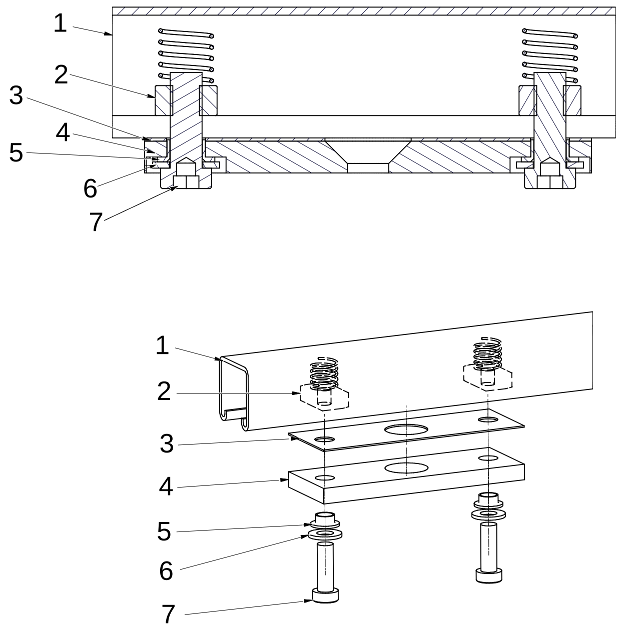


Fig. 4-8 Ceiling attachment

1. *Unistrut rail*
2. *Spring channel nut*
3. *Isolation plate, traverse*
4. *Fixation block*
5. *Isolation case, traverse*
6. *BRB FZB*
7. *MC6LS M10x30A*

Note!

It is important to use low-head bolts for this installation.

---

1. Lift up the ceiling rails Y and bolt them into the ceiling attachment points.

   To bolt the ceiling rails Y into the Unistrut or similar, use M10 low-head bolts and a suitable (M10) washer, between the bolts and the insulation housing.
2. Check that the ceiling rails Y are parallel ±2 mm.
3. Use Loctite 243 on the bolts and tighten them to a torque of 47 Nm.

Ceiling Rails Y Alignment

1. Check that ceiling rails Y are horizontal, measure with a spirit level. If necessary, adjust with the shims kit 1 mm or 2 mm.

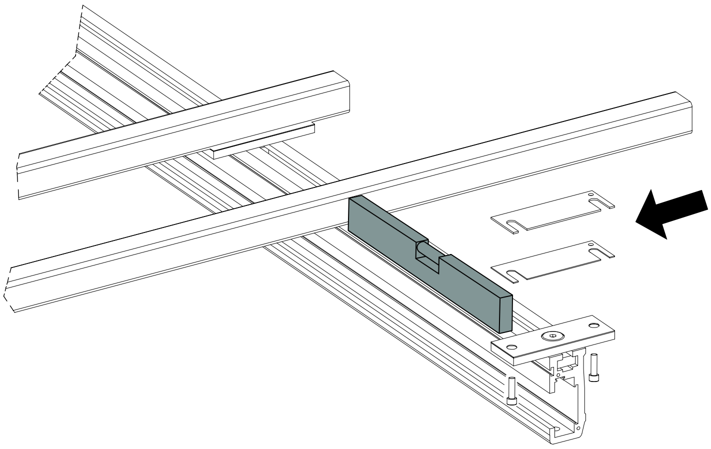
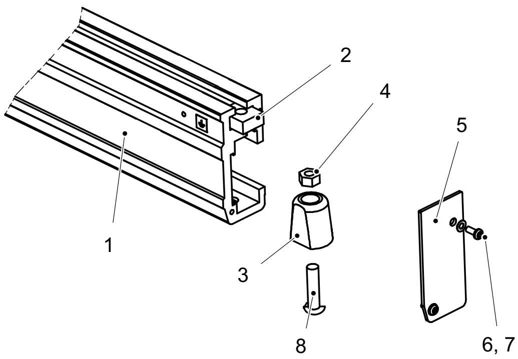


Fig. 4-9 Alignment of ceiling rails Y

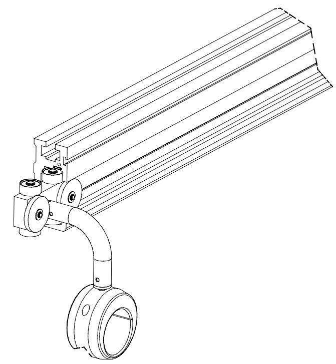
Installing Cable Carriages



1. Open the pack boxes CS Box 4, and CS Box 2.
2. Decide from what side to slide the distance plates.
3. Mount an end stop 3 and an end cover 5 at both ends of the ceiling rail Y 1.

Fig. 4-10 End stop

1. *Ceiling rail Y*
2. *Anchoring nut M12 (0070–001–016)*
3. *End stop, rubber (0070–001–022)*
4. *M6M M10*
5. *End cover, small, ceiling rail (0070–001–020)*
6. *Contact washer KB 5.1x10.2*
7. *K6S 4.6 M5X10 A*
8. *K6S M10x40 A*



4. Install as many cable carriages as needed in the ceiling rail Y.

Fig. 4-11 Cable carriage

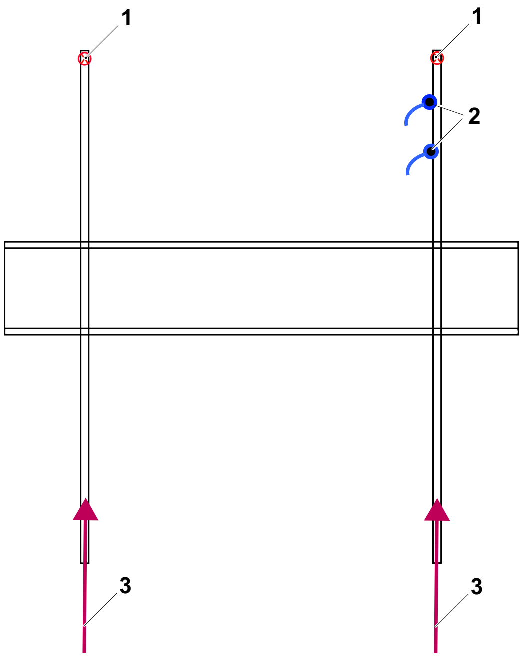


Fig. 4-12 Installations at Ceiling Rails Y

1. *End stops*
2. *Cable carriages*
3. *Distance plates*

5. Mount end stops, cable carriages and distance plates on the Ceiling Rails Y.

Distance Plates

Note!

Install the M10x75 bolts, before rolling in the distance plates all the way.

The tooth belt obstructs installation of the bolts afterward.

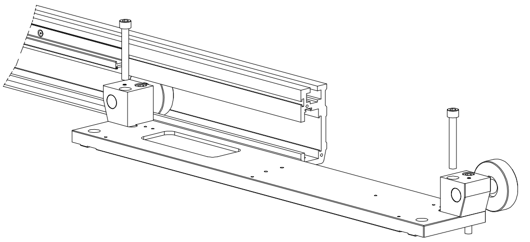


Fig. 4-13 Distance plates

6. Roll in the distance plates into each ceiling rail Y, see **Fig. 4-13**.

End Stops and Covers, Ceiling Rails Y

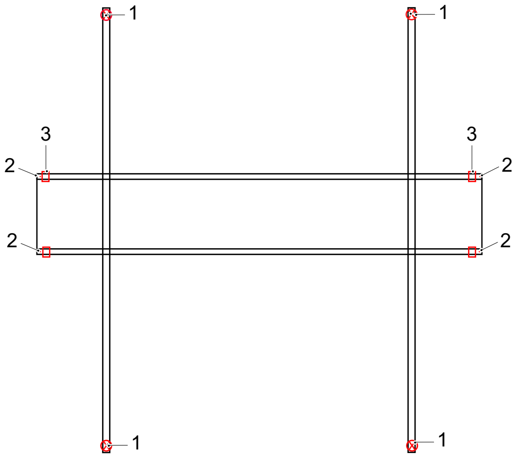


Fig. 4-14 Overview rubber/adjustable end stop

1. *Rubber end stop + K6S bolt and nut, (4 pcs)*
2. *K6 bolt and nut, (4 pcs)*
3. *Adjustable end stop, (2 pcs)*

7. Mount the remaining end stops and covers.

   Fig. 4-14 shows positions for the adjustable end stops, only 2 adjustable end stops are needed, positioned on the same rail or diagonally in relation to each other.

Protective Earth

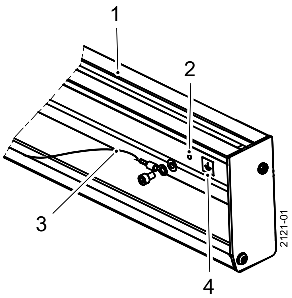


Fig. 4-15 Protective Earth

1. *Ceiling rail Y*
2. *Protective earth connection point*
3. *Cable*
4. *Protective Earth symbol*

8. Connect a protective earth cable 3 from the system cabinet to each ceiling rail Y at the protective earth connection point 2. The cable is to connected at PE02 in the system cabinet, see **Fig. 4-70**

4.2.1.5 Traverse Rail X

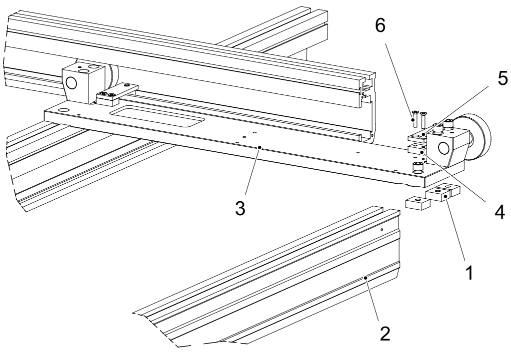


Fig. 4-16 Attach traverse rails X

1. *Installation nut M10, 0070–001–034*
2. *Traverse rails X*
3. *Distance plate, 0070–001–223, CS Box 4*
4. *0070–001–044*
5. *0070–001–242*
6. *MF6S M5x25 (2x)*

1. Lift up the traverse rails X and bolt them into the distance plate, see **Fig. 4-16**. See also for measurements.
2. Select the tooth-belt rail and position it in accordance with **Fig. 4-2**.
3. Pack box CS Box 2 and 4.
4. Put 3 installation nuts M10 into each rail. Attach by 2 pcs of M10x75 and 1 pc of M10x25.

Side Position Bearings

1. Install the side position bearings on the distance plates. See **Fig. 4-16**.
2. Run the traverse rails X all the way and make sure they run smoothly.
3. Check that the rails are parallel and that the wheels are centered in the ceiling rails Y. Adjust if necessary.

4.2.1.6 Electrical Plate Y and Drive Unit Y

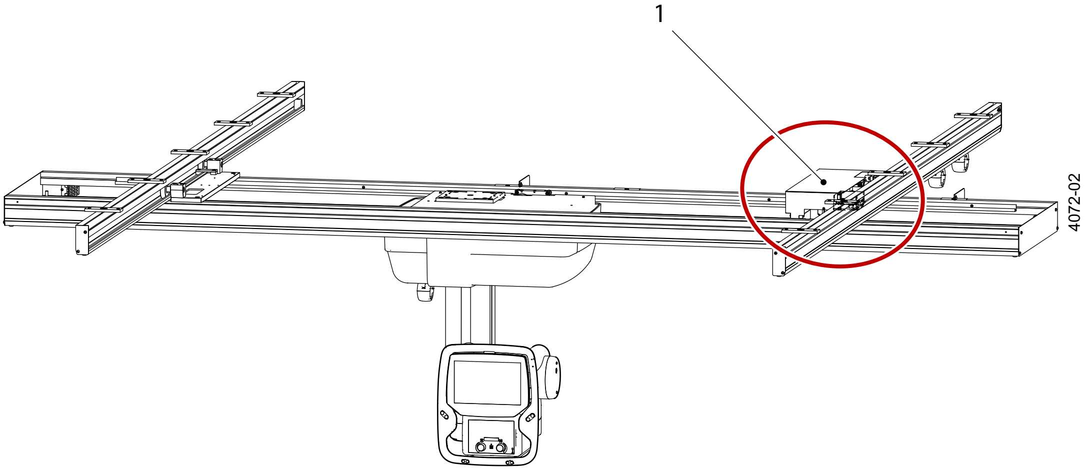


Fig. 4-17 Mounting position of drive unit (1)

1. Unpack the electrical plate.
2. Install the electrical plate Y and drive unit Y, by using the 3 pcs of M5x8A screws and contact washers.

Note!

The drive unit (1) must be mounted at the right side of the traverse, see ***Fig. 4-17****.*

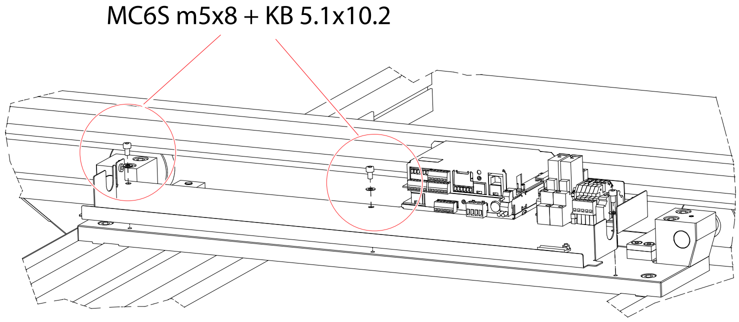


Fig. 4-18 Assembling electrical plate

3. Assemble the electrical plate Y.
4. Unscrew the assembling screws from the support wheel bracket.

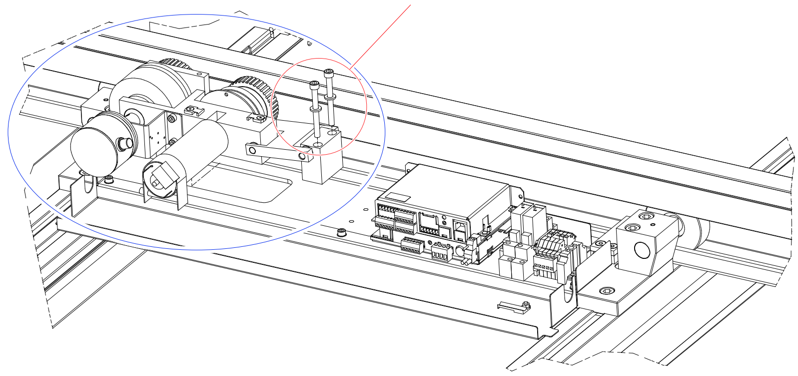


Fig. 4-19 Assembling drive unit

5. Disassemble the support wheel bracket from the braking unit.
6. Assemble the drive unit with 2 screws — do not tighten the screws.

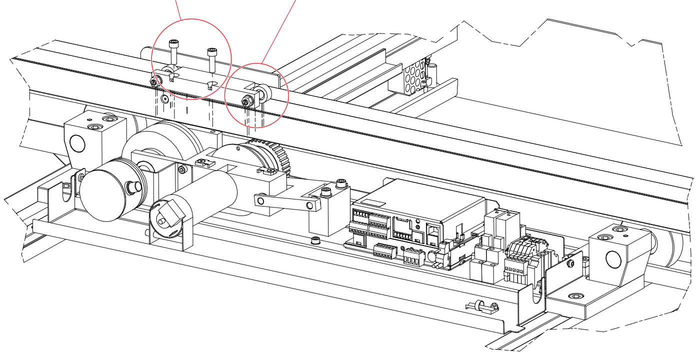


Fig. 4-20 Adjusting wheel axles

7. Reassemble the support wheel bracket at the braking unit.
8. Adjust by loosening the nuts at the eccentric wheel axles. Turn the eccentric wheel axles, with a screw driver, until there is no play and the bearings are not possible to turn.
9. Connect the drive unit to the electrical plate Y, see **Fig. 4-23**.

Note!

As soon as the drive unit is installed, the traverse rail X is locked in its position. The traverse cannot be moved until the power is supplied and the brake is released.

4.2.1.7 Ceiling Wagon

1. Check room layout for the correct orientation of the ceiling wagon. There should be enough space in accordance with **Fig. 4-1**.
1. Decide from which side the ceiling wagon shall be inserted. Mount end stops at the opposite side of the X traverses.

End Stops and Covers, Traverse Rails X

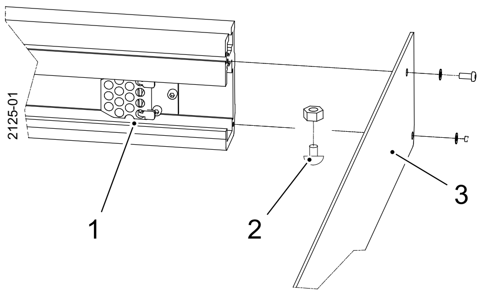


Fig. 4-21 End stop and the cover plate

Install the end stops and the cover plate onto the traverse rails X.

1. Mount the adjustable end stops **1**.
2. Mount the non-adjustable end stops **2**.
3. Mount the end plates **3**.

Install the Ceiling Wagon

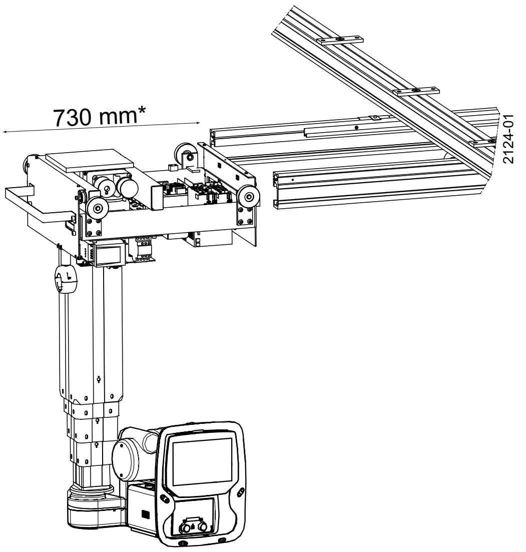


Fig. 4-22

630 mm with bracket removed

Lift up the ceiling wagon and roll it into the traverse rails X, see **Fig. 4-22**.

If this distance cannot be obtained;

1. Remove the 4 wheels and roll them into the traverse rails X.
2. Lift the ceiling wagon into position.
3. Remount the wheels.

Side Position Bearings

1. Install the side position bearings on the ceiling wagon.
2. Run the traverse rails X all the way and make sure they run smoothly.
3. Check that the rails are parallel and that the wheels are centered in the ceiling rails Y. Adjust if necessary.

Cable Hose

1. Install the loose end of the cable hose, referring to the room planning. Preferred position is close to the parking position.
2. Move the ceiling wagon around and check that the cables are not caught into something in the room. The cable hose may be shortened to avoid from hanging down too much.

Drive Unit

1. Lower the electronic plate.
2. Install the drive unit X and connect the cables.

   As soon as the drive unit is installed, the traverse rail X is locked in its position. The traverse cannot be moved until the power is supplied and the brake is released.

4.2.1.8 Electrical plate 1.Y

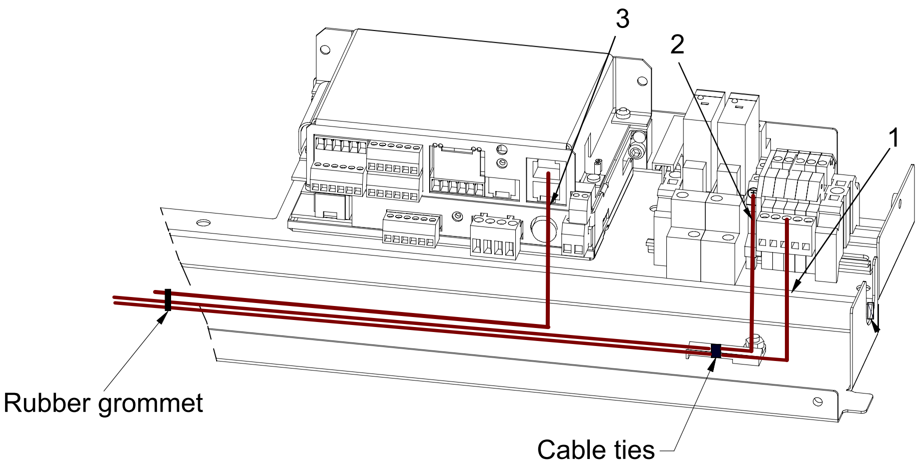


Fig. 4-23 Connect cables on drive unit Y

1. *Cable 1.YJ01 1.YJ01*
2. *Cable 1.YPE 1.YPE*
3. *Cable 1.YJ01 1.YCB01-J6 1.YCAN*

1. Connect to electrical plate 1.Y.
2. Place redundant cabling under the cover.

4.2.1.9 Cable Channel

Measurements

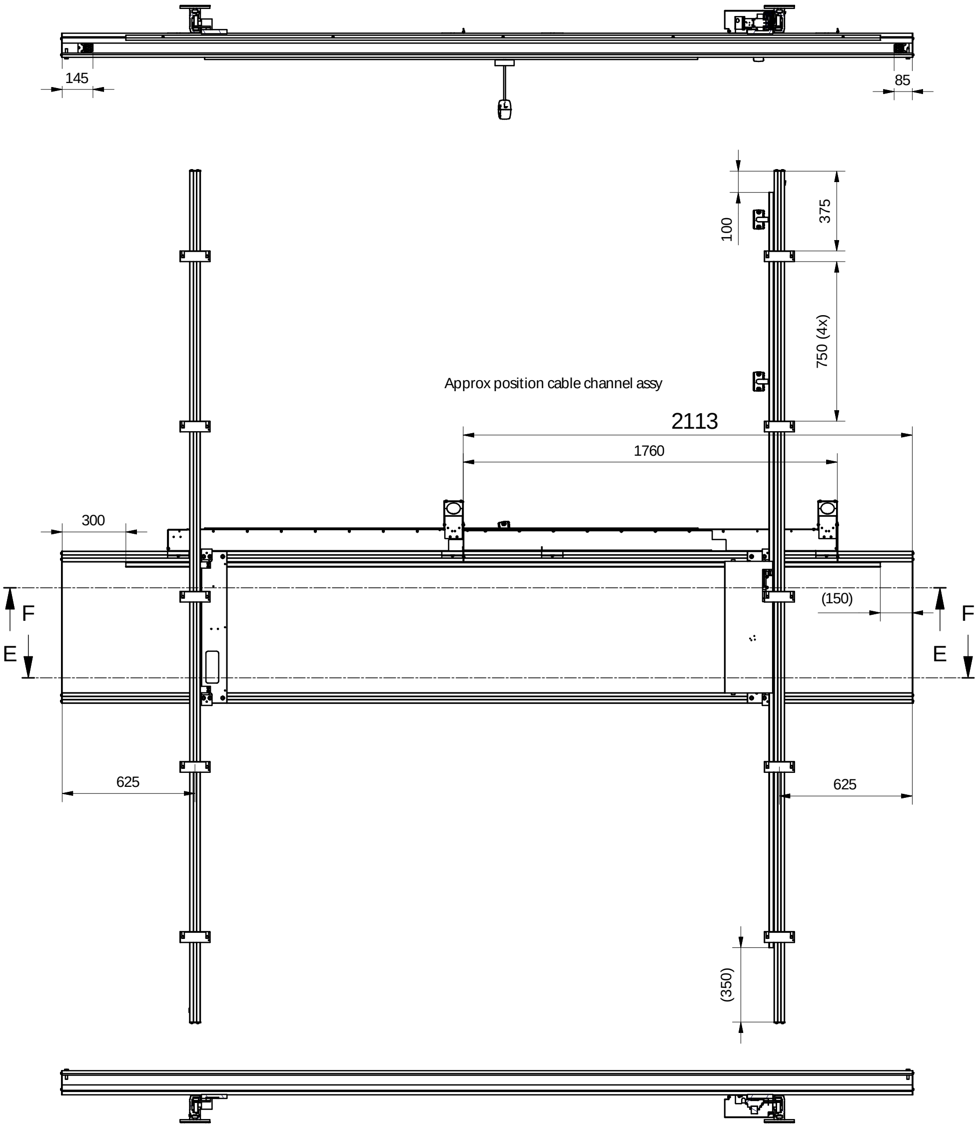


Fig. 4-24 Measurements for rails, 4x4 m

The outer cable attachment shall be close to the Y-beam.

Note!

The distance 2113 mm is used to get the same cable length at both sides.

For a 5 m rail, this distance is 2613 mm.

Mounting Cable Channel

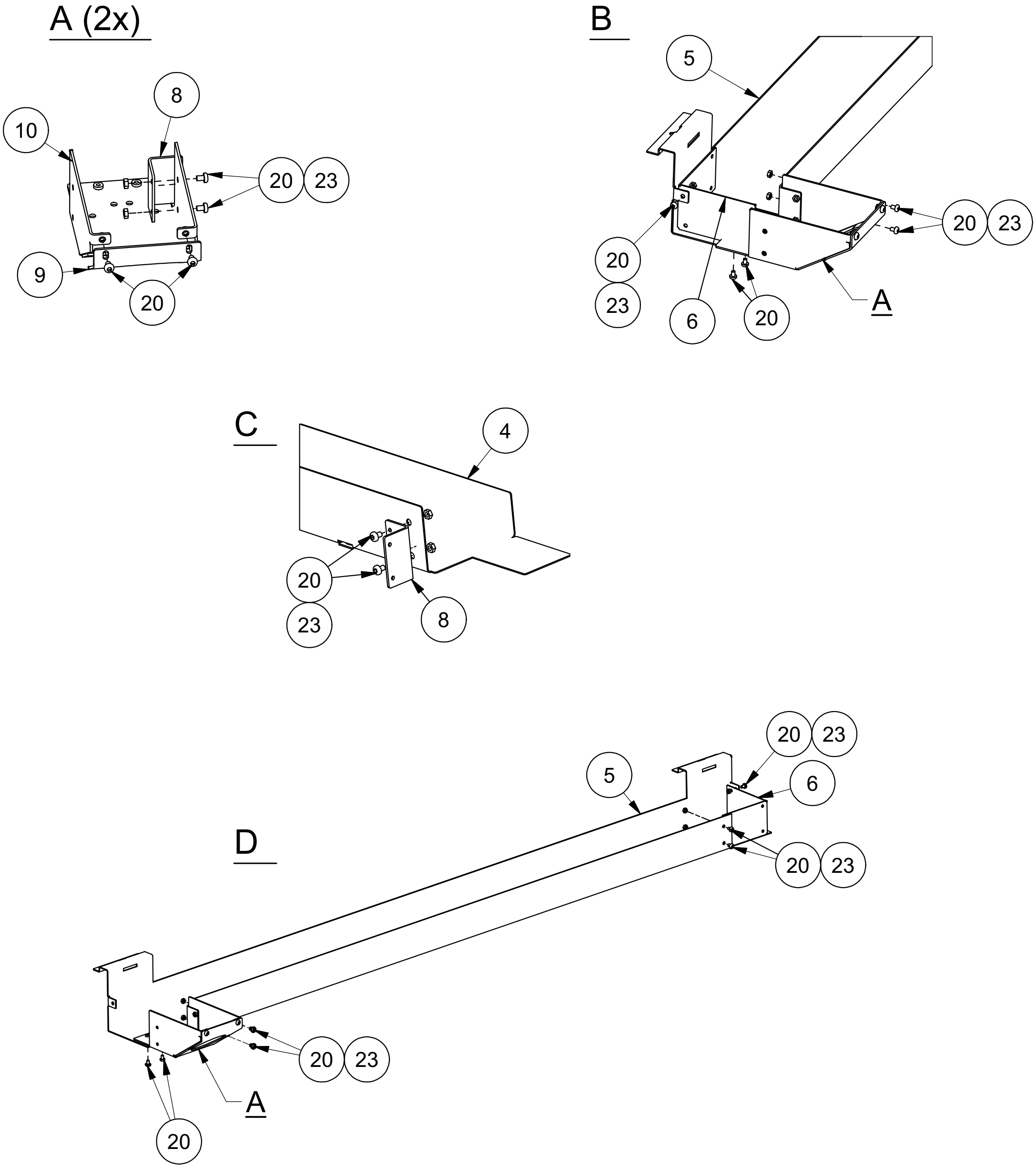


Fig. 4-25 Mounting cable channel

1. Decide at which side the cable hose shall leave the cable channel.
2. Mount the cable channel according to **Fig. 4-25**.

3. Mount the channel brackets, the end plates and the supporting angles at the cable channel ends, in accordance with the numbers in **Fig. 4-26**.

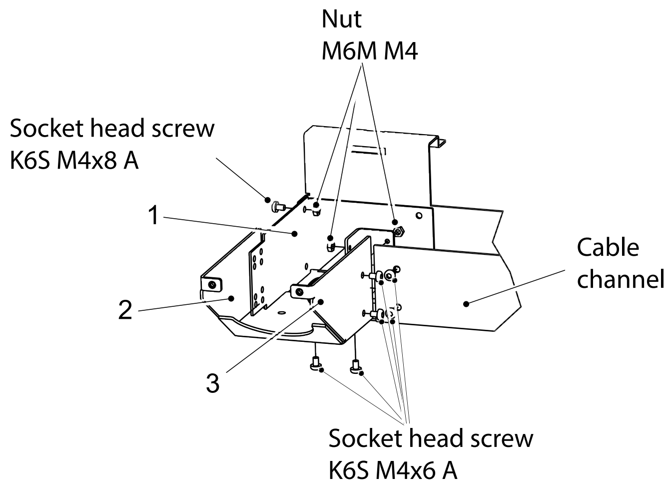


Fig. 4-26 Cable channel bracket, left

Mounting order:

1. *End cover, cable channel (0073–600–034)*
2. *Cable channel bracket, intermediate (0170–600–009)*
3. *Angle, cable channel (0170–002–148)*

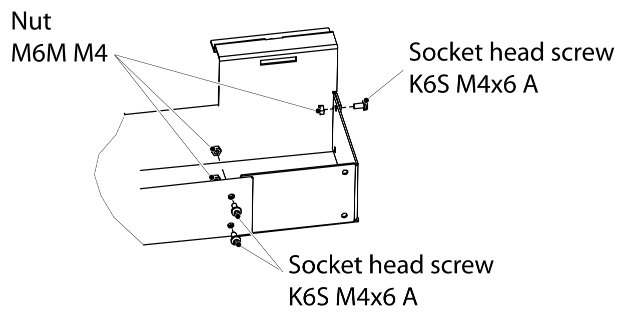


Fig. 4-27 Cable channel bracket, right

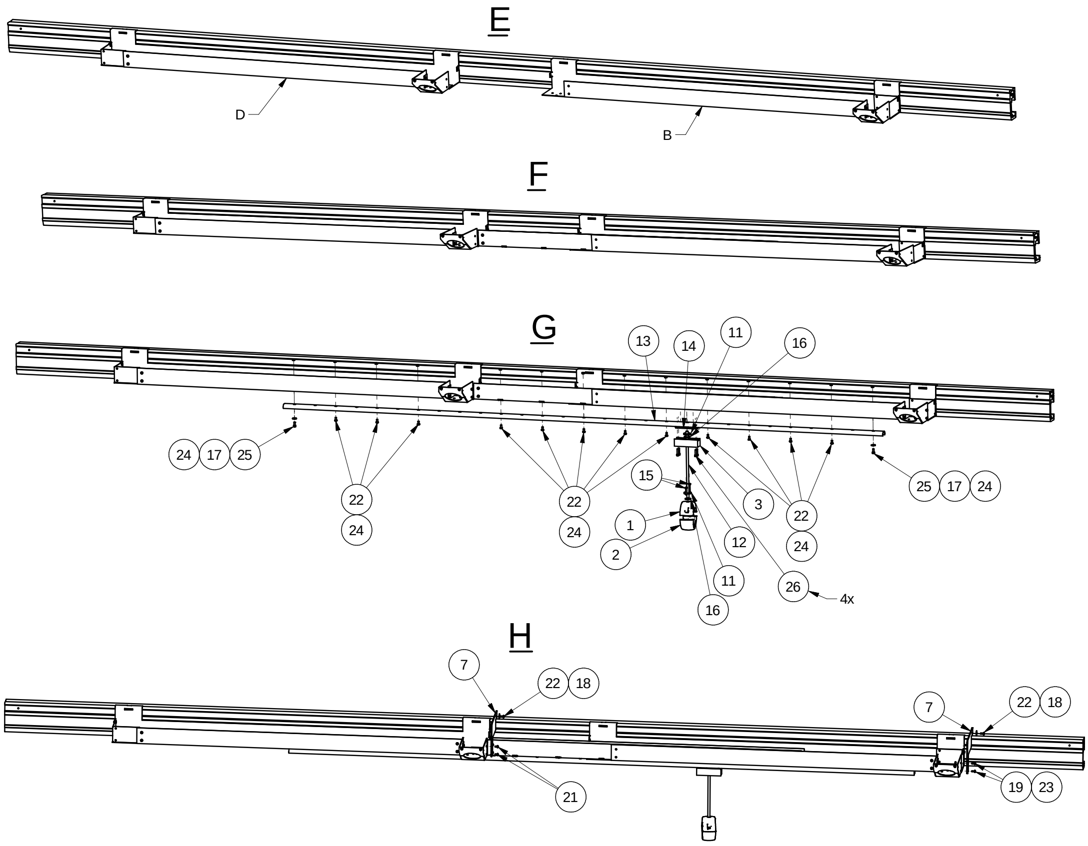


Fig. 4-28 Right hanging

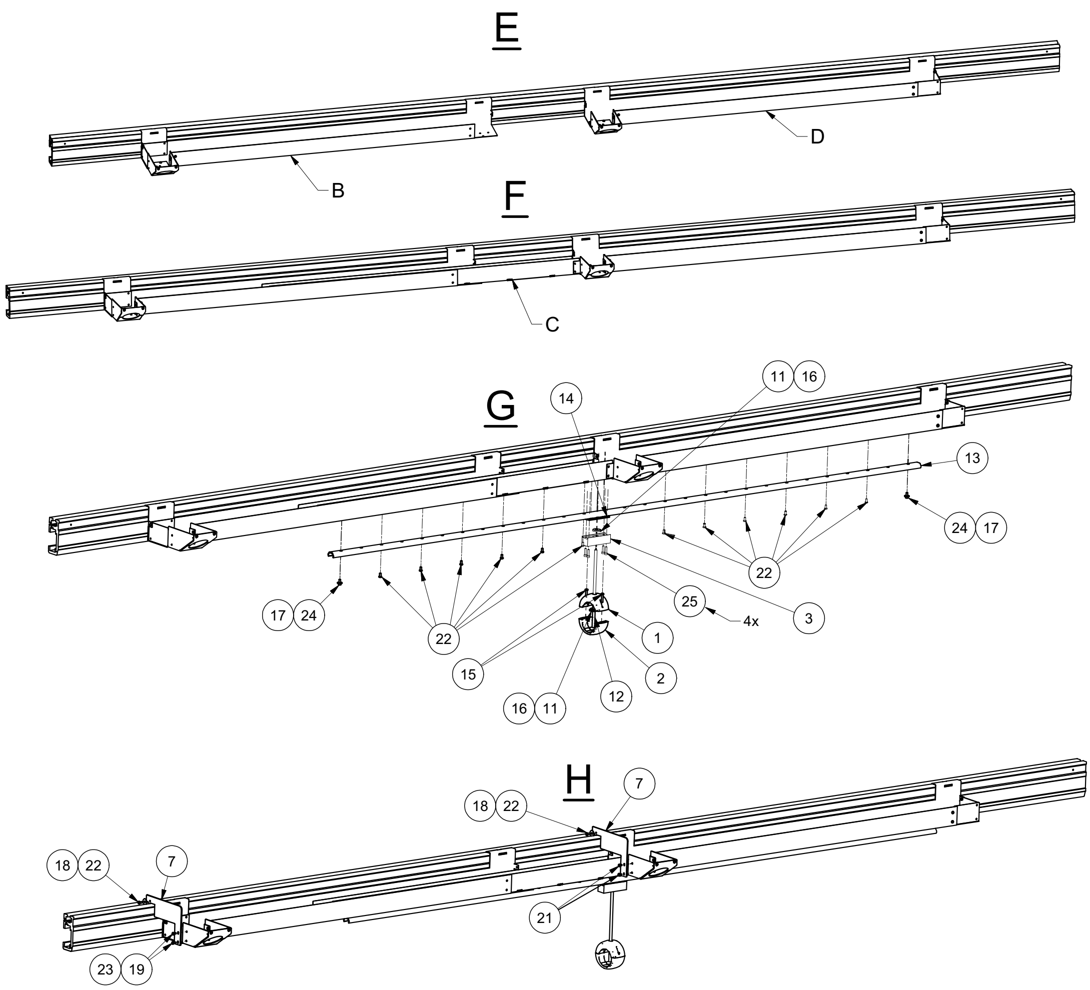


Fig. 4-29 Left hanging

1. *Cable holder, part A(0070–600–045A)*
2. *Cable holder, part B (0070–600–045B)*
3. *Wagon, cable suspension (0073–003–018)*
4. *Cable channel (0073–600–028)*
5. *Cable channel, for 4 m (0073–600–029)*
6. *End cover, cable channel (0073–600–034)*
7. *Support, cable channel (0073–600–042)*
8. *Cable channel, angle (0170–002–148)*
9. *Cable channel bracket hose (0170–600–007)*
10. *Cable channel, intermediate (0170–600–009)*
11. *Cable ties*
12. *Rubber rope (52–101_300mm)*
13. *Rollco SXTE30–2320 (53–237)*
14. *Rollco LSWL30_wagon (53–238)*
15. *Plastic screw KT-PT 5x25mm (54–430)*
16. *BRB FZB (BRB 1.5x21x2)*
17. *BRB FZB 5.3x15x2 (BRB 5.5x19NB)*
18. *SRKB FZB 5.5x19 (BRB 5.5x19NB)*
19. *K6S 10.9 FZB 4x10 (K6S M4X10 A)*
20. *K6S 10.9 FZB 4x6 (K6S M4x6 A)*
21. *K6S 10.9 FZB 4x8 (K6S M4x8 A)*
22. *K6S 10.9 FZB 4x10 (K6S M4x10 A)*
23. *M6M-8 FZB 4 (M6M M4)*
24. *MC6S 8.8 FZB 5x12 (MC6S M5x12 A)*
25. *MC6S 8.8 FZB 5x20 (MC6S M5x20 A)*

4. Adjust the length of the cable channel according to **Fig. 4-24** by pushing one part of the channel into the other. It shall be locked in a later step of the mounting.

Cable Into Channel

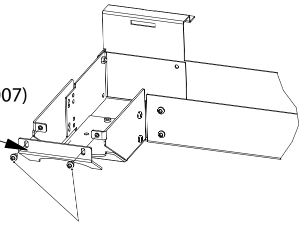


Fig. 4-30 Attach hose bracket

1. *Bracket, hose (0170-600-007)*
2. *Socket head screw K6S M4x6A*

5. Put the cable into the channel, and haul it through the holes in the cable channel brackets. Attach the bracket (1) to the cable channel bracket using the screws (2), see **Fig. 4-30**. Attach the hose to the bracket.

Stabilizing Plates

Note!

The cable must be put inside the channel, before the stabilizing plates are mounted.

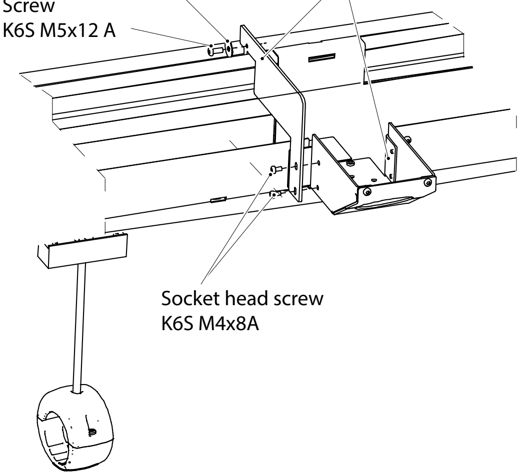


Fig. 4-31 Intermediate cable channel bracket

6. Mount the stabilizing plates at the outside of the cable channel brackets.

Note!

The channel bracket at the channel extension shall have 2 angles mounted.

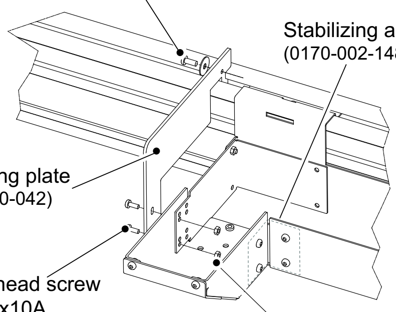


Fig. 4-32 Stabilizing plate

CAUTION!

Remember to fasten the nut and washer at the upper side of the stabilizing plate, in accordance with Fig. 4-32 Stabilizing plate

7. Fasten the nut and washer at the upper side of the stabilizing plate, in accordance with **Fig. 4-32**.

Sliding Rail, Cable Wagon And Cable Suspension

8. Fasten the sliding rail for the cable holder, at the middle of the cable channel, lower side.
9. Mount the cable wagon and the cable suspension.

   See **Fig. 4-28**, view G.

Note!

*Item number 17 and 24 are used as end stops for the carriage. See **Fig. 4-29**.*

4.2.1.10 Wall Attachment For Cable (option)

1. Move the traverse rail X to its end position so the cable channel, mounted on the traverse rail X, will point toward the middle of the ceiling rail Y.

   If the overhead tube crane is not moved to its end position, the hose may not be long enough when the overhead tube crane is positioning after installation.
2. Measure the distance and mount the wall attachment on half this distance, and at the same height as the ceiling rails Y.
3. Shorten the hose if necessary, after mounting the wall attachment.

4.2.1.11 X-ray Tube

The X-ray tube is pre-installed by the Manufacturer. For more information on mechanical installation and adjustment refer to X-ray tube Manufacturing documentation.

4.2.3 Mechanical Installation of System Cabinet

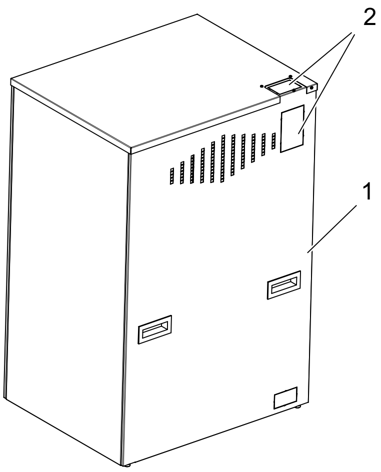


Fig. 4-33 System cabinet

1. Place the system cabinet in a corner of the room, see Planning guide and room layout for further information. The cabinet corner (1), see **Fig. 4-34** and **Fig. 4-35**, must be placed in a corner of the room.
2. Remove one of the cable outlet covers (2). Which outlet to use depends on the installation of the cables from the overhead tube crane, table, and wallstand, see **Fig. 4-33**.

   If the upper outlet is used, cover the outlet with the cable channel, otherwise objects may fall into the cabinet and down to the generator.
3. Cover the edges of the outlet with the edge protection, see **Fig. 4-34**.

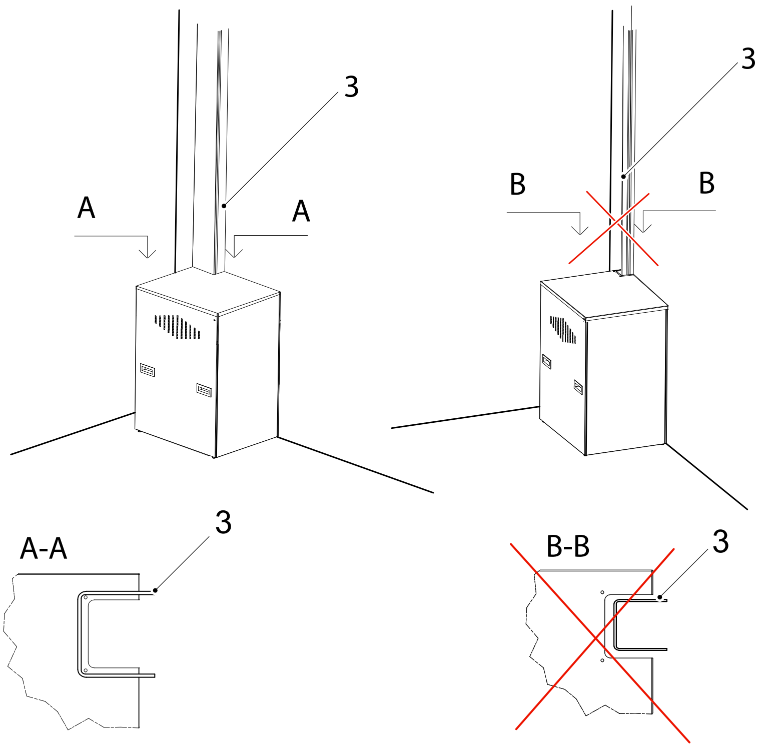


Fig. 4-34 Alternative 1

- The cables must be covered with a cable channel. The cable outlet shall be completely covered by the cable channel.
- The cable channel must not be possible to open without a tool.
- The cables have to be secured with a cable clamp or a suitable strain relief.

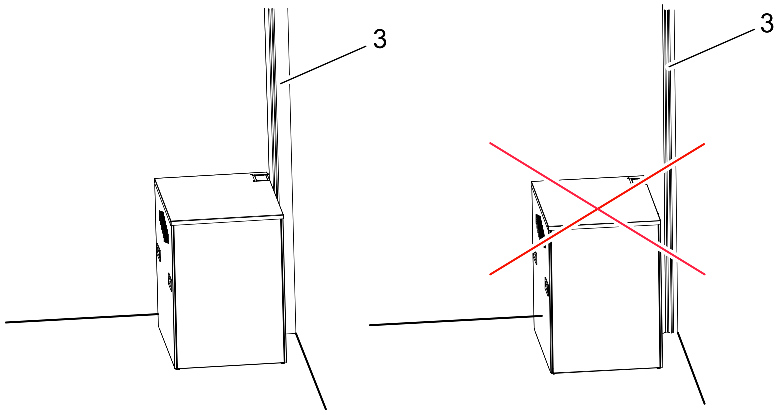


Fig. 4-35 Alternative 2

4.2.3.1 Remove Covers, Cabinet

1. Remove the covers 1–4

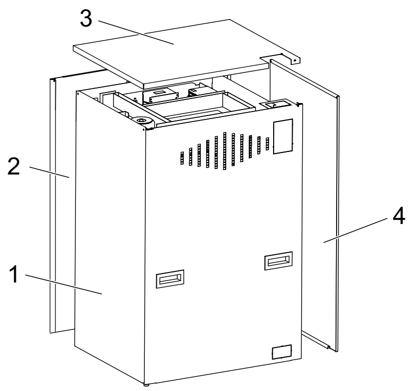


Fig. 4-36 Remove cabinet covers

4.2.4 Electrical Installation

4.2.4.1 General

WARNING!

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

WARNING!

All components shall be connected to the same earth connector on the System.

Note!

A disconnecting device from the mains shall be incorporated external to the equipment according to the national wiring rules.

Interfacing

to the following standards and local regulations.

- IEC 60601-1
- IEC 60601-1-2
- IEC 60601–2–54
- MDD 93/42/EEC

4.2.4.2 Cable Path

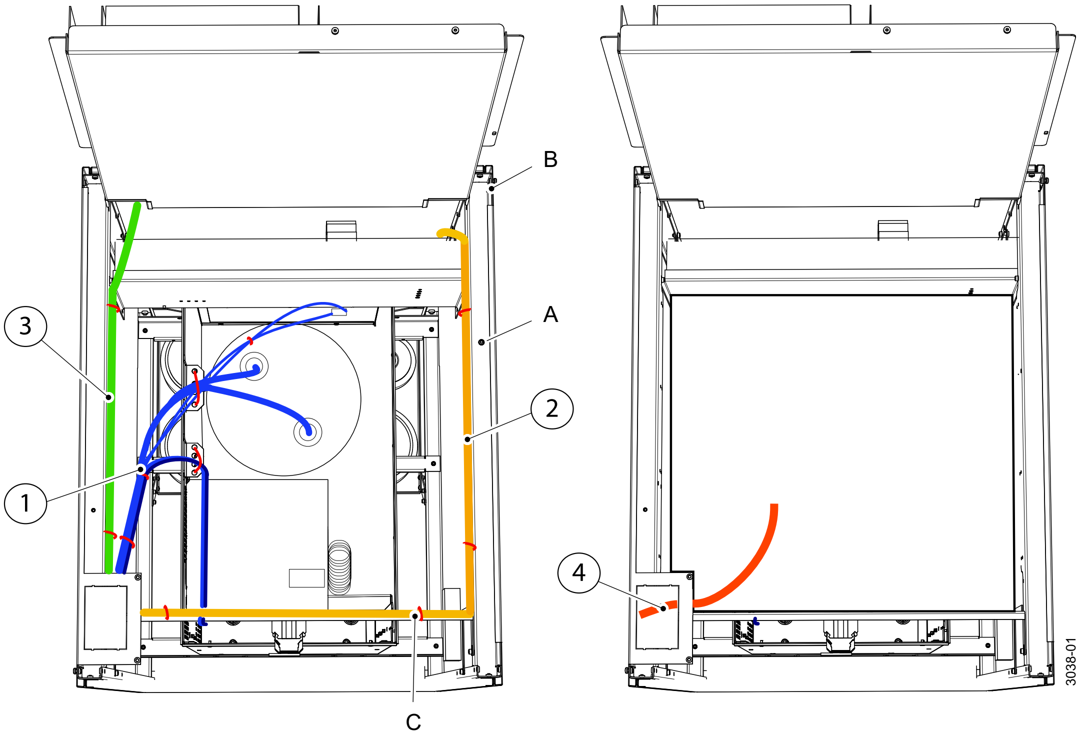


Fig. 4-37 Cable Paths 1–4

1. *Cable path 1 — to the generator.*
2. *Cable path 2 — to the electrical plate 4.2.*
3. *Cable path 3 — to the electrical plate 4.4.*
4. *Cable path 4 — to the electrical plate 4.5.*

A Screw
B Position of attachment
C Cable ties

1. Remove screw (A) according to **Fig. 4-37**.
2. Lift up the electrical plate 4.4 and secure it with screw (A) in position (B).

CAUTION!

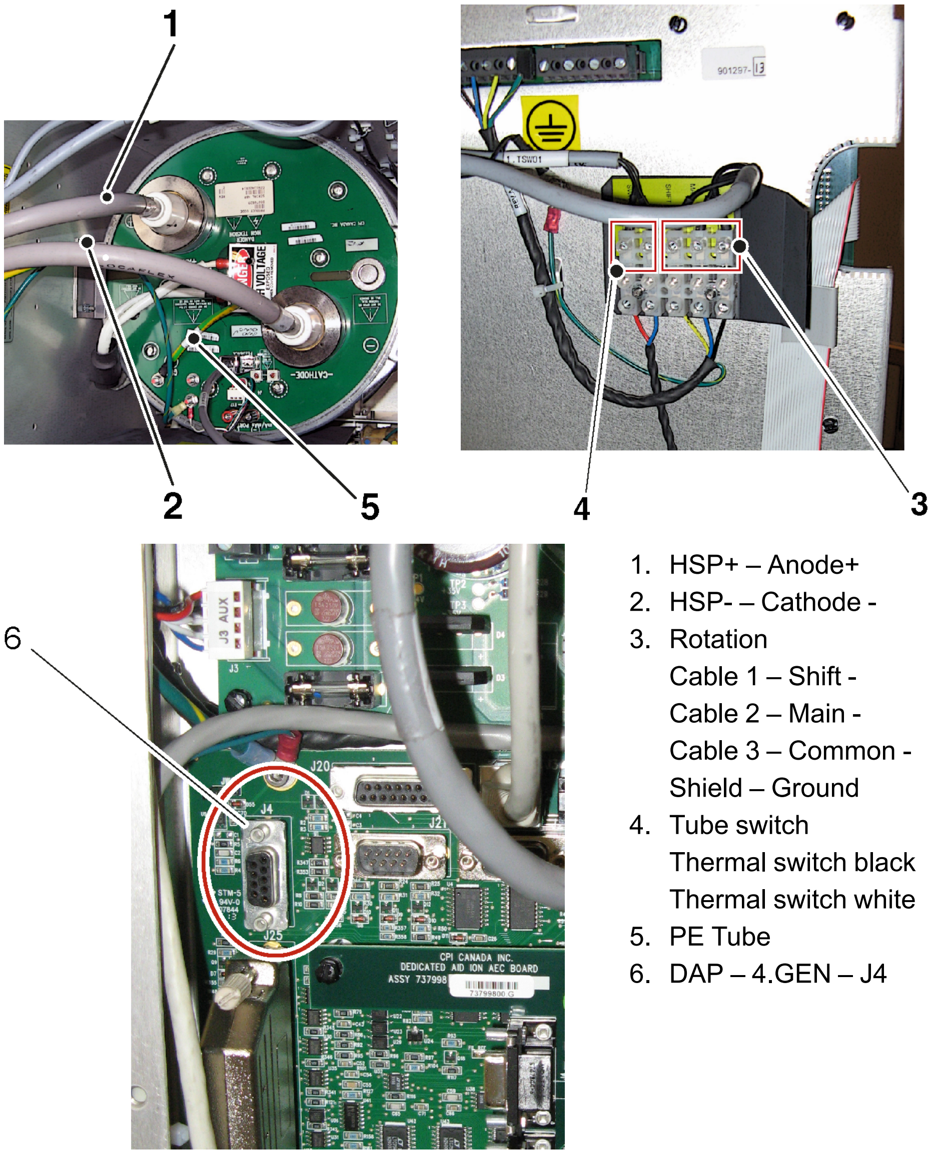
Tie the cables carefully to the frame. Otherwise there is a risk of pinching the cable.

4.2.4.3 Electrical Installation Of Overhead Tube Crane

Note!

The installation cables from the overhead tube crane must be installed covered. They shall not be placed on the floor.

1. Lubricate the HSP connectors generously with silicone oil. Use the silicone gaskets.
2. Wiring to generator, is made according to path 1, **Fig. 4-37**.



1. HSP+ – Anode+
2. HSP- – Cathode -
3. Rotation
   Cable 1 – Shift -
   Cable 2 – Main -
   Cable 3 – Common -
   Shield – Ground
4. Tube switch
   Thermal switch black
   Thermal switch white
5. PE Tube
6. DAP – 4.GEN – J4

Wiring to electrical plate 4.2 is made in accordance with cable path 2, **Fig. 4-37**.

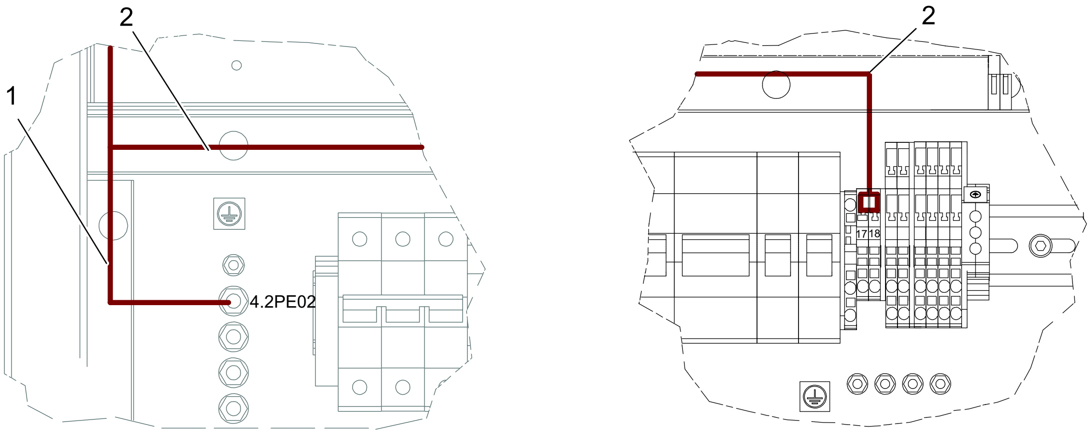


Fig. 4-38 Electrical plate 4.2

1. *1XPE*
2. *1.1MAINS – 17, 18*

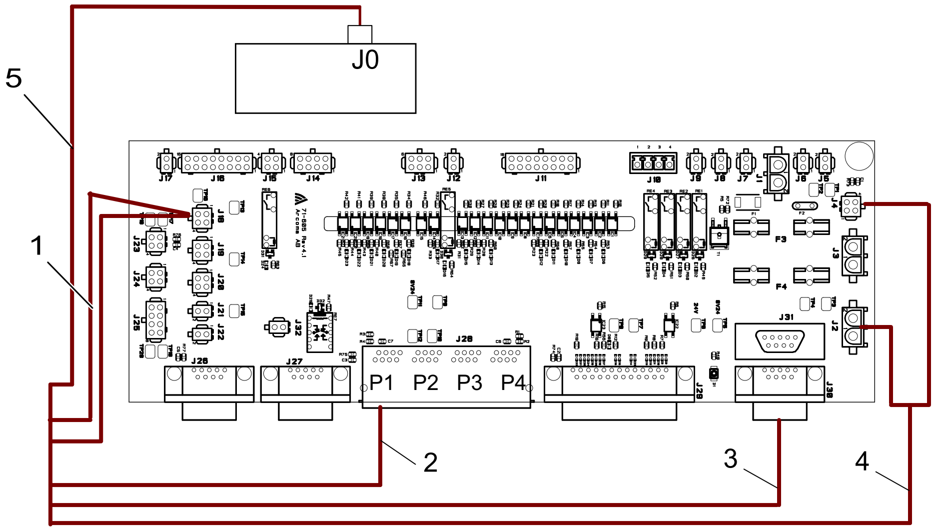


Fig. 4-39 Connecting the overhead tube crane

1. *1.EMRE01 & 1.EMSTOP – J18*
2. *1.1CAN – P1*
3. *1.1Service – J30*
4. *1.Collsig – J2/J4*
5. *1.3DSP01 – 4.4CB800_01 – J0*

4.2.5 Mechanical Installation of Wallstand

WARNING!

Whenever any item is removed from the wallstand, e.g. the detector holder, the wallstand will become highly unbalanced.

Whenever the brake is released, part of the wallstand moves upward and can cause injury.

Make sure that the operation will be performed by personnel who are trained in the use of the equipment.

4.2.5.1 Orientation of Wallstand

1. Check for enough free space around the device to allow free movement before placing the wallstand on the floor.

   See Planning Guide for further information of required space around the wallstand and the position in the room.

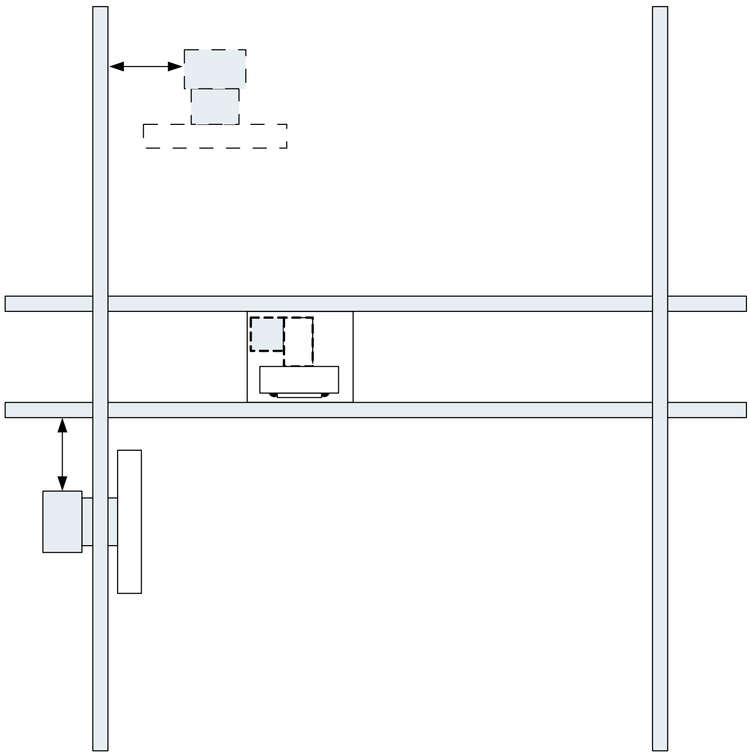


Fig. 4-40

The wallstand center must be aligned with the tube center.

4.2.5.2 Unload Wallstand

WARNING!

Whenever any item is removed from the wallstand, e.g. detector holder, it will become highly unbalanced. Whenever the brake is released it will move upward and can cause injury. Make sure that the operation will be done by personnel who are trained in the use of the equipment.

Unloading

WARNING!

When the wallstand is not bolted to the floor, the wallstand is unstable and front-heavy and may fall down. When you get the wallstand upright, make sure to bolt the wallstand to the floor.

Note!

Packages has “Up” and “Down” marks on the top and bottom sides of the wallstand respectively.

1. Remove the package band from the package.
2. Remove all the mounting screws on the top and bottom of the crate sides.
3. Remove the top crate, then the crate sides as a set.

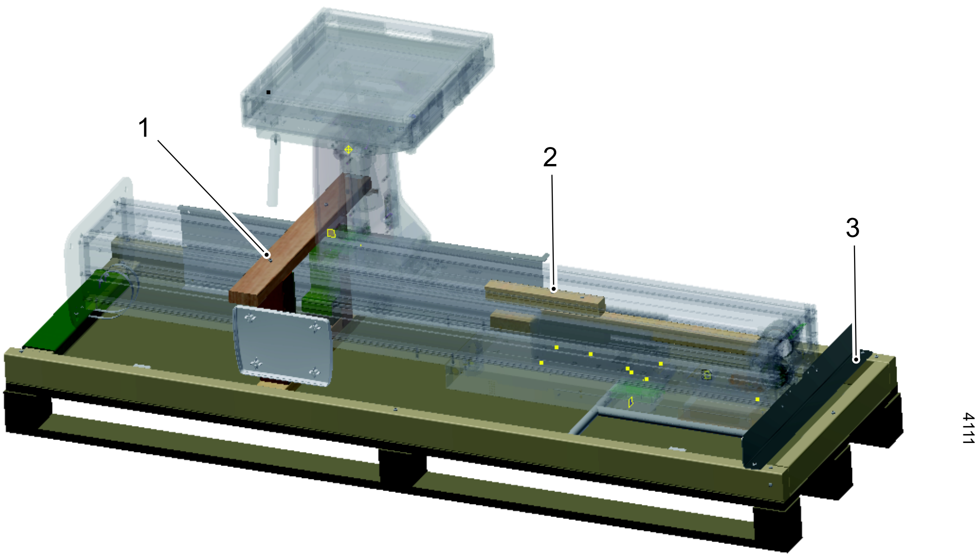


Fig. 4-41 Loosen screws 1, 2, 3

4. Remove screws (**1**,**2**) from the two cross-ties, securing the wallstand, and screw (**3**) on the mounting band at the foot end.

CAUTION!

Do not hold the wallstand by the base when lifting it up.

Note!

*Do **not** lift the wallstand from the bottom.*

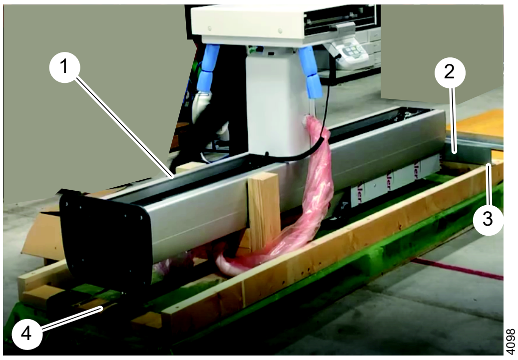


Fig. 4-42 Remove packaging

5. Remove the packaging.
6. Loosen the screws (**3**) fastening the mounting beam (**2**) to the wooden packaging.

   Note!

   *Do NOT remove the mounting band (**4**) at the foot end.*

Note!

The weight of the wallstand is approximately 80 kg. It has to be lifted by at least 2 persons. Use gloves.

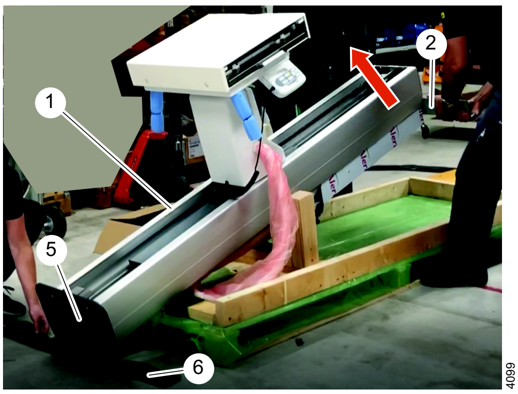


Fig. 4-43 Lift the wallstand

7. Lift the wallstand (**1**) slightly at the head end and push it so that the foot end (**5**) is positioned outside the packaging.

   Use a floor protection/plate (**6**), if necessary.
8. Continue to raise the wallstand (1) using the mounting beam (**2**) off the pallet to an upright position.

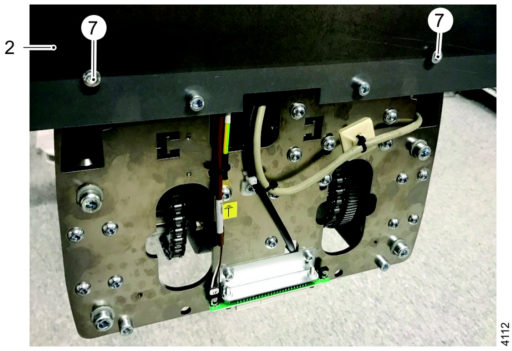


Fig. 4-44 Fasten screws

9. Remove the mounting band (**4**), see **Fig. 4-42** at the foot end (**5**).
10. Remove the mounting beam (**2**).
11. Fasten the two screws (**7**) again when the mounting beam (**2**) has been removed.
12. Position the wallstand in its dedicated position.

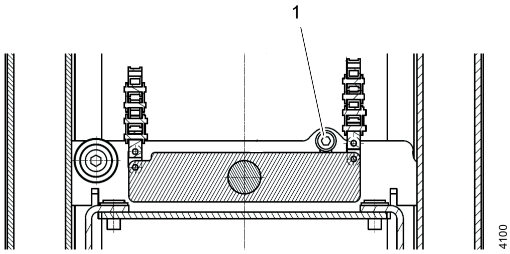


Fig. 4-45 Transport lock

13. Remove transport locks, see **Fig. 4-45**.
14. Mount the top crate, front plate, and lower and back protections plates.

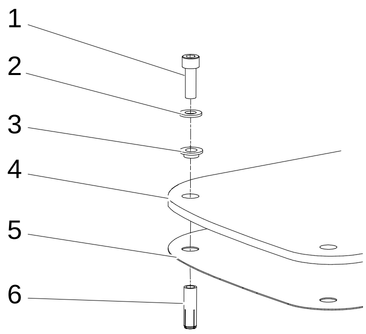


Fig. 4-46 Temporary attachment

1. *Bolt*
2. *Insulation washer*
3. *Insulation case*
4. *Bottom plate*
5. *Insulation plate*
6. *Expanders (enclosed)*

15. Mount the insulation plate (5) between the bottom plate (4) and the floor.
16. Temporary attach the stand to the floor, with 1 bolt (comprising parts 1, 2, 3, 6) at the floor to make it possible to readjust the parallelism to the Ceiling stand.
17. Drill 1 hole (C) in accordance with **Fig. 4-46**.

    The 3 remaining holes shall be drilled after the adjustment.

4.2.6 Alignment of Wallstand

1. Place a spirit level on the column and check that the wallstand is in level.
2. Move the overhead tube crane and place the collimator 10 mm from the detector of the wallstand according to **Fig. 4-47**.
3. Move the overhead tube crane sideways. Measure the distance. The distance should be 10 mm.
4. If the two measured values fail to correspond, adjust the wallstand column by moving it sideways.

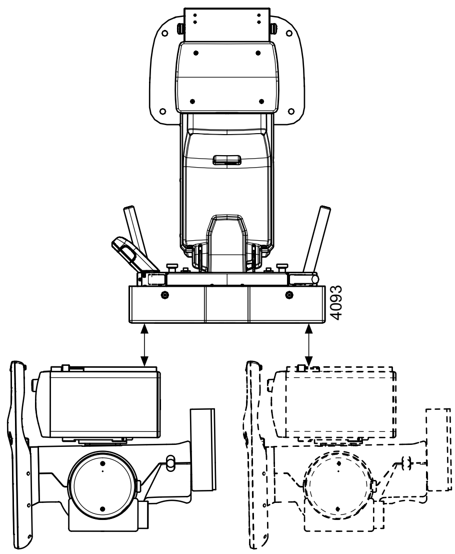


Fig. 4-47 Align wallstand

4.2.7 Wallstand Attachment

4.2.7.1 Wallstand Insulation and Attachment to Floor

Note!

The insulation kit is designed to insulate the wallstand from the hospital building, and will prevent stray currents from reaching the System e.g. via bolt attachments. Stray currents can be present e.g. in reinforcement bars or in water pipes in a building. These currents can be of several hundred amperes and can affect the leakage current from the System to the patient and thereby the safety for patient and user. Stray currents in the building shall be regarded as a failure in the building but the insulation kit provides an extra safety barrier. The insulation kit will also prevent unwanted ground loops due to e.g. electrical contact through the wall or floor lead X-ray shielding via bolt attachments of the Systems components.

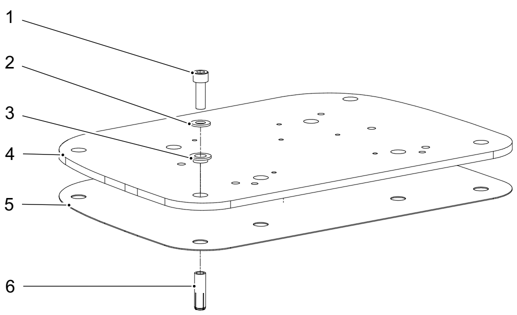


Fig. 4-48 Wallstand insulation plate

Bolt the wallstand into the floor with the enclosed M10 bolt, also install the enclosed insulation plate and washer according to **Fig. 4-48**. Apply Loctite 243, and tighten the bolts with 15 Nm.

1. Bolt
2. Insulation washer
3. Insulation case
4. Bottom plate
5. Insulation plate
6. Enclosed expanders

4.2.8 Install Detector

Install the detector according to Manufacturer’s instructions.

4.2.9 Electrical Installation of Wall Stand

4.2.9.1 Connect Wallstand

Note!

The installation cables from the wallstand must be installed covered. They shall not be placed on the floor.

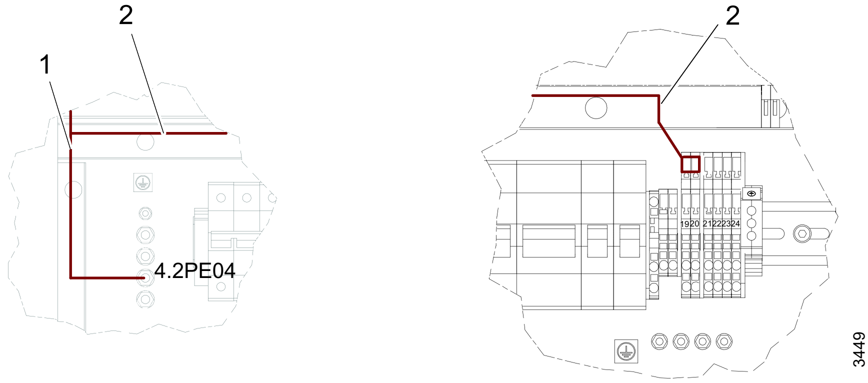


Fig. 4-49 Connecting the wallstand

1. *3.0PE01*
2. *3.0MAINS – 19, 20*

- Wiring shall be done according to cable path 2, see **Fig. 4-37**.
- Wiring shall be done according to cable path 3, see **Fig. 4-37**.

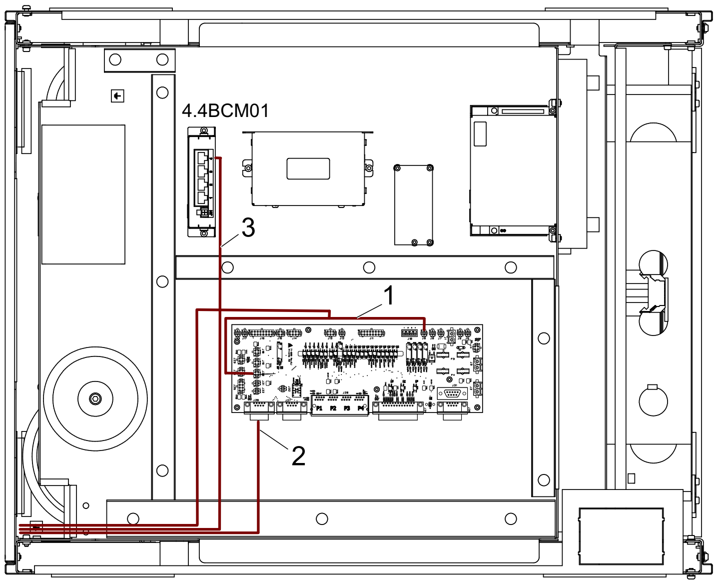


Fig. 4-50 Connecting the wallstand

1. *3.0SIG01 — J9–J20*
2. *3.0COLL01 — J26*
3. *3.0CAN01 — 4.4BCM01–4*

4.2.9.2 Connect Wall Stand AEC

- Wiring shall be done according to cable path 3, see **Fig. 4-37**.

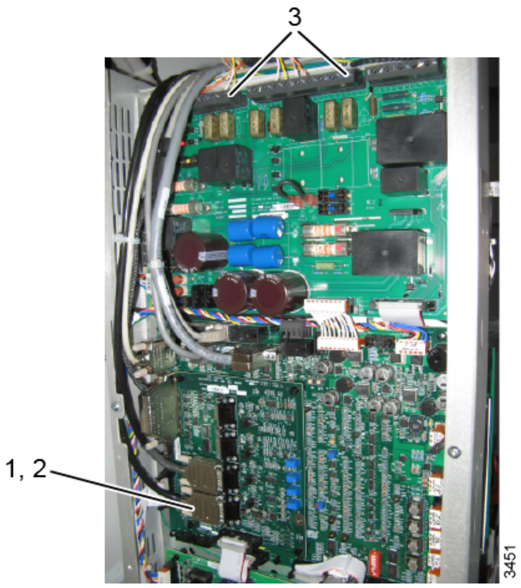


Fig. 4-51 Connecting wall stand AEC

1. 3.DAID01 – ION chamber
2. 3.DB3C01 (option) (channel 1) – Solid state chamber
3. 3.DI/F01 Connect to Generator AUX-PWD

   A1 J2–7

   A2 J2–8

   B1 J2–5

   B2 J2–6

   Option, the cable is only present if a fix detector or a detector with charging is installed at the wall stand.

4.2.10 Mechanical Installation Of Table

4.2.10.1 Orientation of Table

Before placing the table on the floor, check for enough free space around the table to allow free movement. See Planning Guide for further information of required space around the table.

- Place the table on the floor according to the room layout.

  It is possible that a cable duct is already made in the floor where the table shall be placed.

WARNING!

Squeezing hazard! When the Table is lifted, the columns will bend toward the middle of the Table. Two persons must keep the columns vertical.

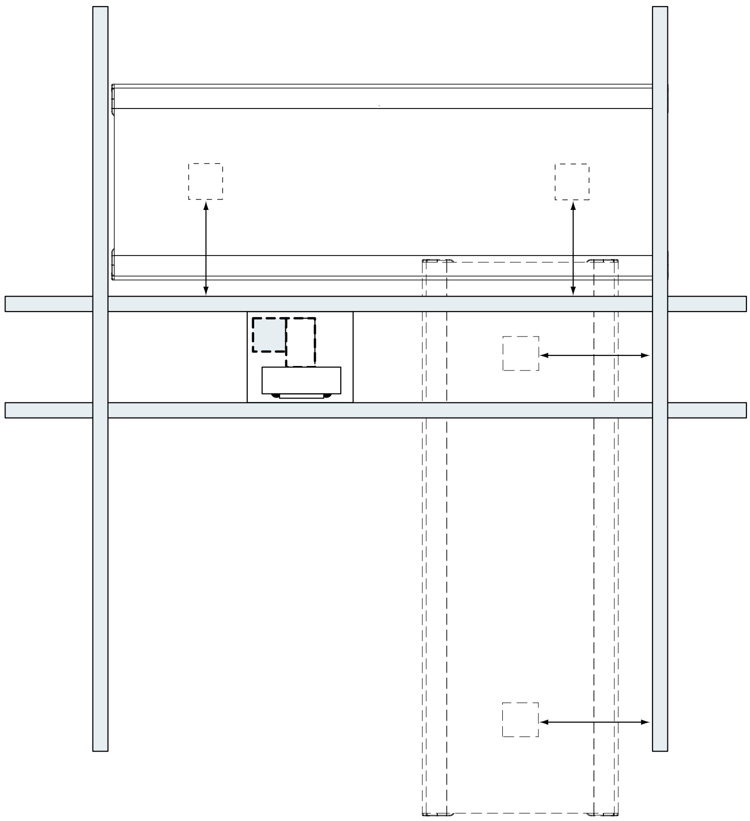


Fig. 4-52

4.2.10.2 Unload table

Note!

Do not tilt the table when unloading.

Note!

Make sure there is enough free space to slide on and off the table top, see Planning guide.

Note!

Do not place anything at the table when it is not attached.

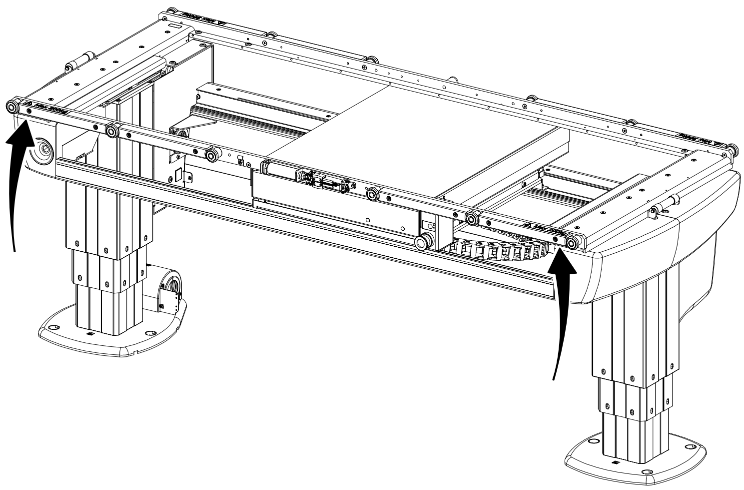


Fig. 4-53

- Slide/lift off the table from the pallet by grabbing underneath the table frame.
- Place the table where intended in the room.
- Continue the mechanical installation of the table after the alignment of the table is ready. See **4.7.3 Horizontal Alignment Of Table, Page 187**.

Transport Protection of Detector

Remove the transport protection of the detector according to **Fig. 4-54**. There is one on each side of the detector.

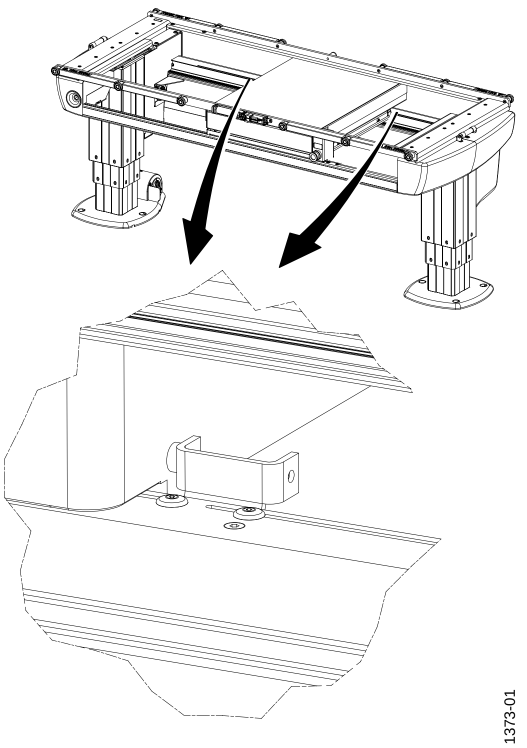


Fig. 4-54 Transportation holder

4.2.11 Electrical Installation of Table

4.2.11.1 Connect Table

Note!

The cables from the table to the system cabinet, must be installed covered.

They shall not be placed on the floor.

- Connect the table according to figures.
- Wiring shall be done according to cable path 2, see **Fig. 4-37**.

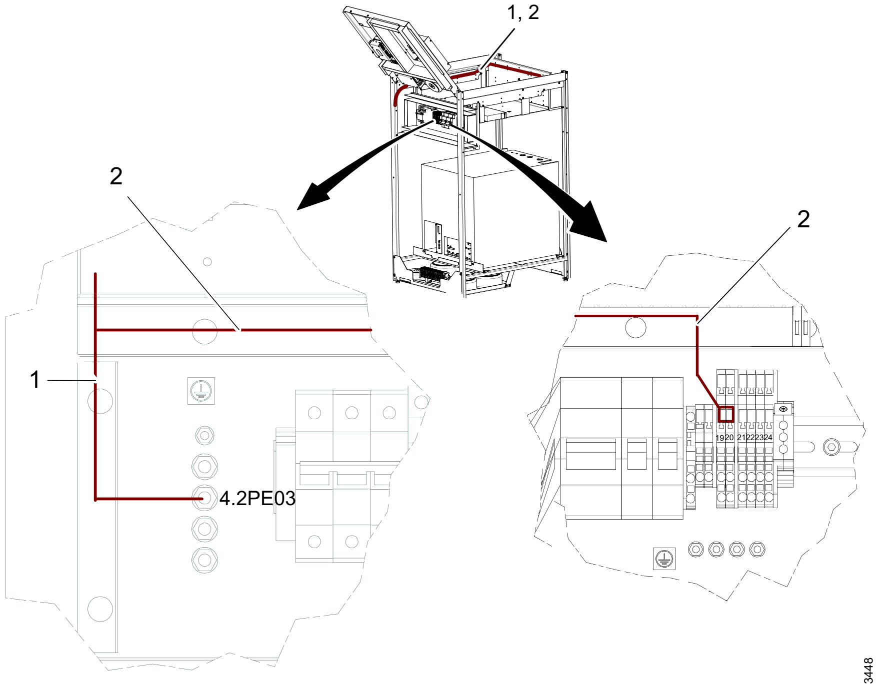


Fig. 4-55 Connecting the table

1. *2.0PE*
2. *2.0MAINS – 19, 20*

Wiring shall be done according to cable path 3, see **Fig. 4-37**.

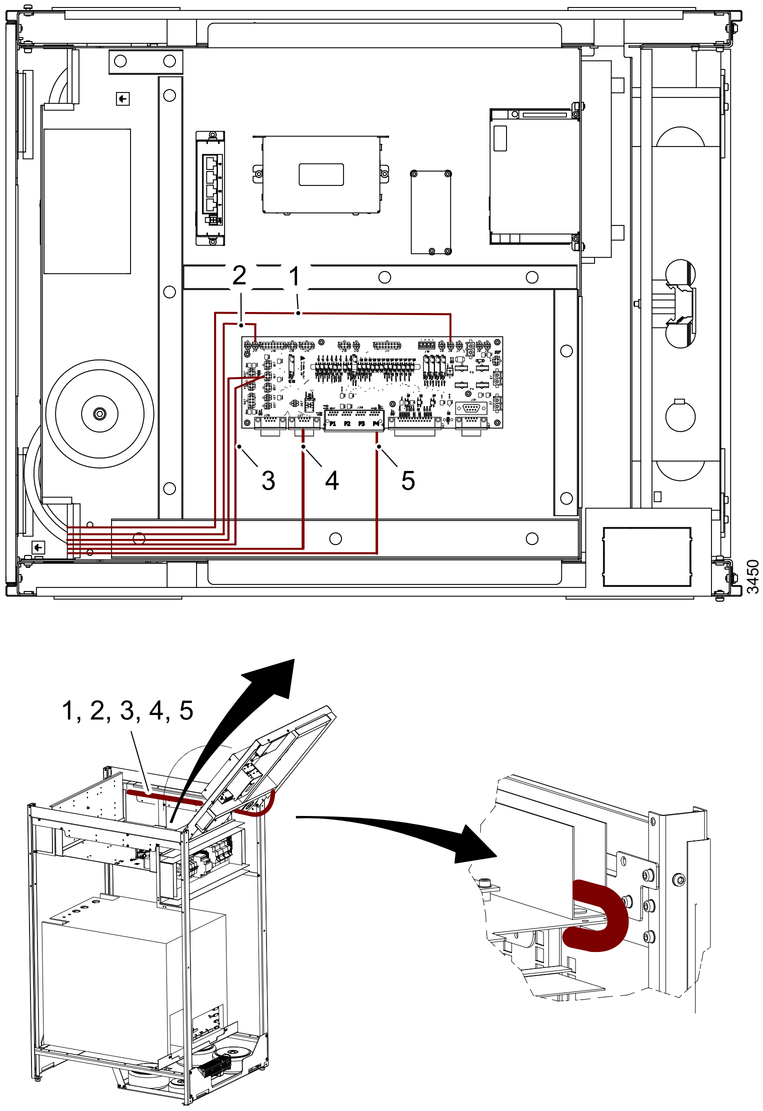


Fig. 4-56 Connecting the table

1. *2.0IND01 — J8*
2. *2.0I/O01 — J17*
3. *2.0RE01 / 2.0EM01 — J19*
4. *2.0COLL01 —J27*
5. *2.0CAN01 — J28P4*

Connecting Table AEC

Wiring shall be done according to cable path 3, see **Fig. 4-37**.

Wiring to the generator is made according to cable path 1.

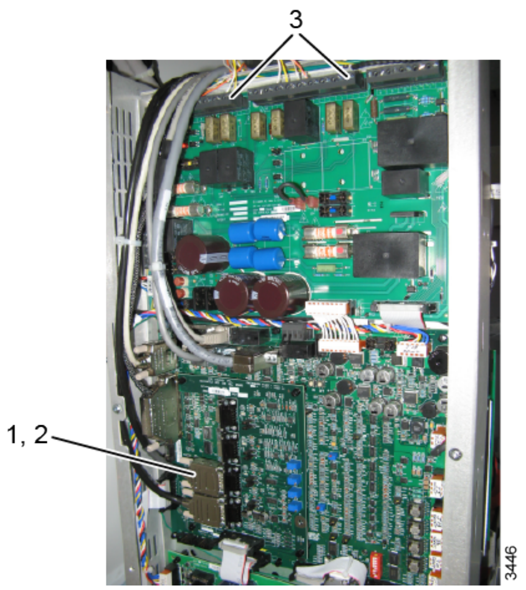


Fig. 4-57

1. 2.0SIG03 (channel 2) (standard) – ION chamber
2. 2.DB3C01 (option) – Solid state chamber
3. 2.DI/F01 Connect to Generator AUX-PWD

   A1 J2–7

   A2 J2–8

   B1 J4–5

   B2 J4–6

   Option, the cable is only present if a fix detector or a detector with charging is installed at the table.

Foot Control X/Y/Z or Foot Control X/Y Separate (option)- Cable 2.4J01 or 2.4J02

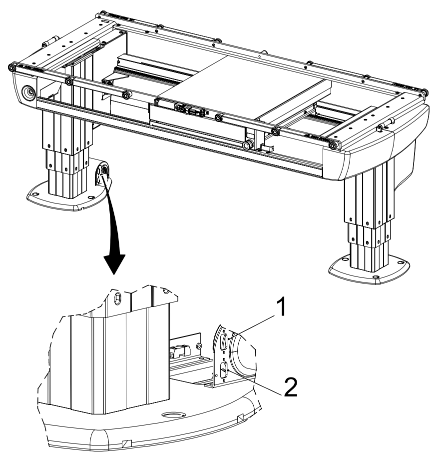


Fig. 4-58 Installation of foot control

- Install the foot control and connect the cable 2.4J01 or 2.4J02 according to **Fig. 4-58**.
  See also System Block Diagram for the Table, **9.1.6.1**.

1. Cable 2.4J01
2. Cable 2.4J02

4.2.12 Connect Options

4.2.12.1 Foot Control, Wireless (option)

CAUTION!

Make sure that the correct control is activated, as there is one foot control for the table and one for the wallstand.

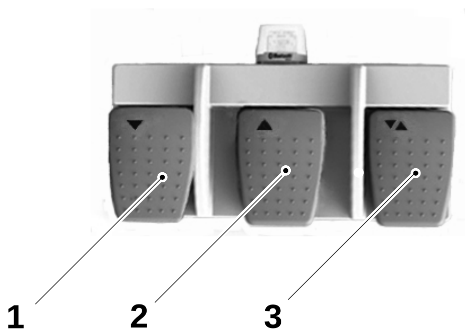
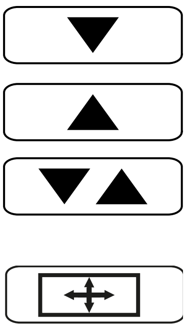


Fig. 4-59 Wireless foot control

The table and the wallstand with motorized vertical movement can be maneuvered from the foot control.

The wireless foot control is an optional control unit for table and wallstand.

Consider the working area when maneuvered.



1. Z movement down
2. Z movement up
3. Release pedal: Unlocks wallstand detector brake.

   Manual movement is possible.
4. Release pedal: Unlocks table top.

   Manual movement is possible, table top is floating.

How To Manoeuver

1. Press pedal to move downward.
2. Press pedal to move upward.
3. Press the pedal to release the brakes. On activation, the table top or the wallstand detector holder, can be moved manually.

   When the release pedal is activated, the collimator light will be lit.

Note!

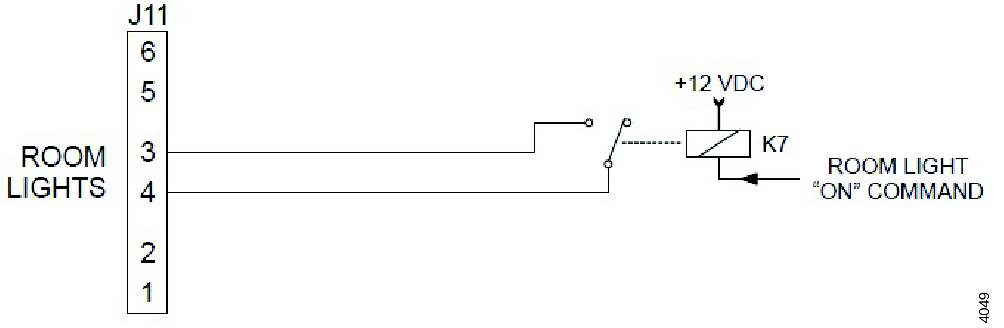
The foot control must not be used outside the examination room.

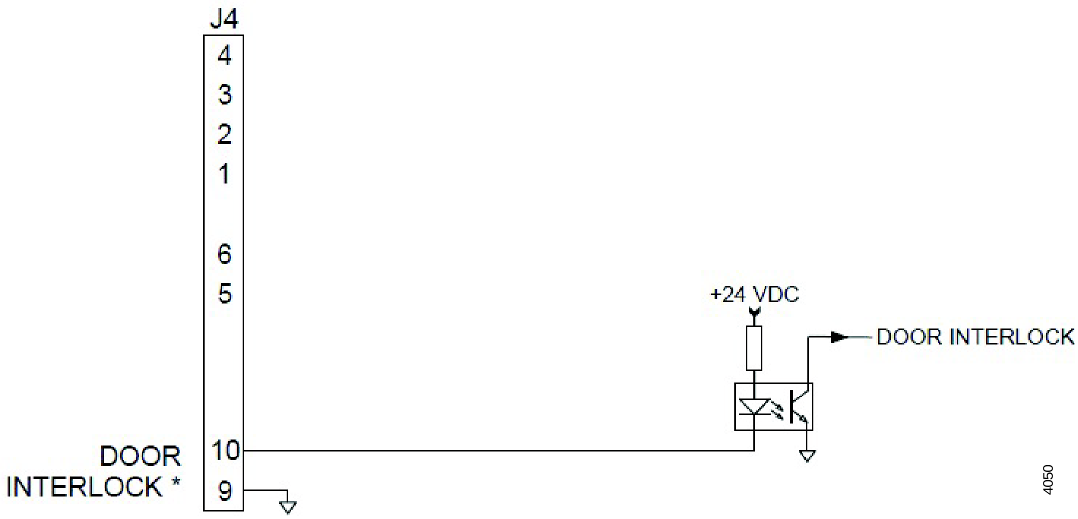
The device has no applied parts and should not be accessible to patients.

Battery

The yellow battery indication LED will begin to flash once every two seconds, when the remaining battery capacity is approximately 1 week of constant use, or 168 hours. It will then change to 2 flashes per second when the capacity has been reduced to approximately 2 days, or 48 hours.

4.2.12.2 Room Lights





The generator supplies a dry contact closure when the room light is to be activated. Relay K7 is energized during X-ray exposure

4.2.12.3 Installation Of Wireless Access Point (option)

WARNING!

The cable must be installed covered. It must not be placed on the floor.

WARNING!

The wireless access point must be installed out of reach from patient and user.

Note!

The wireless access point is only used with the wireless detector.

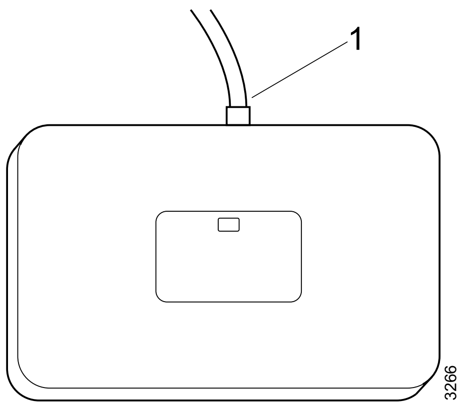


Fig. 4-60

1. Install the wireless access point at the wall in the x-ray room out of reach from patient and user.
2. Connect cable 5.0WLAN01 to connection 1.

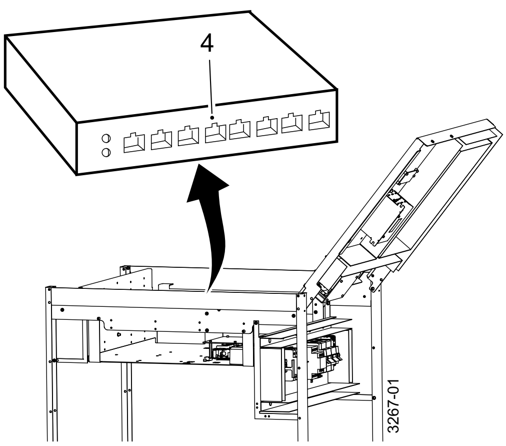


Fig. 4-61

3. Connect cable 5.0WLAN01 to 4.5HUB01-4 in the system cabinet.

4.2.12.4 Electrical Installation Image System

Electrical Installation of Image System Computer

CAUTION!

The image system PC should only have the image system software installed.

Other software installations could interfere with system operation.

Note!

The cables must be installed covered.

They shall not be placed on the floor.

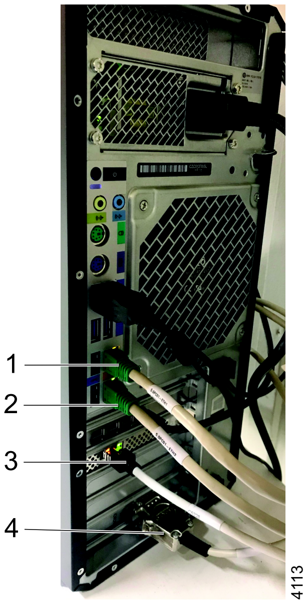


Fig. 4-62 Connections image system PC

- Position the image system PC in the operation room.
- Connect the cable Image PC 0073–750–038 between the image system PC and the system cabinet.

1. Cable 5.0ETHCB800 – 5.0PC01-ETH1
2. Cable 5.0ETHIS – 5.0PC01-ETH2
3. Cable 5.0ETHHospital – 5.0PC01-ETH3
4. Cable 5.0RS232IS – 5.0PC01-I/0

Hospital Network

- Connect cable 5.0ETHHospital to the Hospital ETH network.

Connections To System Cabinet

- Wiring shall be made according to cable path 3. in **Fig. 4-37**.

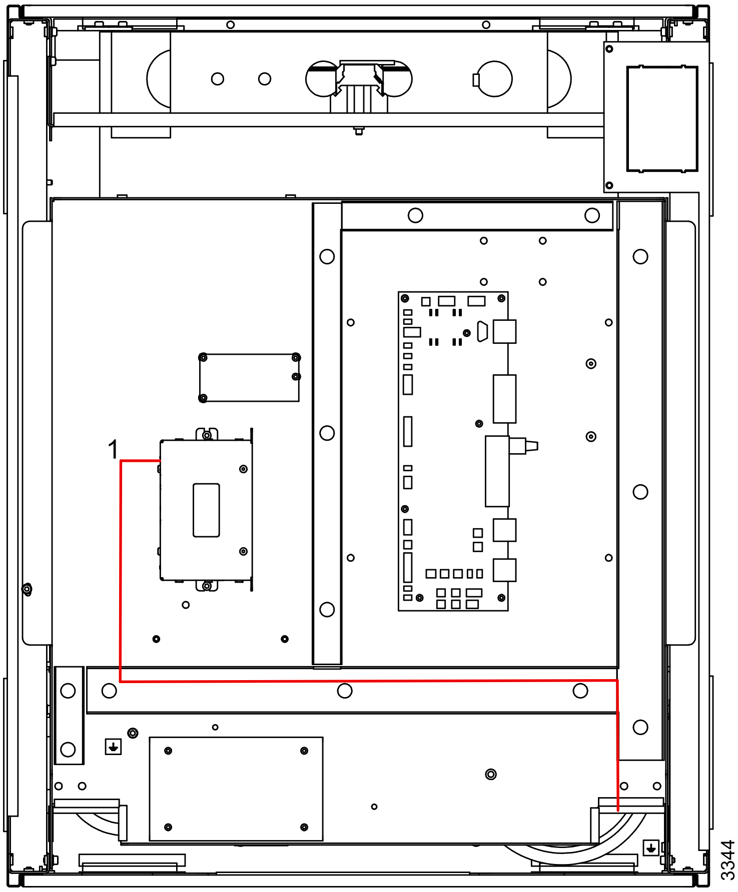
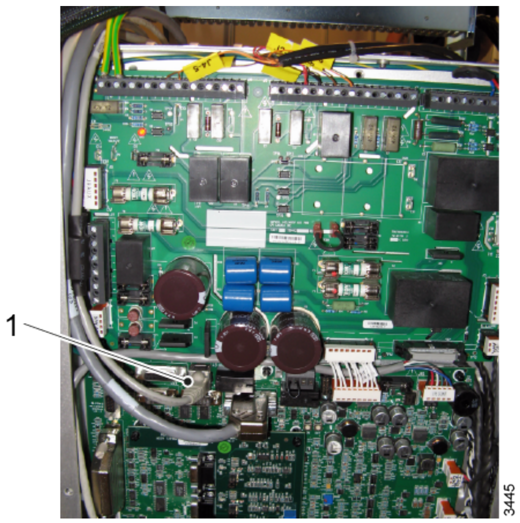


Fig. 4-63 Electrical plate 4.4 with CB800

1. Cable 5.0ETHCB800 – 4.4CB800_01–J1

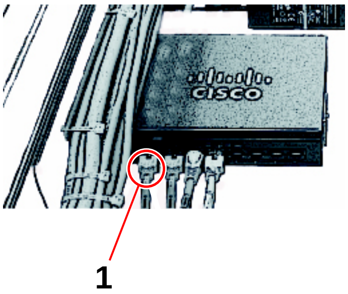


- Wiring shall be made according to cable path 1 in **Fig. 4-37**.

1. Cable 5.0RS232IS – 4.GEN–J3

Fig. 4-64 Cable 5.0RS232IS – 4.GEN–J3

- Wiring shall be made according to cable path 4 in **Fig. 4-37**.

Cable 5.0ETHIS	4.5HUB01–1	

Wallstand Detector Installation

Table 4-1

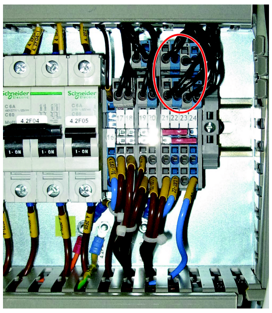
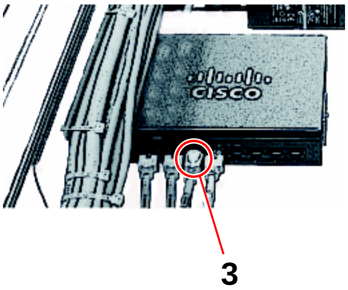
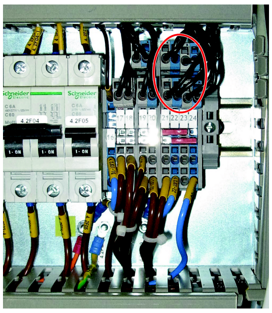
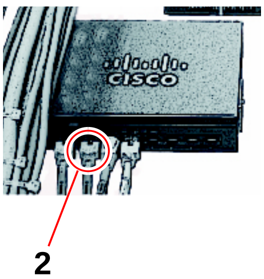
• Wiring shall be done according to cable path 2, see **Fig. 4-37**.		
3.DPOW01	4.2J01 21–22	
• Wiring shall be done according to cable path 4, see **Fig. 4-37**.		
3.DETH01	4.5HUB01–3	

Table Detector Installation

• Wiring shall be done according to cable path 2, see **Fig. 4-37**.		
2.DPOW01 or 2.DPOW02	4.2J01 21–22	

• Wiring shall be done according to cable path 4, see **Fig. 4-37**.		
2.DLAN01 or 2.DETH01	4.5HUB01–2	

4.2.12.5 Electrical Installation of Mini Console

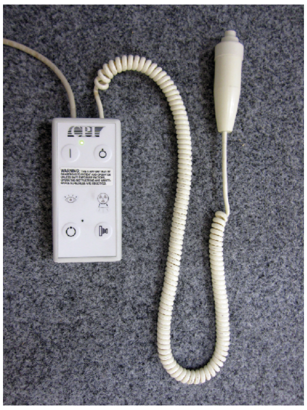


Fig. 4-65 Connecting mini console

1. Position the mini console in the operation room and connect cable Gen Console between the mini console and the cabinet.

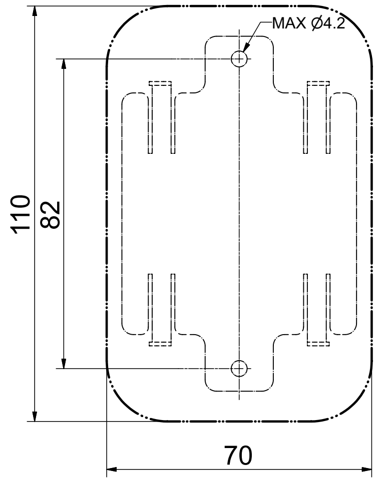
Fig. 4-66 Cables

Gen. Console cable is hanging, rolled together, inside the cabinet.

2. Connect to ESI card, cable path 3

4.2.12.6 External Servo Button

Mechanical Installation of External Servo Button



- Install the external servo button in the operation room, using M4 bolts.

Fig. 4-67 Installation plate external servo button

Electrical Installation of External Servo Button

- Position the external servo button in the operation room and connect the cable to the system cabinet.
- Wiring shall be done according to cable path 3, see **Fig. 4-37**.

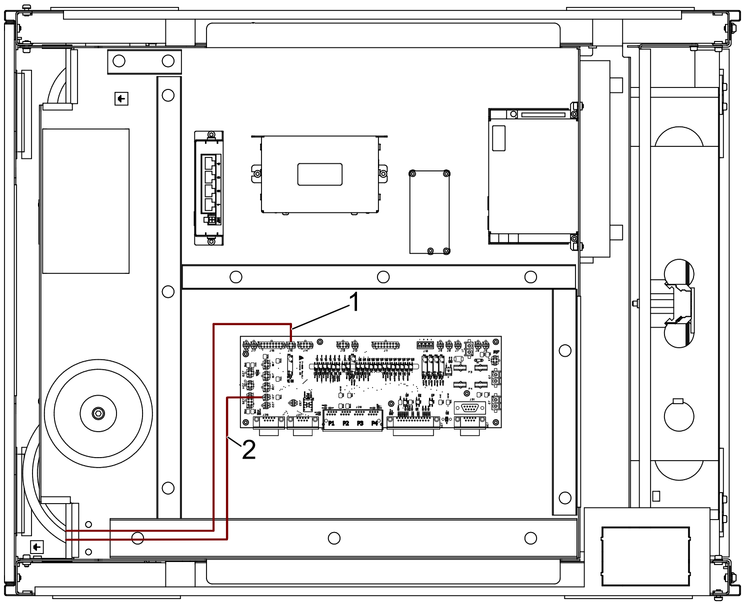


Fig. 4-68 Connecting to FIB

1. *J15*
2. *J21*

4.3 Measure Protective Earth

DANGER!

Make sure the mains power is switched off before the mains protective earth cables are disconnected.

4.3.1 Measure Insulation Between Hospital Protective Earth and System

- Measure the resistance between hospital protective earth and system protective earth. The resistance value must be ∞ Ω.

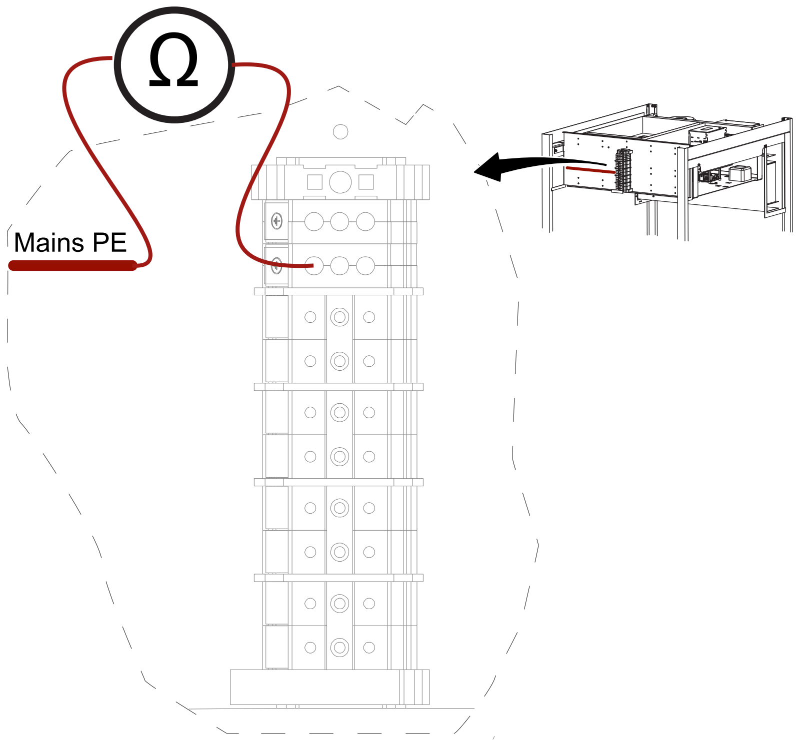


Fig. 4-69 Measure insulation

4.3.2 Protective Earth Subsystem

Protective earth is measured to ensure that all cables are correctly connected.

A visual or audible device (Ohmmeter, buzzer, etc.) may be used to indicate grounding continuity.

The measured value must be < 0.1 Ω.

1. Make sure the protective earth cables from table, wallstand and overhead tube crane are connected and the bolts are tightened, see **Fig. 4-70**.

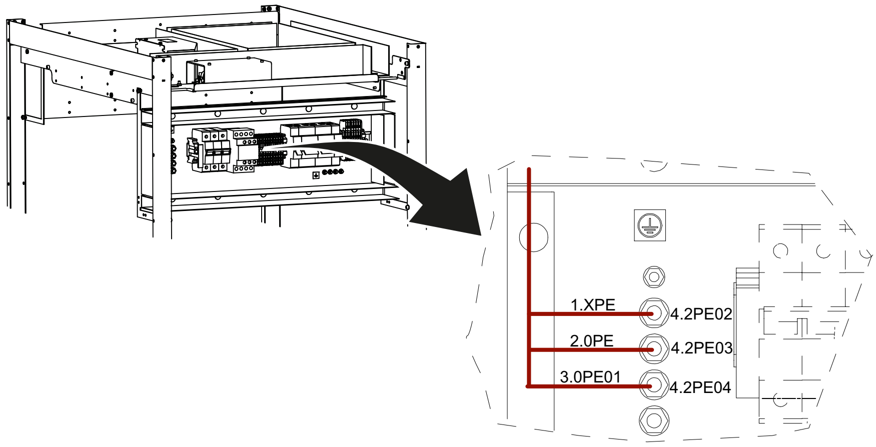


Fig. 4-70 Protective earth 4.2

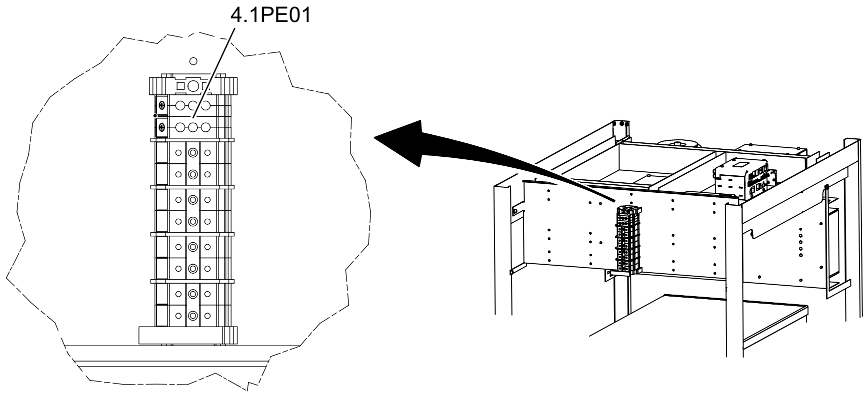


Fig. 4-71 Measuring point 4,1PE01

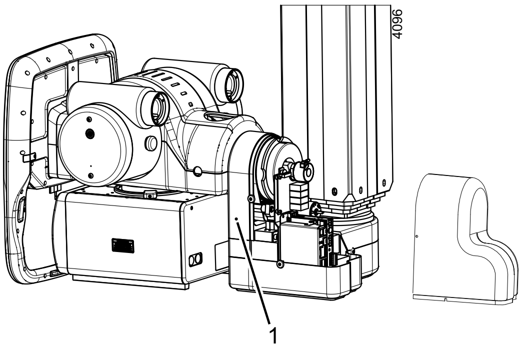


Fig. 4-72 Measuring point 1.CS

1. *Alpha/Beta arm (1A PE)*

2. Measure the protective earth for overhead tube crane between the measuring point 1.CS and the ground terminal 4,1PE01.

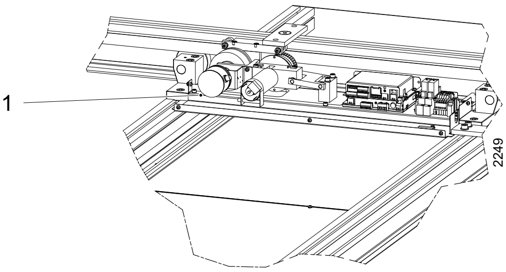


Fig. 4-73 Measuring point 2.CS

1. *Traverse wagon Y*

3. Measure the protective earth for overhead tube crane between the measuring point 2.CS and the ground terminal 4,1PE01.

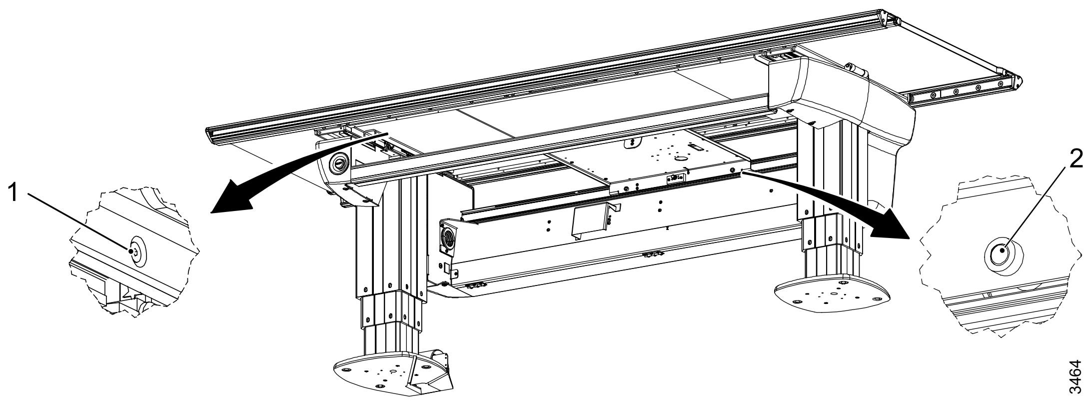


Fig. 4-74 Measuring points 1.TS and 2.TS

1. *1.TS*
2. *2.TS*

4. Measure the protective earth table between the measuring points 1.TS, 2.TS and the ground terminal 4,1PE01.

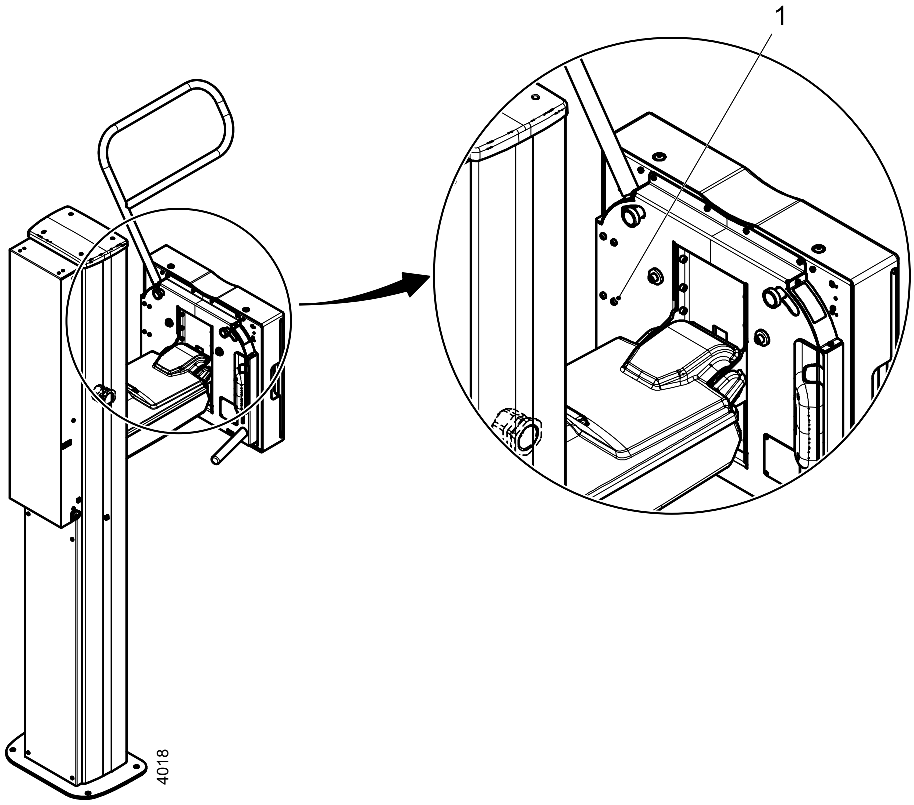


Fig. 4-75 Measuring point 1.WS

5. Measure the protective earth wallstand between the measuring point 1.WS (1) and the ground terminal 4,1PE01.

4.4 Electrical Building Installation

The Machinery directive 2006/42/EC requires the system to be fitted with means to isolate it from all energy sources.

WARNING!

To avoid risk of electrical shock, this equipment must only be connected to a supply mains with protective earth.

Note!

When service or maintenance will be performed, the technician shall lock the equipment from all energy sources.

Note!

A disconnecting device from the mains shall be incorporated external to the equipment according to the national wiring rules.

4.4.1 Power Ratings and Line Requirements

The system requires a three-phase electrical line with a protective earth ground (4 or 5 wires).

The mains voltage of the positioning system and image system can be adjusted with a transformer tap configuration, allowing compensation for differences of the mains voltage.

The generator has an automatic main line selection (no transformer tap configuration required).

The voltage has to be manually set to:

- 3 Phase VAC ±10%
- 400 VAC 50/60 Hz
- 480 VAC 50/60 Hz
- 400 VAC with neutral 50/60 Hz
- maximum wire gauge 4 AWG (25 mm²)
- required fuse 63 A B curve thermal breaker

Having selected the voltage, make a mark at the system serial number label, at the related check box for the power rating.

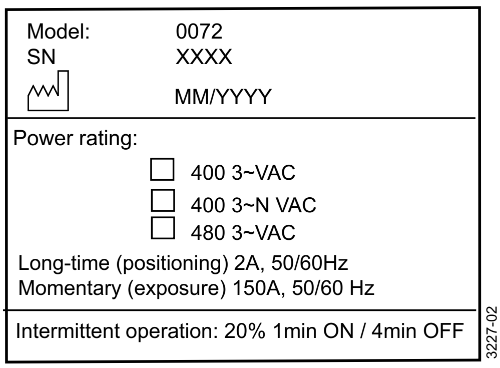


Fig. 4-76 Label

Recommended service disconnect (as per the above table):

- All wiring and grounding should comply with the national electrical code or equivalent.
- All wiring must be copper.
- The disconnecting switch shall be located within reach of the operator.

4.4.2 Tap Configuration 380 VAC / 400 VAC

1. Make a mark at the system serial number label, at the related check box for the power rating, after having selected the voltage.

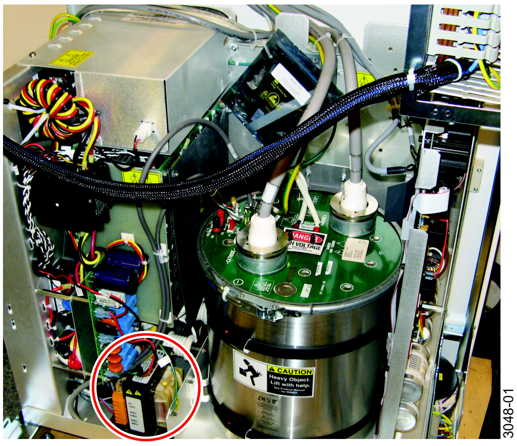


Fig. 4-77 400VAC, Position of generator transformer

2. Check that the red wire is connected to 400V, at the generator transformer. See **Fig. 4-78**.

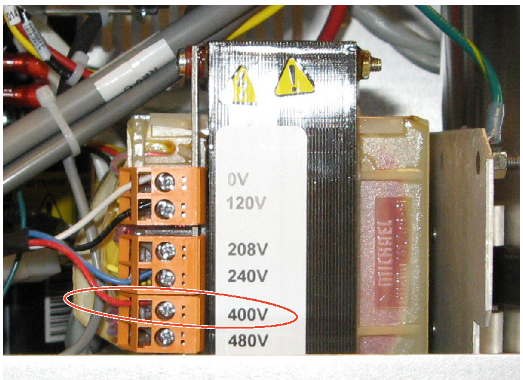


Fig. 4-78 Connection 400V

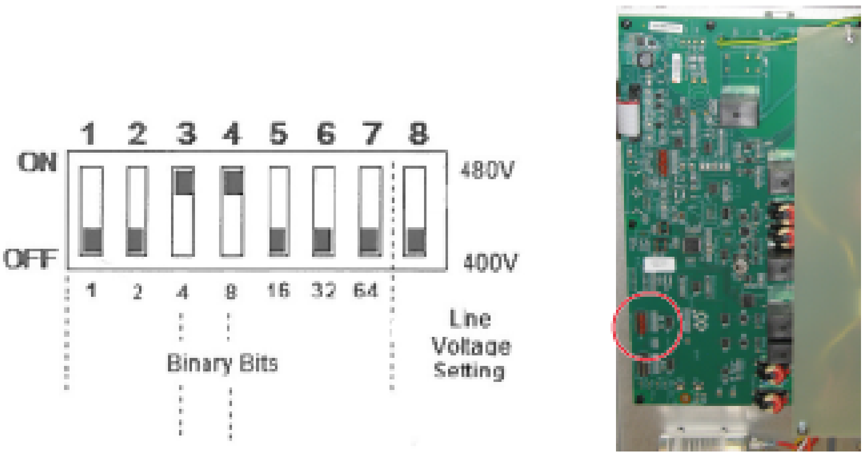


Fig. 4-79 Position of the SW3 DIP-switch

3. Check that the DIP-switch SW3-8 is set to 400V. See **Fig. 4-79**.

1. Make sure the wire (**A**) is connected according to **Fig. 4-80**.

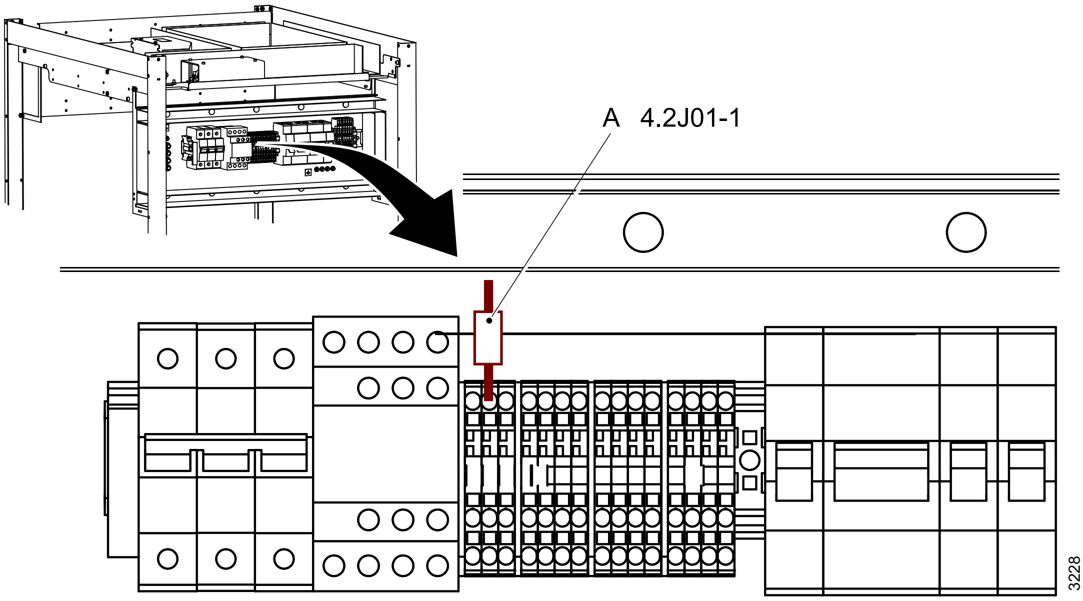


Fig. 4-80 Connect wire A

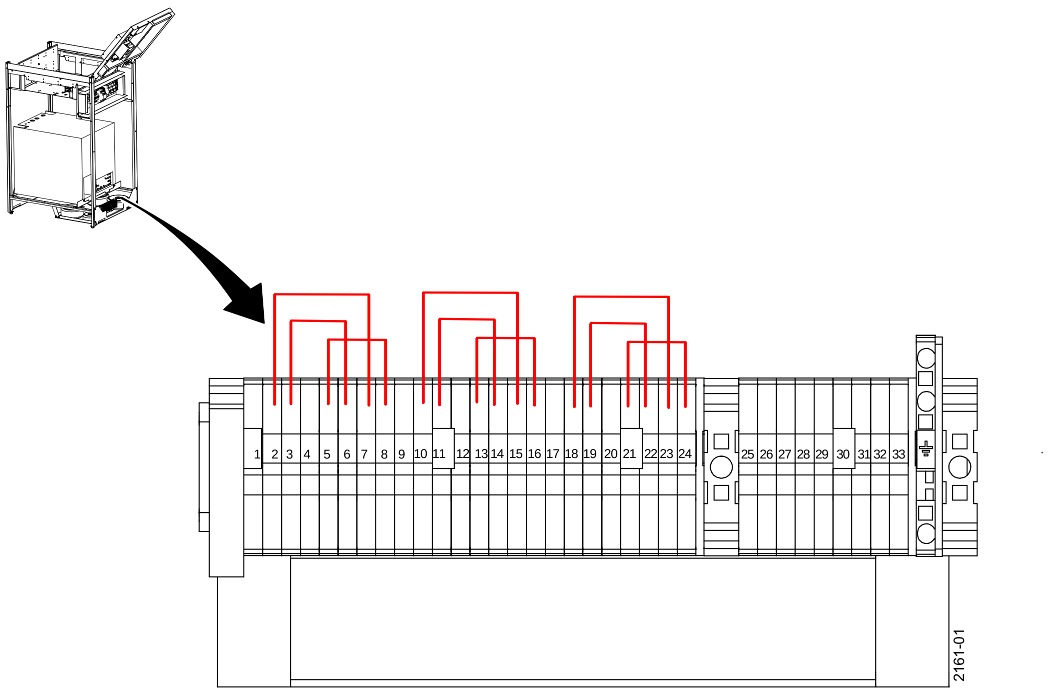


Fig. 4-81 380V

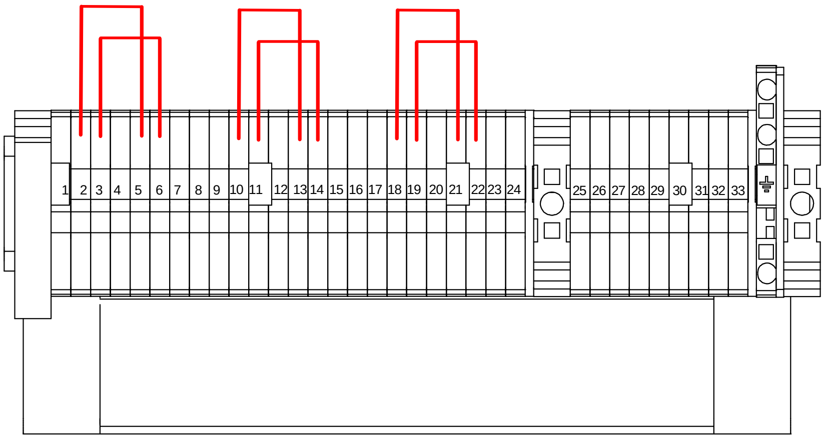


Fig. 4-82 390V

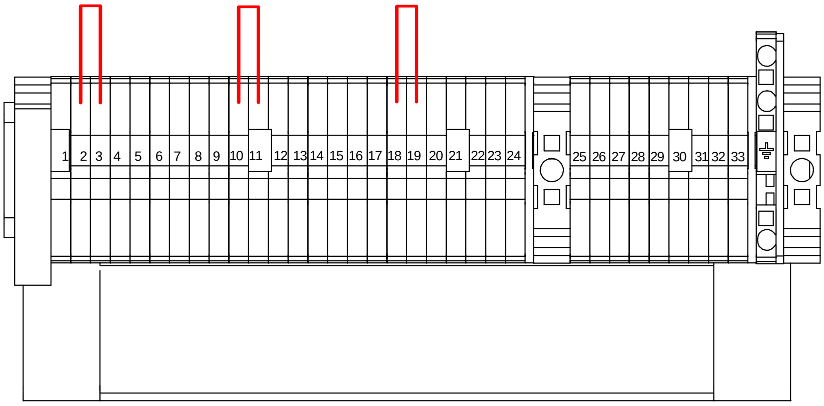


Fig. 4-83 400V

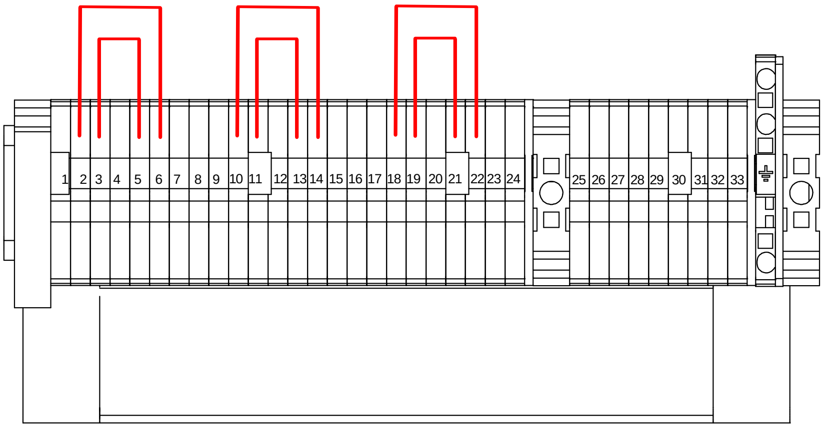


Fig. 4-84 410V

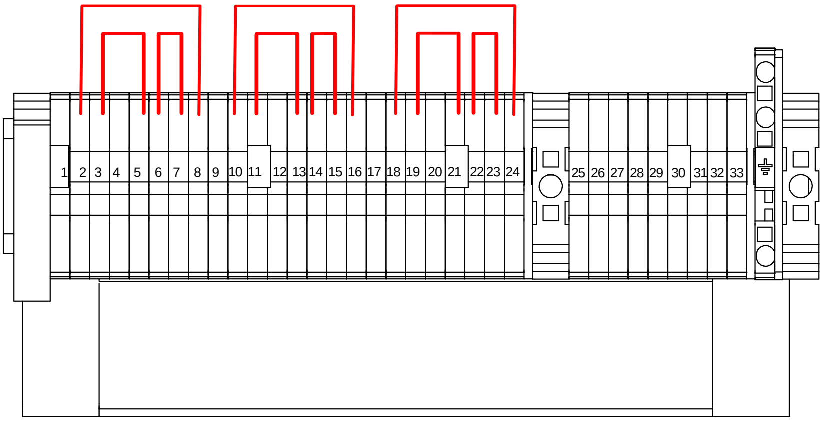

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33

Fig. 4-85 420V

4.4.3 Tap Configuration 480 VAC

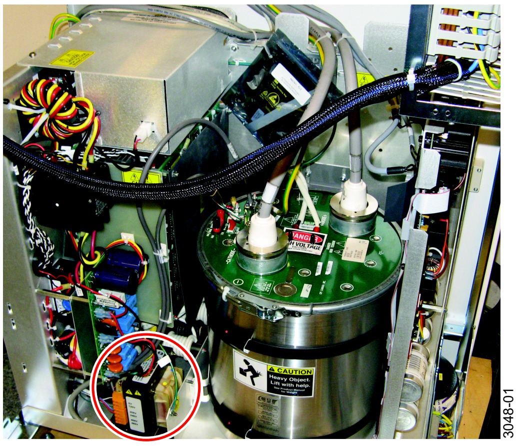


Fig. 4-86 480VAC, Position of generator transformer

1. Make a mark at the system serial number label, at the related check box for the power rating, after having selected the voltage.

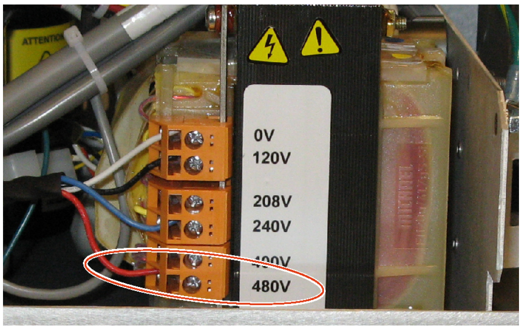


Fig. 4-87 480V connection

2. Check that the red wire is connected to 480 V, at the generator transformer, see **Fig. 4-87**.

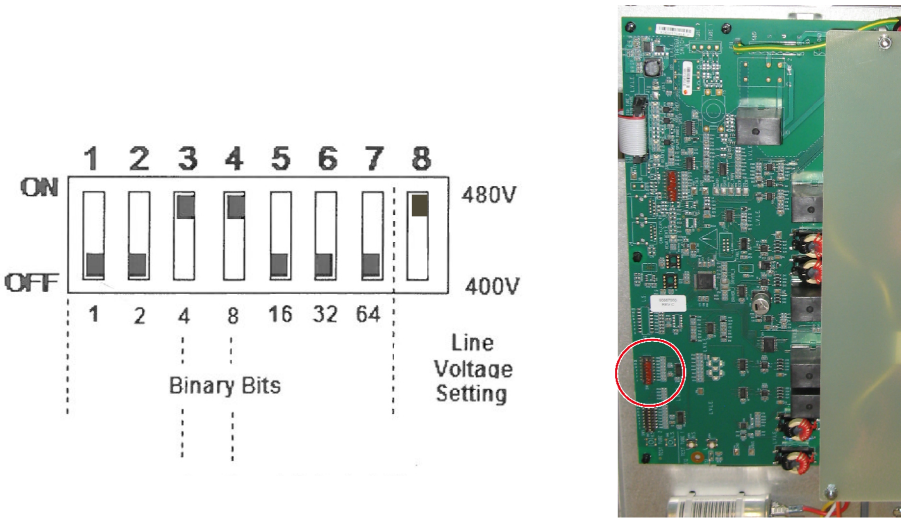


Fig. 4-88 Position of the SW3 DIP-switch

3. Check that the DIP-switch SW3-8 is set to 480V, see **Fig. 4-88**.

Make sure the wire (**A**) is connected according to **Fig. 4-89**.

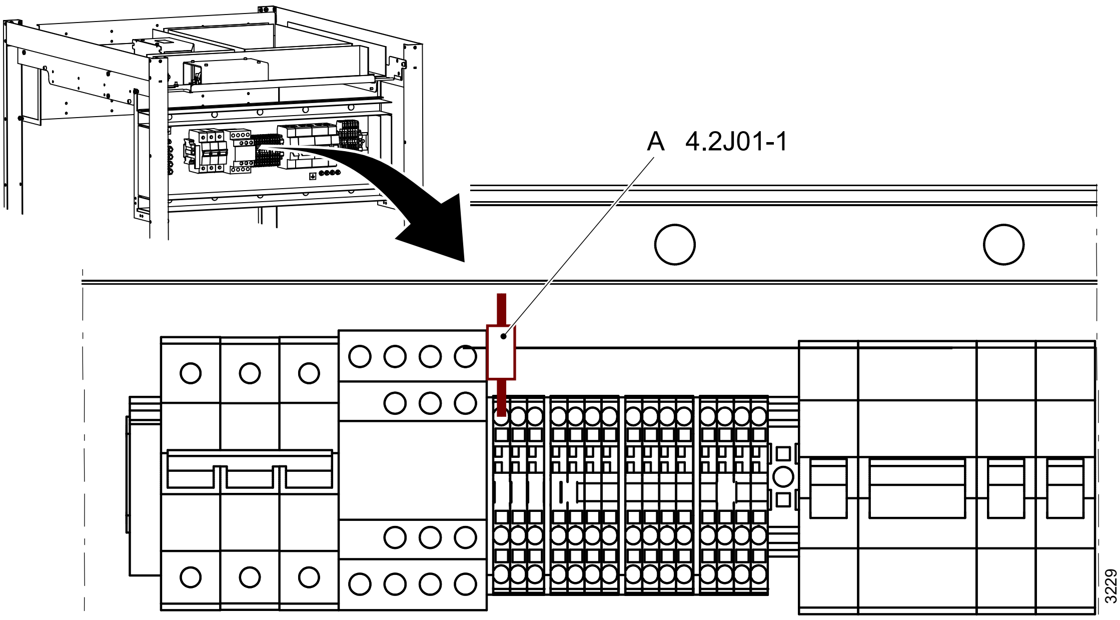


Fig. 4-89 Connect wire A

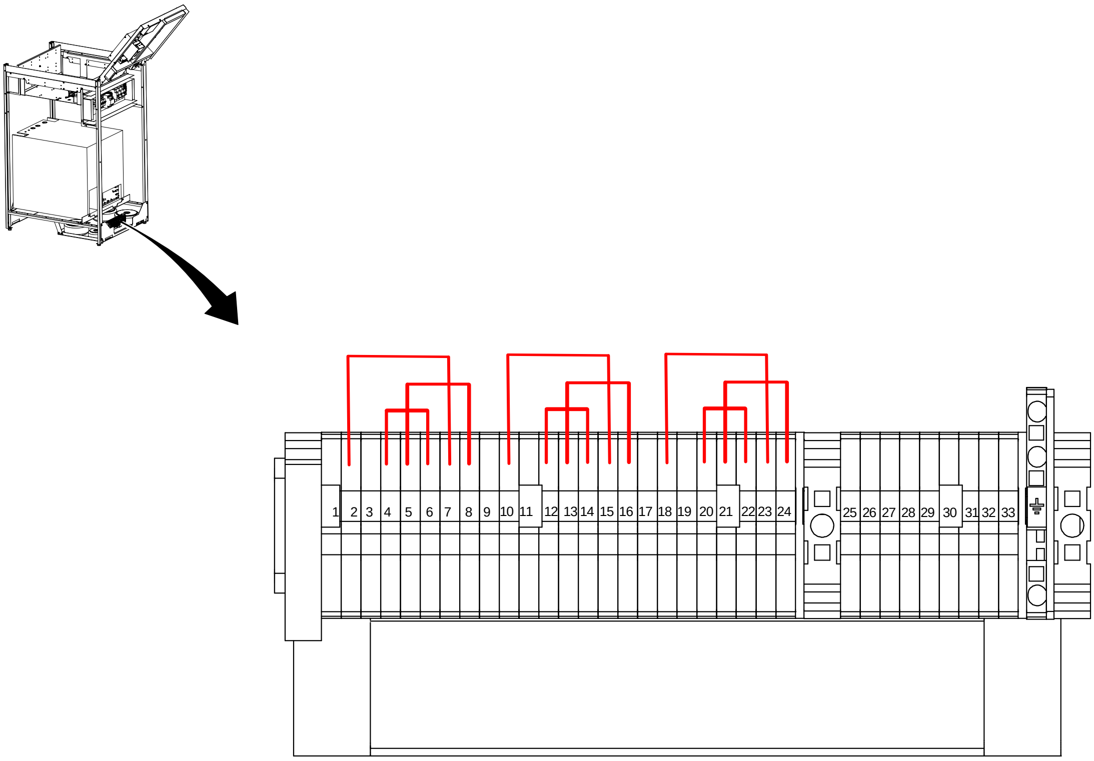


Fig. 4-90 460V

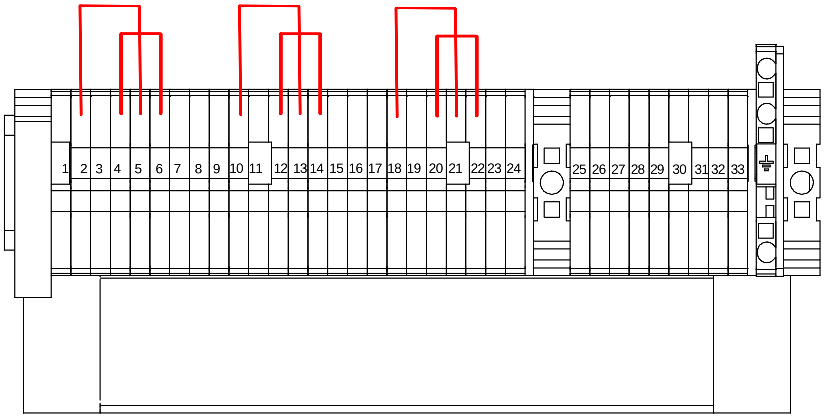


Fig. 4-91 470V

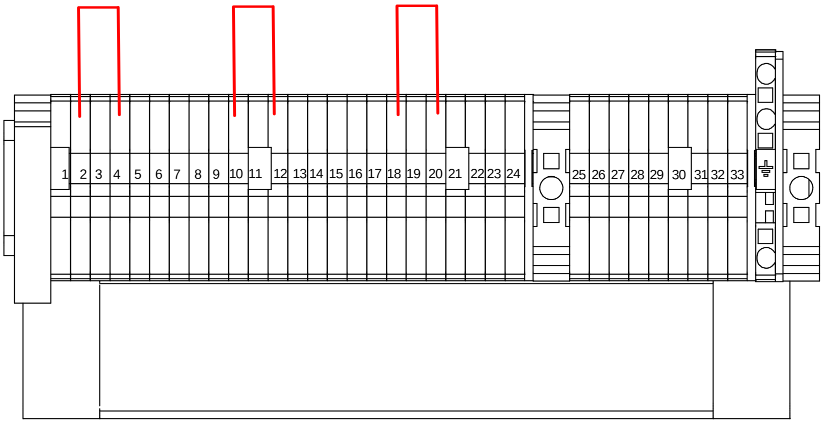


Fig. 4-92 480V

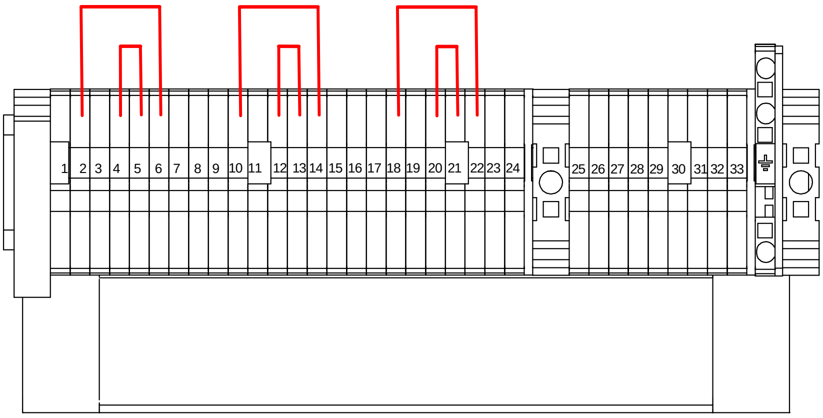
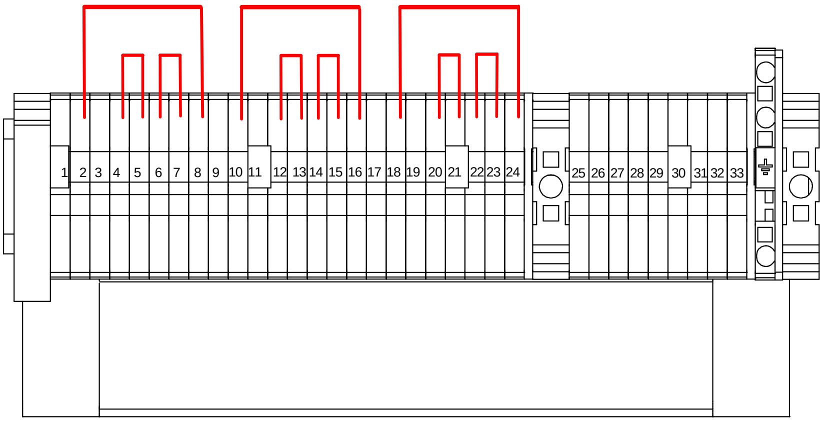


Fig. 4-93 490V



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33

Fig. 4-94 500V

4.5 Electrical Installation Mains

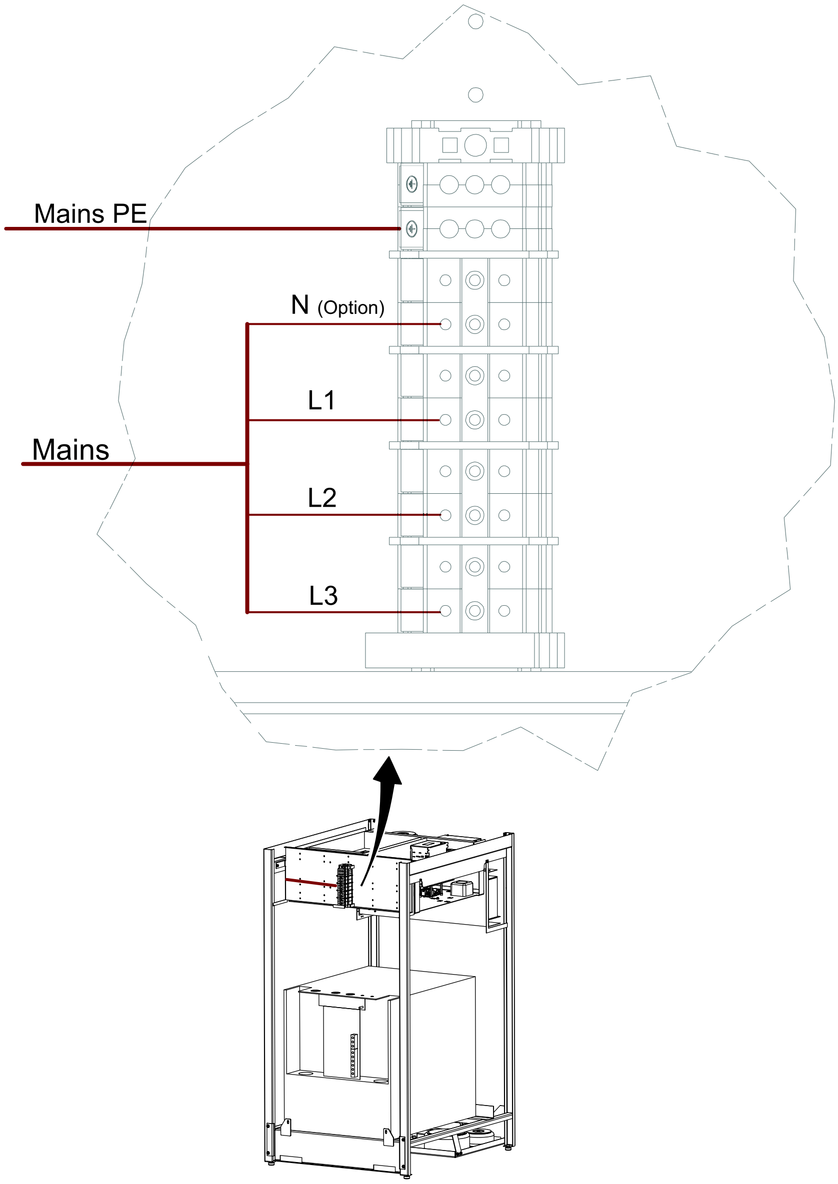


Fig. 4-95 Electrical installation mains

- Connect mains power and mains protective earth according to **Fig. 4-95**.

4.6 Collimator

The collimator is pre-installed by the manufacturer.

For more information on mechanical installation and adjustment, refer to the collimator manufacturer documentation.

4.7 Start-Up Procedure

4.7.1 Check Voltage To The System

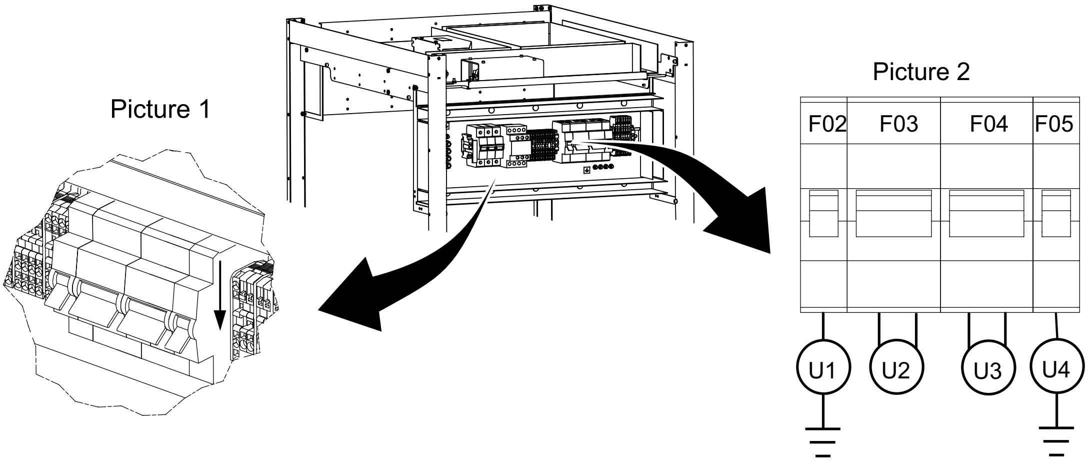
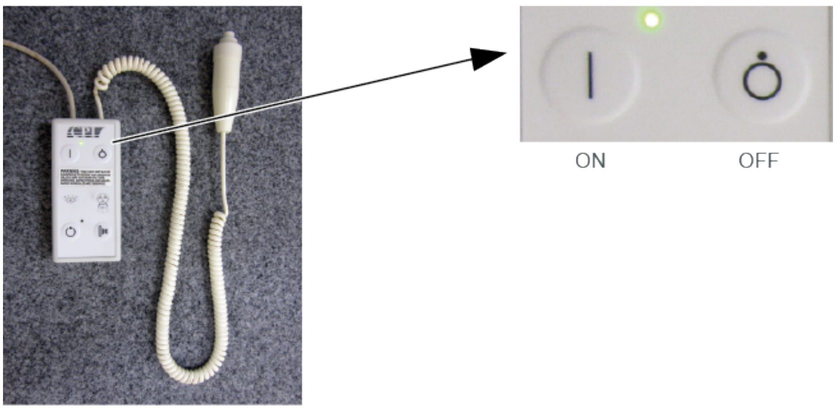


Fig. 4-96 Check voltage to the subsystem

- Switch off (press down) the fuses according to picture 1 and switch on the mains power to system with the mains switch.
- Measure at the fuse 4.2F02 and 4.2F05 according to picture 2.
  - U1 = 230V ±10%
  - U4 = 230V ±10%
- If the measured value fails to correspond with the levels listed above, check the tap configuration.
- If the measured values correspond with the levels listed above, switch on (press up) 4.2F02.

Picture 3



- Switch on the system from the mini console *“ON”* button according to picture 3.
- Measure at the 4.2F03 and 4.2F04 according to picture 2.
  - U2 = 230V ±10%
  - U3 = 230V ±10%
- If the measured values correspond with the levels listed above, switch off the power at mini console *“OFF “* button (picture 3) and switch on (press up) 4.2F03, 4.2F04 and 4.2F05.

4.7.2 Check Alignment, Overhead Tube Crane

WARNING!

The Z movements are factory default, and may not conform to the current conditions.

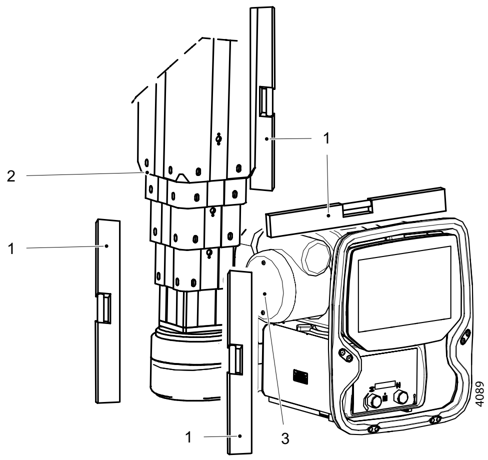


Fig. 4-97 Level overhead tube crane

1. *Spirit level*
2. *Column*
3. *Tube of overhead tube crane*

1. Place a spirit level (**1**) on the overhead tube crane's column (**2**).
2. Check that the column (**2**) is vertical (± 1°) in two directions.

   If necessary, check the wheels of the ceiling wagon.
3. Place a spirit level (**1**) on the overhead tube crane's tube (**3**).
4. Check that the tube (**3**) is horizontal (± 1°) in both directions.

   If not horizontal, see **4.7.2.1 Adjust Alpha Index, Page 182**.

5. Check that the collimator is placed in its index position.
6. Turn on the collimator light and mark a cross in the center of the collimator light field on a piece of paper placed on the floor.

   Drive the column upward/downward and the center of the collimator light field must stay on the same mark on the paper.

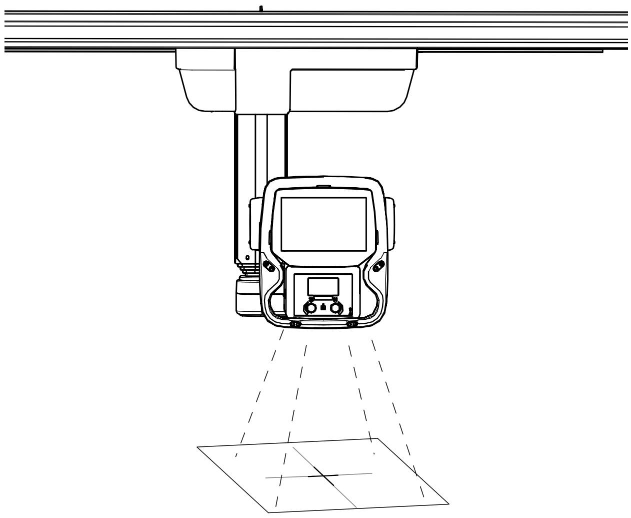


Fig. 4-98 Check collimator light field

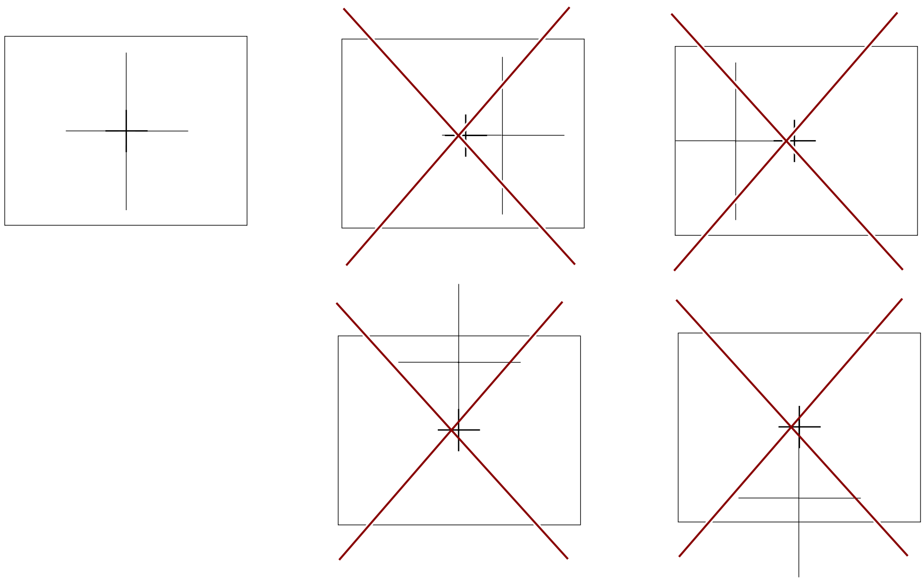


Fig. 4-99

*If the collimator light field moves in x or y direction, or rotate/tilt the tube angle, check the **4.2.1.4 Ceiling Rails Y, Page 113** and **4.2.1.5 Traverse Rail X, Page 121**. These must be level. If necessary, adjust the Alpha index or rotate/tilt the tube angle.*

Note!

Adjusting the alpha index and/or rotating/tilting the tube angle must be done before using the overhead tube crane as a reference to other devices.

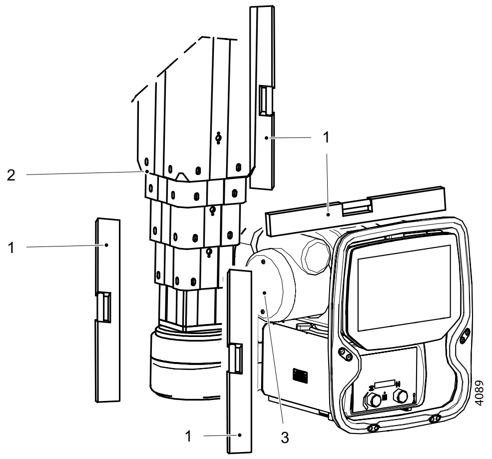


Fig. 4-100 Level overhead tube crane

1. *Spirit level*
2. *Column*
3. *Tube of overhead tube crane*

7. Check that the tube (**3**) and tube tilt angle is horizontal by using a spirit level (**1**).

4.7.2.1 Adjust Alpha Index

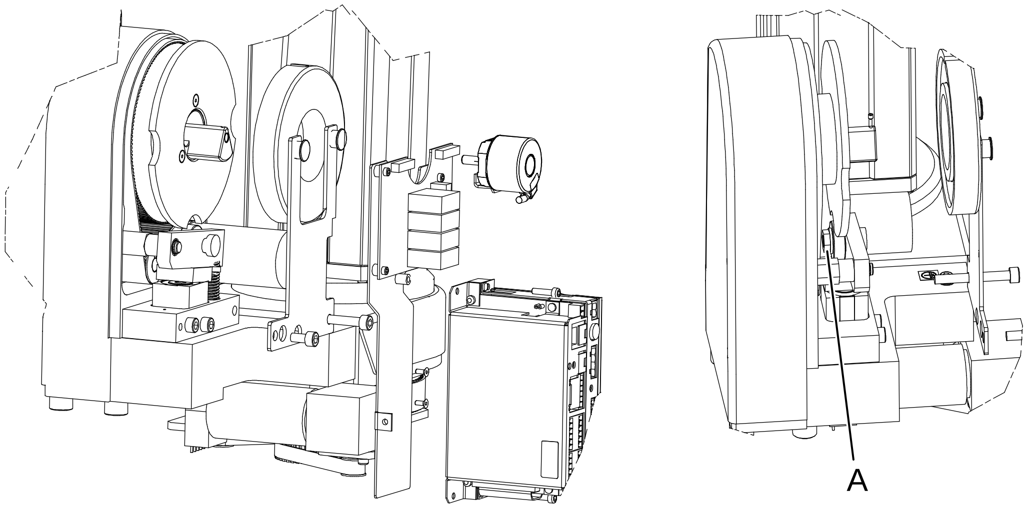


Fig. 4-101 Adjust alpha index

Adjust the alpha index if necessary:

1. Loosen the nut (**A**).
2. Adjust the tube to horizontal level, use a spirit level.
3. Tighten the nut (**A**).

4.7.2.2 Adjust Beta Index

1. Loosen the two nuts in **Fig. 4-102**.
2. Align by the method described in **Fig. 4-99**.
3. Fasten the nuts.

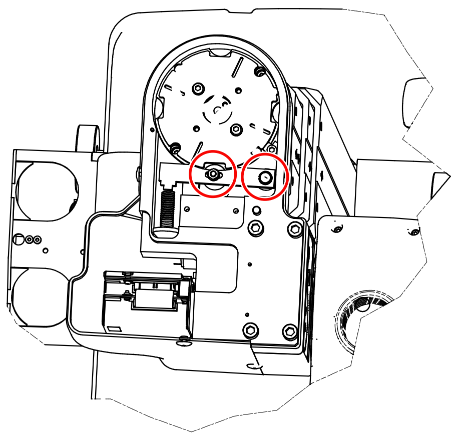


Fig. 4-102 Adjust Beta Index

4.7.2.3 Adjust Index Magnet

The index magnet shall be adjusted if the movement of the overhead tube crane is irregular in the middle of the sweep (alpha 0°), during Tomo-movement.

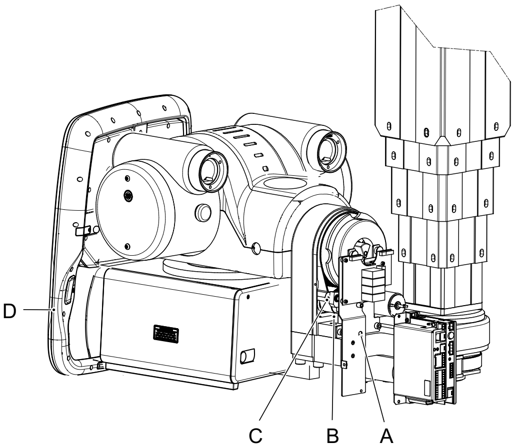


Fig. 4-103 Adjust Index Magnet

1. Remove the covers.
2. Loosen the bolt (**A**) that is behind the hole.
3. Turn the handle (**D**) until the arm (**C**) is against the magnet (**B**).

   Rail (**B**) has to be installed on the front.
4. Activate the magnet from the node A view in the service software, see **Fig. 6-9**.
5. When the arm (**C**) is against the magnet (**B**) tighten the bolt (**A**).

4.7.2.4 Adjust the Mechanical End Stop, Beta

Depending on how the overhead tube crane is installed, you might need to adjust the mechanical end stop beta.

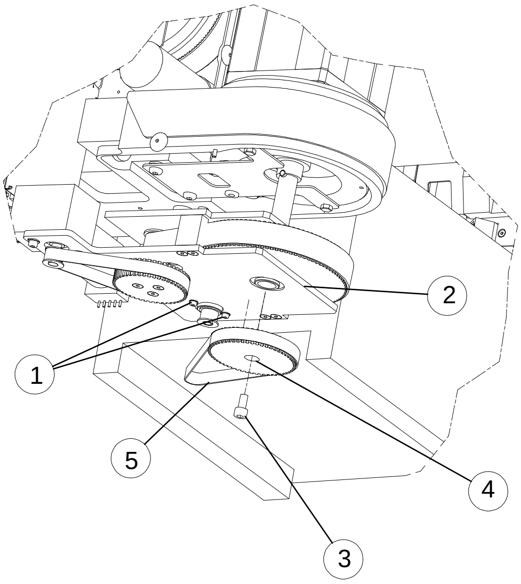


Fig. 4-104 Adjust the mechanical end stop, Beta

1. Disconnect power.
2. Remove cover and cables connected to beta drive unit.
3. Release screws (**1**) holding potentiometer and release tension of belt.
4. Hold beta drive unit (**2**) to prevent it from falling.
5. Remove screw (**3**), pulley (**4**) and belt (**5**).
6. Remove beta drive unit (**2**) by sliding it downward.

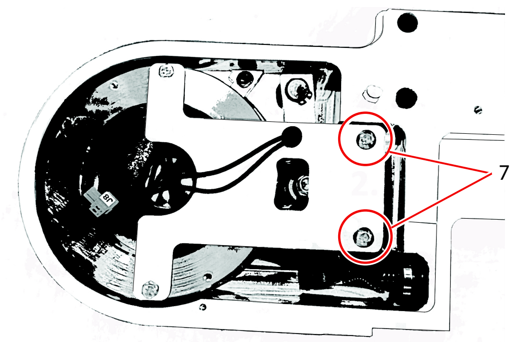


Fig. 4-105 Release screws

7. Release the two screws (**7**), **Fig. 4-105**. Remove the beta magnet.

Note!

Keep track of all shims and washers.

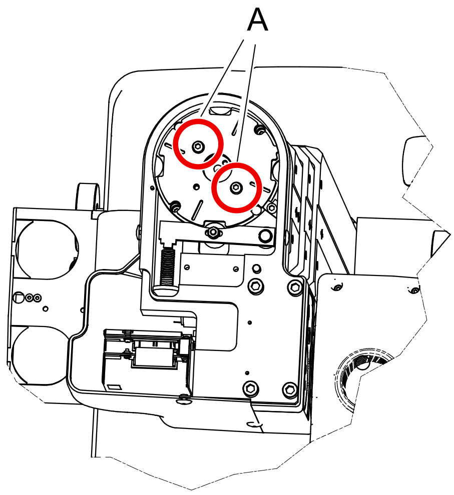


Fig. 4-106 Unscrew bolts

8. Unscrew the bolts (**A**), see R**Fig. 4-106**.
9. Turn the index plate into desired position.
10. Fasten the bolts (**A**) in desired position for the end stop (4 different positions are possible).
11. Reassemble any removed shims or washers.

    Put back all shims and washers as they were removed.
12. Reassemble drive unit.
13. Install pulley (4) with screw (3). Torque 9.8 Nm, Loctite 243.
14. Install belt (5).
15. Adjust tension by pushing potentiometer and tighten screws. Tension = +/-2 mm when pushing on the belt between the c/c of the pulleys.

4.7.2.5 Alignment of Overhead Tube Crane, X- and Y-Direction

1. Turn on the collimator light and mark a cross in the center of the collimator light field on a piece of paper placed on the wall.

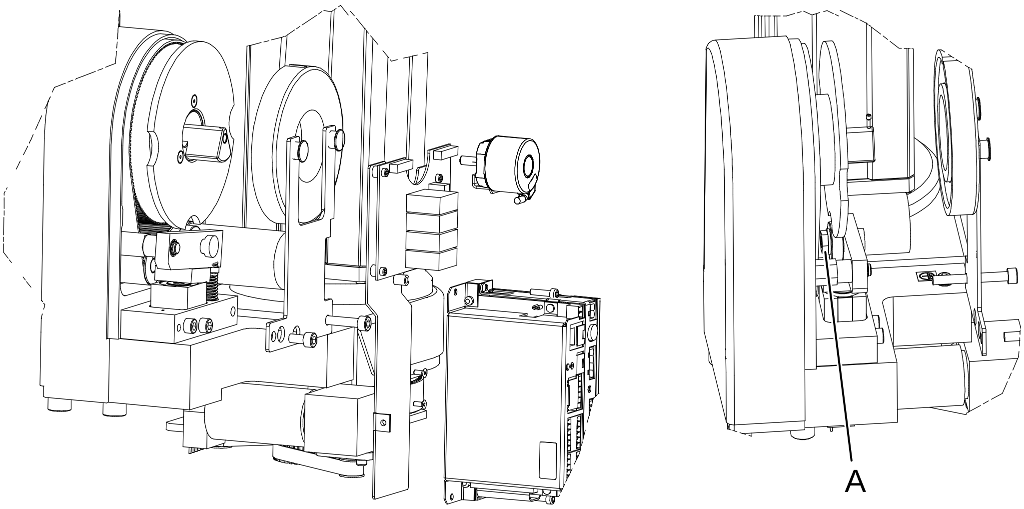


Fig. 4-107

2. Move the overhead tube crane backward/forward and the center of the collimator light field must stay on the same mark on the paper.

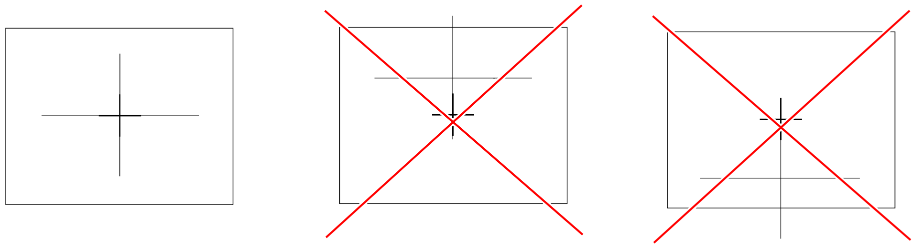


Fig. 4-108 Center of collimator light field

If the collimator light field moves in z direction, check the **4.2.1.4 Ceiling Rails Y, Page 113** and **4.2.1.5 Traverse Rail X, Page 121**. These must be level.

4.7.3 Horizontal Alignment Of Table

1. Move the table and place the collimator above the table frame.
2. Light up the collimator and place the light field on the detector.
3. Move overhead tube crane and detector and observe the alignment.
4. Move the overhead tube crane forward/backward along the table frame. The border of the light field must not move from the border of the table frame, see **Fig. 4-109**.

If needed, adjust the table position.

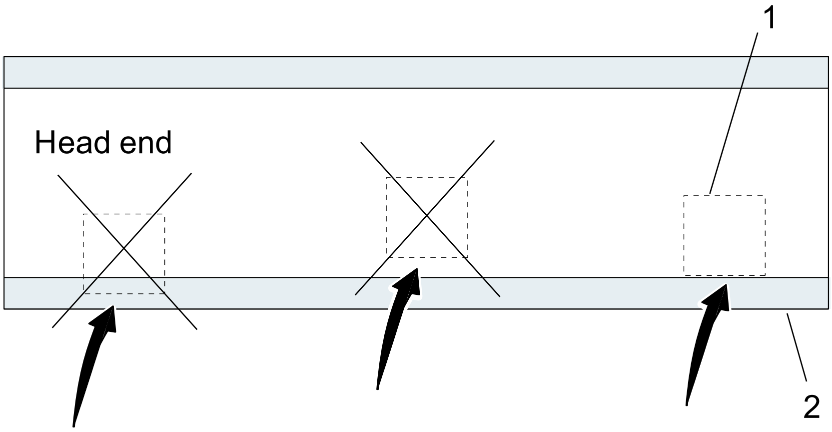


Fig. 4-109 Correct table position

1. *Light field*
2. *Table frame*

Note!

Make sure there is enough space to slide on and off the table top, see Planning Guide.

4.7.4 Table Attachment

1. Drill holes using the drill template, see **Fig. 4-52**, 12 mm diameter, for the expanders.

   The hole depth for the enclosed expanders shall be 45 mm.

Fig. 4-110 Hole depth for expanders

For an alternative attachment to the floor, see the requirements in the Planning guide.

4.7.4.1 Insulation

2. Put the enclosed expanders in the holes. Place a mandrel in the expander and drive in 5-10 mm to attach the expander.
3. Place the Table over the drilled holes and install the insulation plate and washers according to **Fig. 4-110** and **Fig. 4-111**.

Note!

The insulation kit is designed to insulate the Table from the hospital building, and will prevent stray currents from reaching the System e.g. via bolt attachments.

Stray currents can be present e.g. in reinforcement bars or in water pipes in a building. These currents can be of several hundred amperes and can affect the leakage current from the System to the patient and thereby the safety for patient and user. Stray currents in the building shall be regarded as a failure in the building but the insulation kit provides an extra safety barrier. The insulation kit will also prevent unwanted ground loops due to e.g. electrical contact through the wall or floor lead X-ray shielding via bolt attachments of the Systems components.

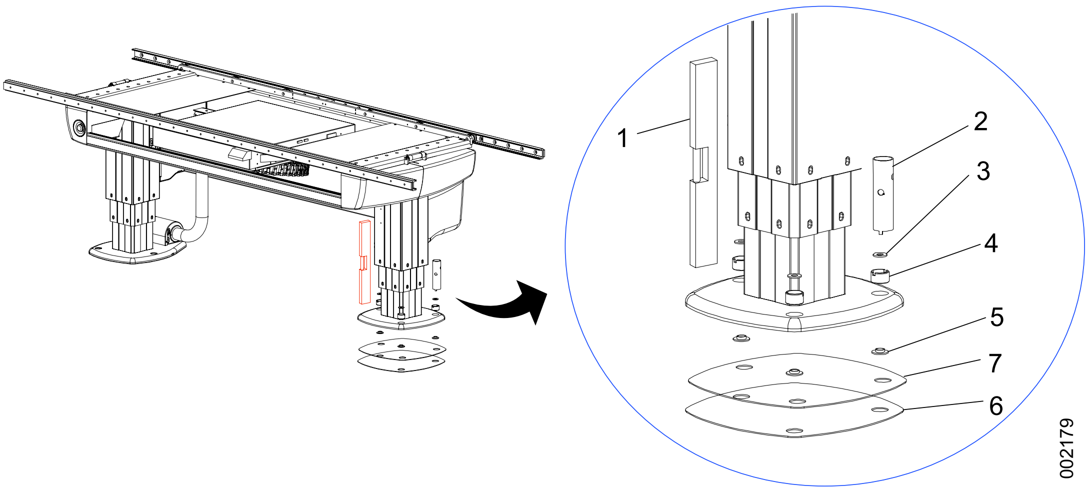


Fig. 4-111 Install insulation plate

1. *Spirit level*
2. *Installation tool*
3. *Insulation washer*
4. *Adjusting bolt*
5. *Insulation washer*
6. *Insulation plate*
7. *Shims*

4. Place a spirit level on the table top and check if the table top is horizontal (±1 mm), see **Fig. 4-112**. Shim each column if necessary.

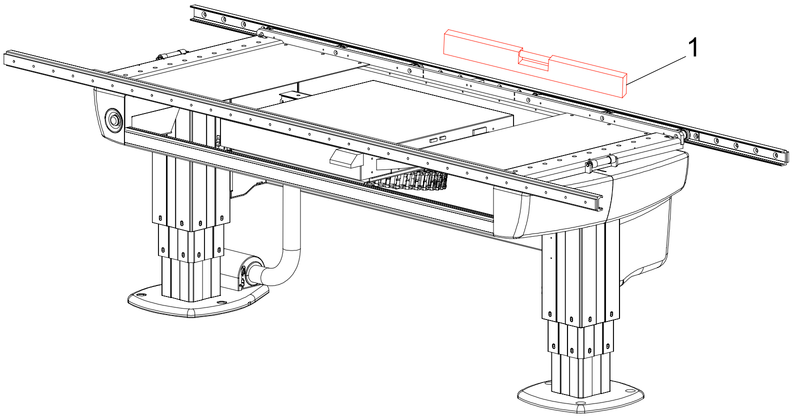


Fig. 4-112 Level table columns

5. Place a spirit level (1) on two adjacent sides of each column. The column shall be 90° with a tolerance of ±0.5°.
6. To adjust the column use the adjusting bolts (4) and the installation tool (2), see **Fig. 4-111**. The adjusting bolts are only for alignment.

   Shims shall be used to align table top.
7. Bolt the table into the floor. Use the M10 screws included in the shipment. Apply Loctite 243 and tighten with 15 Nm.
8. Every attachment point shall be able to carry a load of at least 4.2 kN.

4.7.5 Measure Insulation Between Hospital Protective Earth And System

DANGER!

Make sure the mains power is switched off before the mains protective earth cables are disconnected.

See **4.3 Measure Protective Earth, Page 163**.

4.7.6 Calibration Of Overhead Tube Crane

4.7.6.1 Definitions

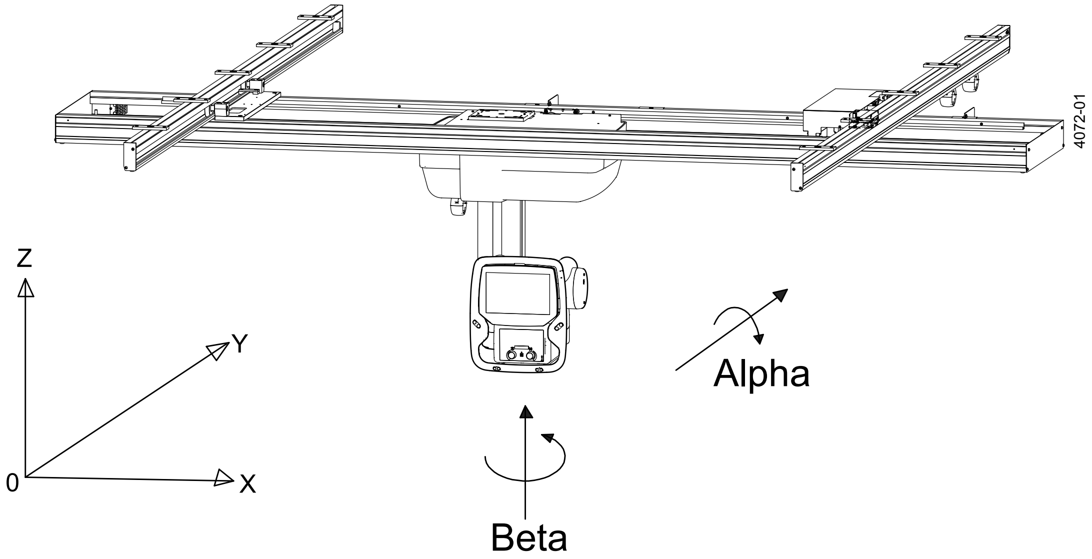


Fig. 4-113

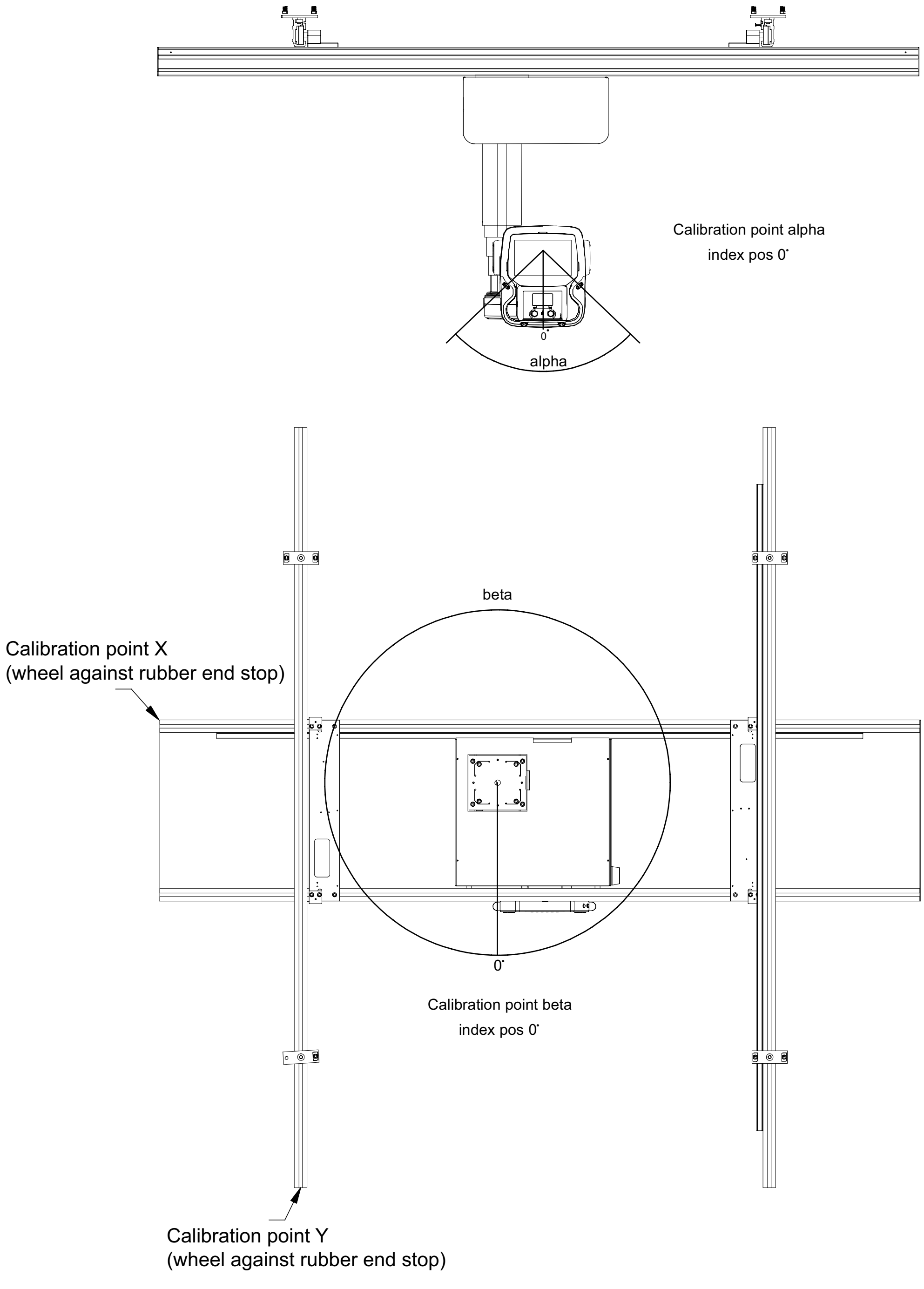
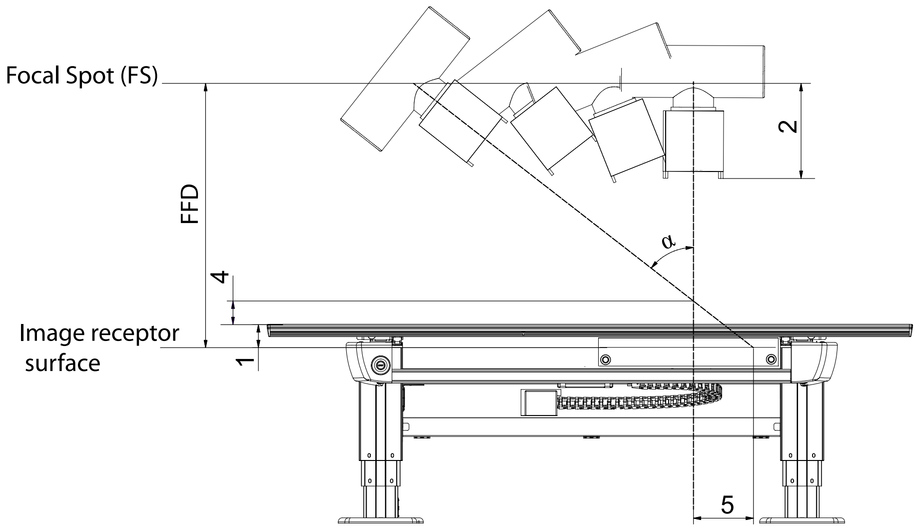


Fig. 4-114 Calibration X, Y

Note!

*The overhead tube crane must be calibrated according to **Fig. 4-114**, irrespective of how the overhead tube crane is going to be used after the installation, (i.e. normal installation or reverse installation) and the placement of the Table in relation to X and Y.*

Table Definitions



1. Tabletop surface to Image receptor surface
1+2 FS to Image receptor holder offset.
3. Not applicable
4. Rotation point (pendulum parameters)
5. Calculated movement range (Image receptor holder)

1 - 4 = parameters

Fig. 4-115 Important measures

4.7.7 Password

There are two access levels:

- Basic level for the Operator. Only used for reading purposes.
- Advanced level for the Service technician. Used for setting up the System and perform basic error detection.

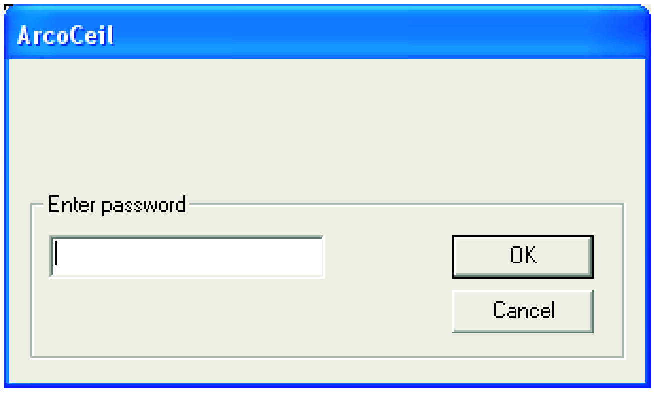


Fig. 4-116 Enter password

To change the access level:

1. Chose the *File menu* and *Change user.*
2. Enter the password for the selected type of access level.
3. Press the *OK button*.
4. If no change shall be done, chose *Cancel button*.

4.7.8 System Setup

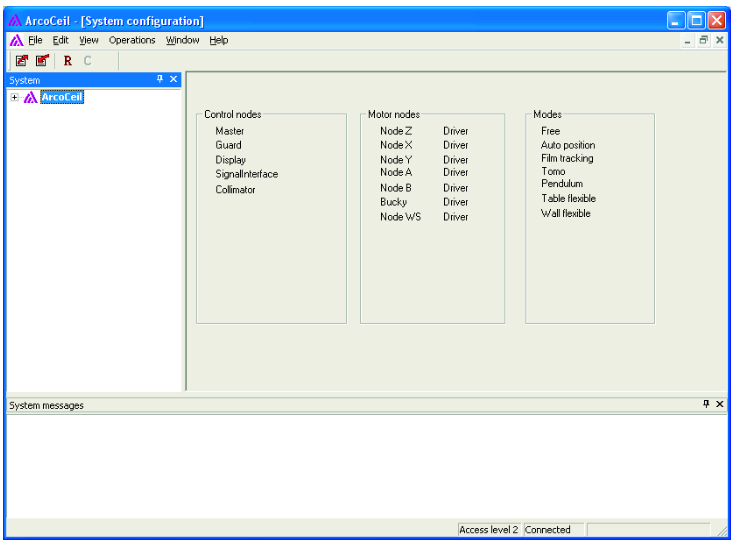


Fig. 4-117

Before setting up the overhead tube crane, check the following:

1. Connect a standard serial cable (maximum length 2 m), between the System cabinet (J31 at the FIB) and the serial interface port (COM), on the service lap top (PC).
2. Start the service program.
3. Select COM-port.

4. Start the overhead tube crane service software from the enclosed USB and enter password.

Note!

Note that the software in all nodes, including service software and the parameters are tested and verified as a software package.

The version on all nodes, service software and parameters must belong to the same software package in order to guarantee the function.

Further check can be made against the SwRLN_document.

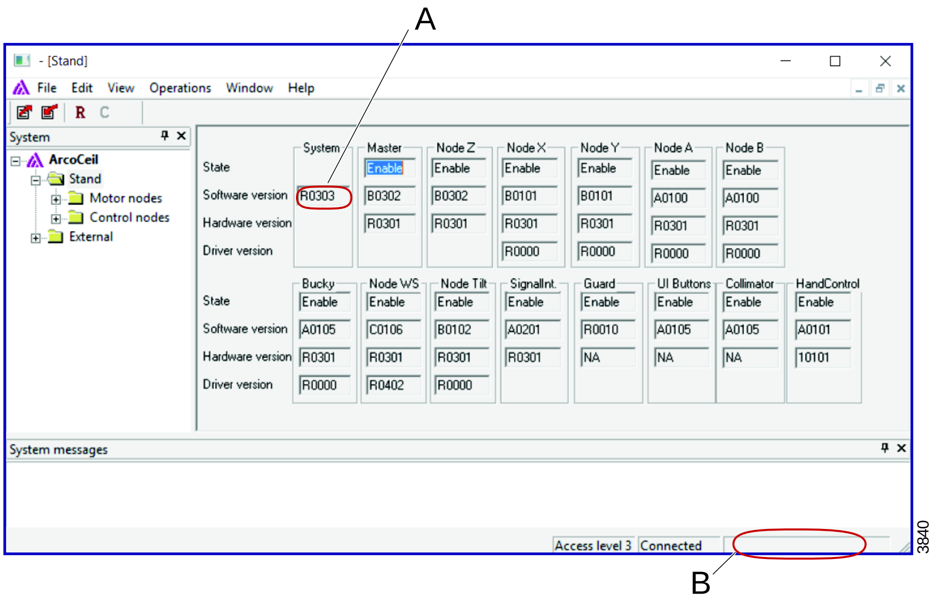


Fig. 4-118

A System software version

B Status field

5. Check that the system software version is shown in the service program **A**. The box must not be blank.

   If problems occur with the service software configuration, they are displayed in the status field **B**.

6. Check the state of all the nodes. All nodes shall be in enable state.

4.7.8.1 Hardware Key

To identify the current configuration in the system, the dialogue box `Hardware Key Mask` is used.

The hardware key is made based on the ordered options for the System. The information describes the setting unique for each System.

It is possible to disable functionality in the system by unmarking a check box. This could be helpful if a node is broken. Then it is still possible to use the system if the node is removed.

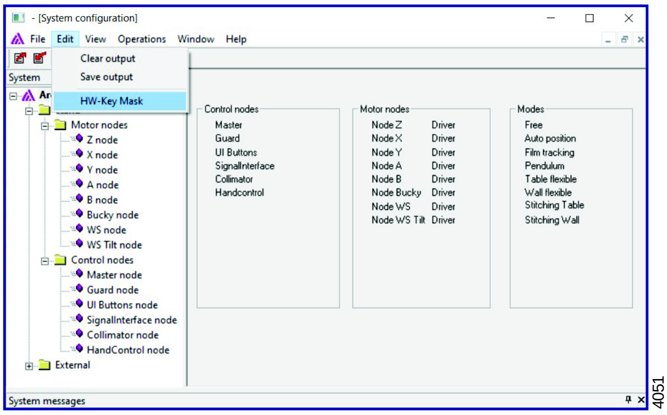


Fig. 4-119

1. From the ceiling system service software, select `Edit` and `HW-Key Mask`.

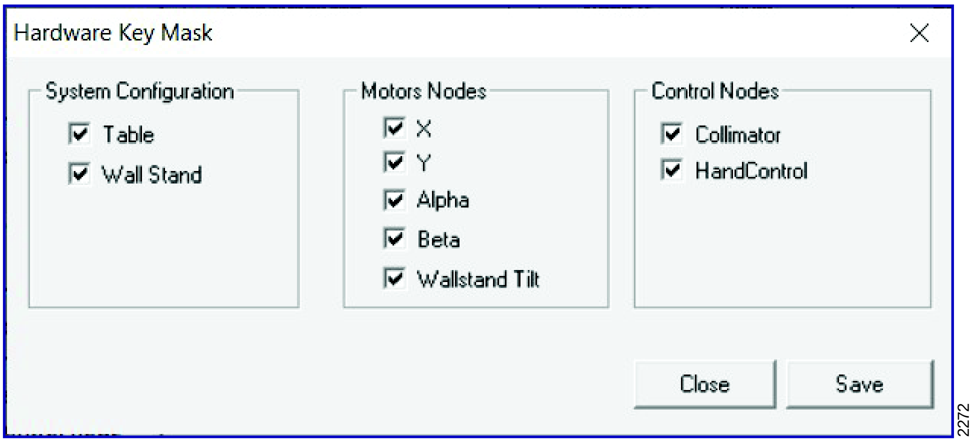


Fig. 4-120 Hardware key

2. Make your choices in the dialogue box.
3. Press `Close` to return without saving changes.
4. Press `Save` to save parameters.

Descriptions of dialogue box options:

System Configuration:	Current configuration for the system: - Wallstand - Table or - Table and wallstand
Motor Nodes:	Nodes with motorized movement.
Control Nodes:	Nodes with specific control functionality, for example to control the collimator.

4.7.8.2 Motorized Movements

Calibration of X-axis

1. Enter the *Node X* view.
2. Move the stand (X-axis) to its calibration point. See **Fig. 4-114**.
3. Make sure that the stand is placed against the mechanical end stop.
4. Press the *Calibrate* button in the Node X view.
5. Check that the position of the X-node has been set to zero.
6. Move the stand (X-axis) in the positive direction and check that the position changes concurrently.
7. Place the stand 1-2 cm from the mechanical end stop (if no external object is in the way), at the same side where the calibration point (position 0) is located.
8. Press the *Set Low* button to set the low end stop.
9. Place the stand 1-2 cm from the opposite mechanical end stop (if no external object is in the way).
10. Press the *Set high* button to set the high end stop.
11. Move the X-axis, from the service software with the blue arrows, and check that the System stops at the defined positions (the end stop positions that has been set).

Note!

The end stops shall be set at a minimum distance of 500 mm, between the stand and the surrounding walls (consider the Beta rotation).

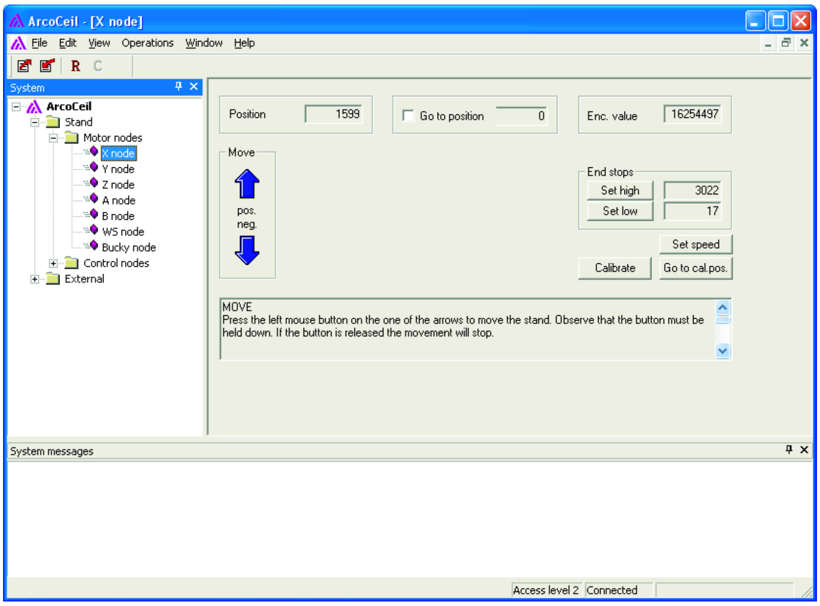


Fig. 4-121

Adjust The Drive Unit X and Y

Move the overhead tube crane in both X and Y directions.

Adjust the drive units if:

- the drive units run too stiff (e.g. object protection error during automatic movement).
- the drive units lose contact with the tooth belt when the brake is activated (the overhead tube crane shall not be able to move when the brake is activated).

To adjust the drive units:

1. Loosen the nut (**A**).
2. Turn the eccentric bolts (**B**), see **Fig. 4-122**.

   It shall be possible to rotate the wheels (**C**) by finger pressure. Repeat until the drive units runs smoothly.

When the calibration of the overhead tube crane is done, a fine adjustment of the drive units may be needed.

Check that the tooth belt wheels does not lose contact with tooth belt, during the entire stroke of X/Y-direction.

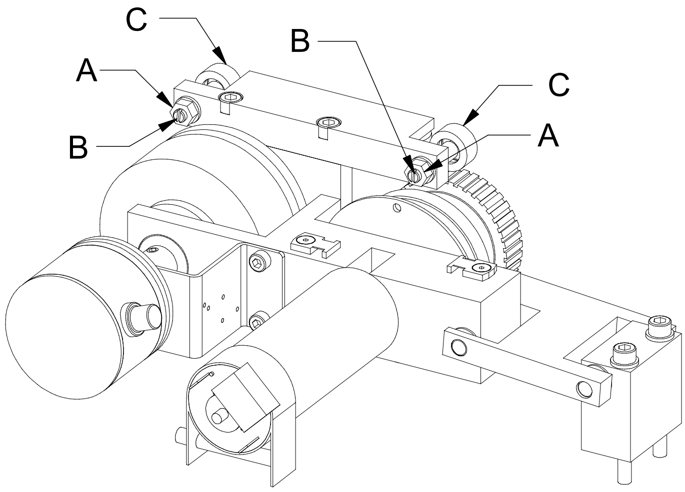


Fig. 4-122 Adjust the drive unit

The tooth belt should not cause vibrations in the maneuver handle, when the overhead tube crane is moved manually.

Calibration of Y-axis

1. Enter the *Node Y* view.
2. Move the stand (Y-axis) to its calibration point. See **Fig. 4-114**.
3. Make sure that the stand is placed against the mechanical end stop.
4. Press the *Calibrate* button in the *Node Y view*.
5. Check that the position of the Y-node has been set to zero.
6. Move the stand (Y-axis) in the positive direction and check that the position changes concurrently.
7. Place the stand 1-2 cm from the mechanical end stop (if no external object is in the way), at the same side where the calibration point (position 0) is located.
8. Press the *Set Low* button, to set the low end stop.
9. Place the stand 1-2 cm from the opposite mechanical end stop (if no external object is in the way).
10. Press the *Set high*, button to set the high end stop.
11. Move the Y-axis, from the service software with the blue arrows, and check that the System stops at the defined positions (the end stop positions that has been set). The overhead tube crane shall run smoothly, if not adjust the drive unit Y. See **Adjust The Drive Unit X and Y, Page 198**.

Note!

The end stops shall be set at a minimum distance of 500 mm, between the stand and the surrounding walls (consider the Beta rotation).

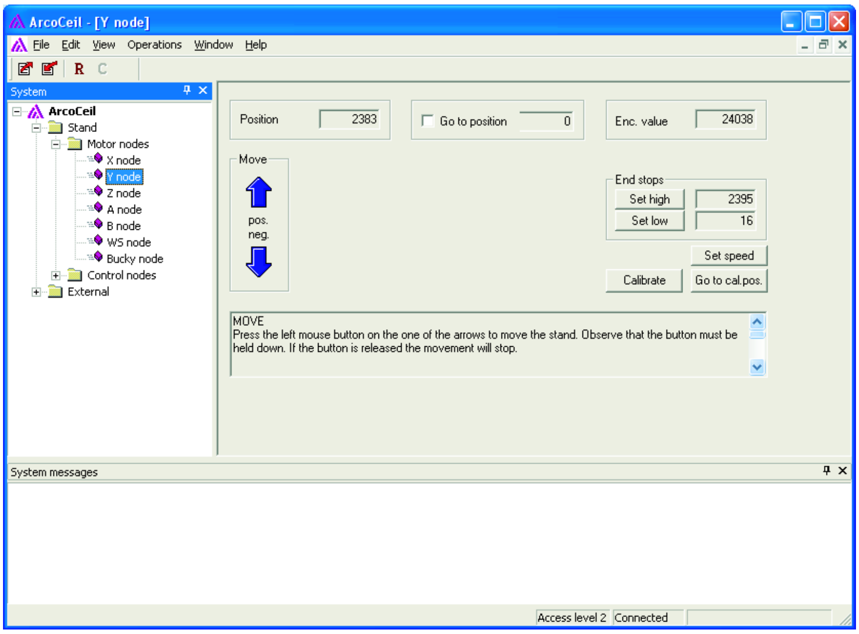


Fig. 4-123

Calibration of Z-axis

1. Enter the *Node Z* view.
2. Move the stand (Z-axis) to its calibration point (1500 mm between the focal spot and the floor).
3. Press the *Calibrate* button in the Node Z view.
4. Check that the position of the Z-node has been set to 1500.
5. Restart the system.
6. Press the *Connect* button (File => Connect) and check in the service software that the position (Node Z) has been set to 1500.
7. Move the stand (Z-axis) in the positive direction and check that the position changes concurrently.
8. Measure the distance between the floor and the focal spot on at least five different positions and check that the distance is concurrent (±3 mm) with the displayed position in the service software.

   If the distance differs more than the specified value (±3 mm) helix compensation must be performed. See **Helix Adjustment, Page 202**.

   Note!

   After the helix compensation has been performed the Calibration of the Z-axis must be redone from step one.

9. Place the stand (Z) at the position for the high end stop, see **Fig. 4-125**.
10. Press the *Set high* button to set the high end stop.
11. Place the stand (Z) at the position for the low end stop (maximum range of 1750 mm, between the end stops, see **Fig. 4-125**).

    Observe that the end stop must be set so that there is a space between the lowest part of the stand and the floor of at least 120 mm, due to squeeze hazard.
12. Press the *Set low* button to set the low end stop.
13. Move the Z-axis and check that the System stops at the defined positions (the end stop positions that have been set).

Note!

*If the present end stops inhibit the movement, press the **Remove** button.*

If this button has been pressed, the end stops must be set again.

CAUTION!

Observe that the end stop must be set so that there is a space between the lowest part of the stand and the floor of at least 120 mm, due to squeeze hazard.

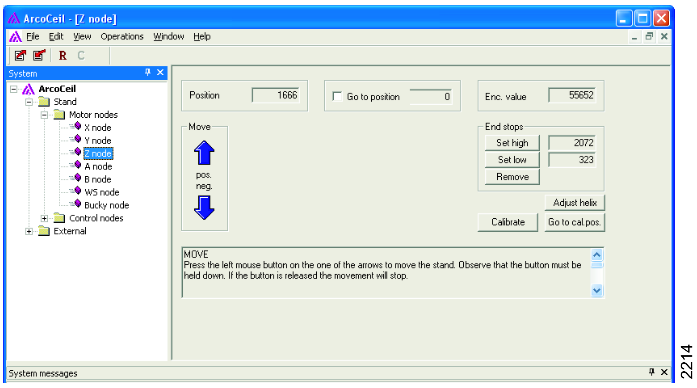


Fig. 4-124 Z node

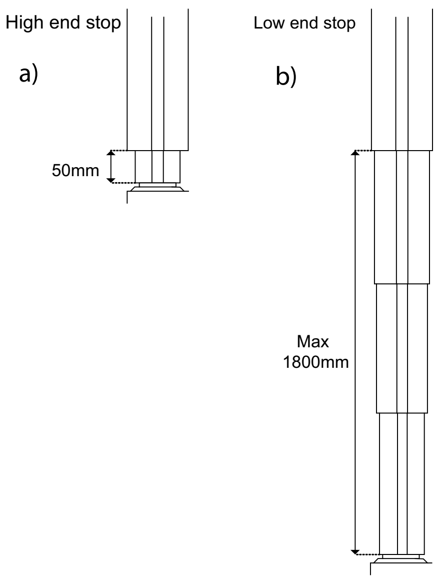


Fig. 4-125 High and low end stops

Helix Adjustment

Only perform if necessary. Check if helix is correct according to step 8 at *Calibration of the Z-axis*.

1. Enter the *Node Z* view.
2. Press the *Helix* button.
3. Move the Z-axis upward until the inner segment of the column is 7 cm from the outer segment, see a) in **Fig. 4-125**.
4. Measure the actual height between the floor and the focal spot.
5. Enter the value in the *Height 1* edit box.
6. Press the coherent *Enc. value* button.
7. Move the Z-axis downward until the focal spot is approximately 1200 mm above the floor.
8. Measure the actual height between the floor and the focal spot.
9. Enter the value in the *Height 2* edit box.
10. Press the coherent *Enc. value* button.
11. Place the stand (Z) at the position for the low end stop (maximum range of 1750 mm, between the end stops), see b) in **Fig. 4-125**.
12. Measure the actual height between the floor and the focal spot.
13. Enter the value in the *Height 3* edit box.
14. Press the coherent *Enc. value* button.
15. Press the *Write* button to calculate and set the helix compensation value.
16. Redo the calibration of the Z-axis.

Note!

After the helix compensation has been performed, the calibration of the Z-axis must be redone from step one.

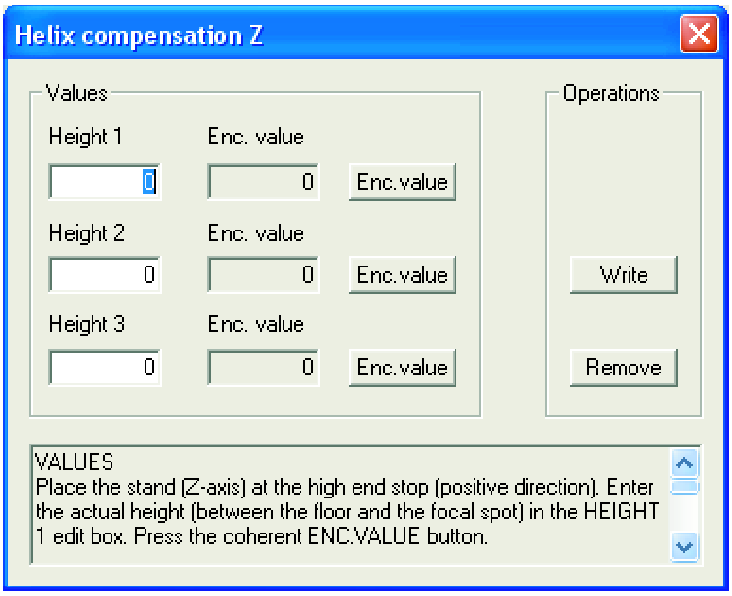


Fig. 4-126

Calibration of Alpha-axis

Only perform if necessary. Start with a check.

1. Turn the alpha-axis in +/- 90°.
2. Check that the display shows the correct value.

   If correct value is shown the alpha-axis is correct and no calibration is needed.

Make sure that the alpha-axis is in the 0 position before calibration of alpha-axis. If not, see **4.7.2.1 Adjust Alpha Index, Page 182**.

1. Enter the *Node A* view.
2. Move the stand (alpha-axis) to its calibration point, see **Fig. 4-114**. Set the A-axis in the 0° index.
3. Press the *Calibrate* button.
4. Move the alpha-axis until the display shows an angle of max 135º.
5. Press the *Set High* button to set the high end stop.
6. Move the alpha-axis until the display shows an angle of max -135º.
7. Press the *Set low* button to set the low end stop.
8. Verify that the value for that Alpha angle in the display is correct in all the indexes (-90°, 0° and 90°).

Calibration of Alpha Compensation

Only perform if necessary.

1. Turn the alpha-axis in +/- 90°.
2. Check that the display shows the correct value.

   If correct value is shown the alpha-axis is correct and no calibration is needed.

Make sure that the alpha-axis is in the 0 position before calibration of alpha-axis. If not, see **4.7.2.1 Adjust Alpha Index, Page 182**.

1. Press the *Reset Alpha comp. param.* button to reset the Alpha compensation parameters.
2. Press the *Calibrate* button.
3. Set the A-axis in the -90° index.
4. Press the *-90 deg.* button to get the compensation values in -90°.
5. Set the A-axis in the 90° index.
6. Press the *90 deg.* button to get the compensation values in 90°.
7. Press the *System reset* button.

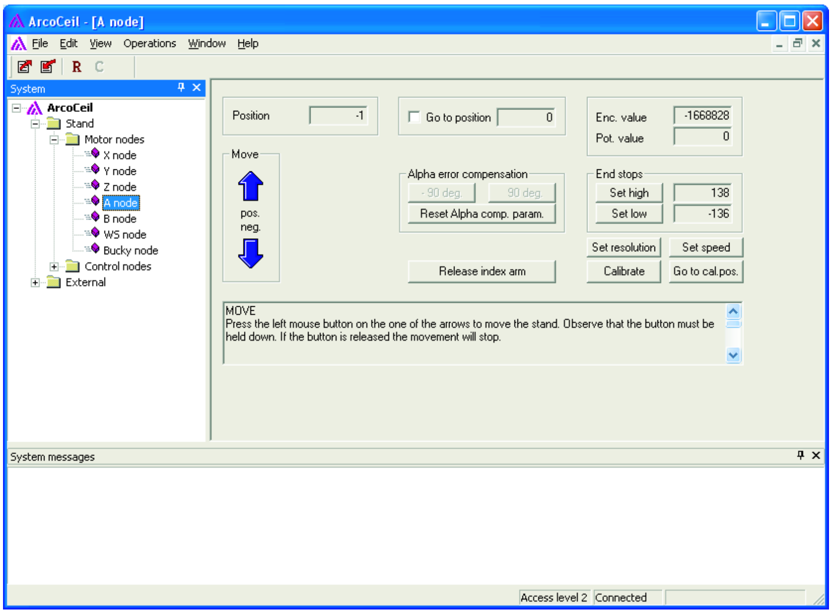


Fig. 4-127 Calibration of Alpha Compensation

Calibration of Beta-axis

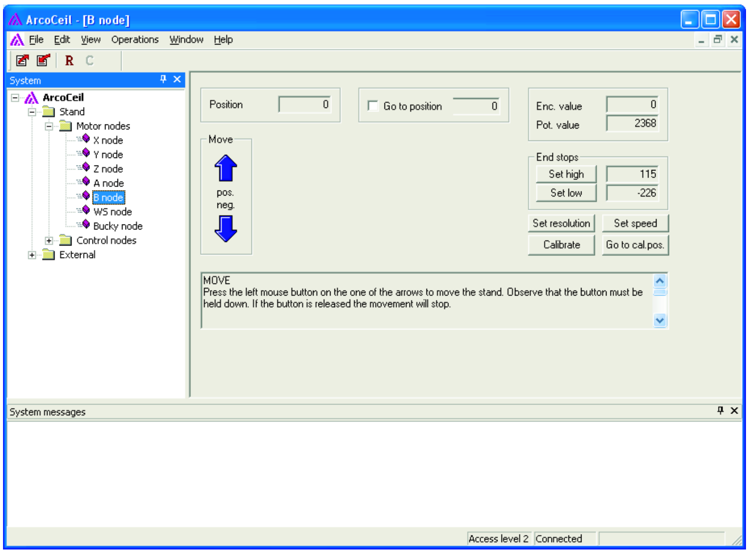


Fig. 4-128 Calibration of Beta-axis

Only perform if necessary:

1. Turn the beta-axis in +/- 90°.
2. Check that the display shows the correct value.

   If correct value is shown, the beta-axis is correct and no calibration is needed.

Note!

If the mechanical end stop is kept in the factory preset position, paragraph 2 through 6 shall be disregarded.

1. Enter the *Node B* view.
2. Adjust the mechanical end stop (if necessary), so that the Beta rotation suits the particular installation.
3. Move the beta-axis to the mechanical end stop (positive direction).
4. Remove the potentiometer for the Beta-movement.
5. Rotate the potentiometer until the encoder value reaches 3050 (+/– 20).
6. Install the potentiometer and check the value again.
7. Turn the beta-axis toward the mechanical end stops (in both directions) and check that the displayed value is correct (the displayed value does not flicker or changes uncontrolled).
8. Move the stand (beta-axis) to its calibration point (see **Fig. 4-114**).
9. Make sure that the beta-axis is in the 0° index.
10. Press the *Calibrate* button in the Node B view.
11. Check that the position of the B-node has been set to zero.
12. Move the stand (beta-axis) in the positive direction (turn counter clockwise). Check that the position changes concurrently.
13. Move the stand (beta-axis) in the positive direction (turn counter clockwise). Place the stand approximately 1° from the mechanical end stop (mechanical end stop of the b-axis).
14. Press the *Set high* button to set the high end stop.

15. Move the stand (beta-axis) in the negative direction (turn counter-clockwise). Place the stand approximately 1º from the opposite mechanical end stop (mechanical end stop of the beta-axis).
16. Press the *Set Low* button to set the low end stop.
17. Move the beta-axis, from the service software with the blue arrow. Check that the System stops at the defined positions (the end stop positions that has been set).

4.7.8.3 Beta Resolution

Before altering the resolution of the Beta node check the following:

1. Check that all nodes are alive (a green LED is toggling on the control board).
2. Check that the service cable is connected to the serial interface port on the service application host (PC).
3. Start the service application.

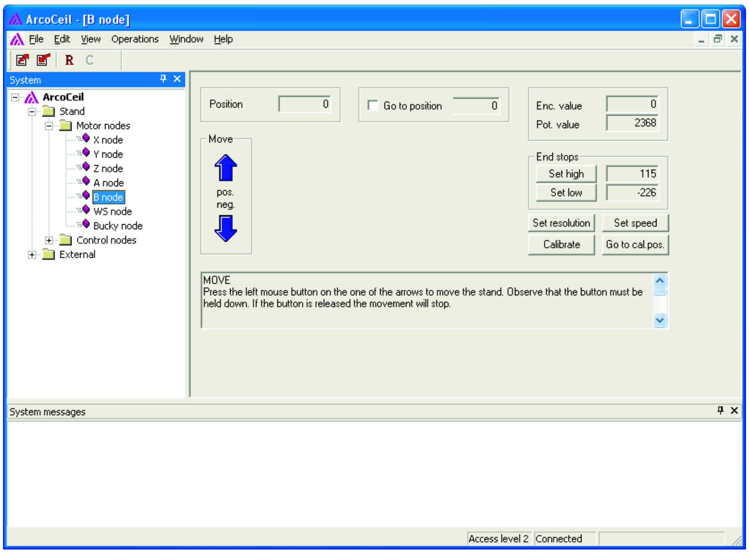


Fig. 4-129 Beta Resolution

4. Enter the view of the node, which resolution is to be altered (node A or node B).
5. Check that all the potentiometer value is changing (the potentiometer value can be read in the SSW) when moving the axis.
6. Check that all the encoder value is changing (the encoder value can be read in the SSW) when moving the axis.
7. Set the axis in the -90° mechanical index. Read out the potentiometer and the encoder value.
8. Set the axis in the 90° mechanical index. Read out the potentiometer and the encoder value.
9. Calculate the resolution, using the following formula:

   (180 / (Pot.value 1 - Pot.value 2)) * 10 000 = Potentiometer resolution

   (180 / (Enc.value 1 - Enc.value 2) / 180) * 100 000 = Encoder resolution

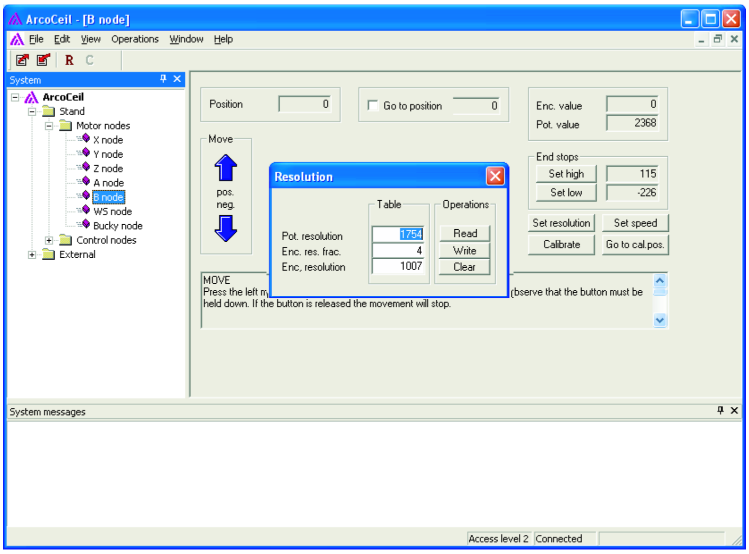


Fig. 4-130 Set Resolution

10. Press the *Set Resolution* button.
11. Enter the *Potentiometer Resolution* and the *Encoder resolution* in the coherent edit boxes.
12. Enter the fraction of the encoder resolution in the coherent edit box (see example below). If the Encoder resolution value is 1009,416564…,the “Enc. res frac.” shall be set to 4.
13. Press *Write button* to store the values.
14. Close the dialogue box.
15. Move the axis, with the blue arrows, and check that the movement works correctly.
16. Place the axis (manually) in the mechanical indexes. Verify that the position is coherent with the position of the indexes.

4.7.9 Calibration of Bucky-Axis on Table

Fig. 4-131 Calibration of Bucky-Axis on Table

Note!

The value on the position must increase when moving in positive X or Y direction.

If it does not increase, then activate the inverted direction.

Note!

If the present end stops inhibit the movement, press the Remove button.

If this button has been pressed, the end stops must be set again.

Note!

To be able to calibrate, the bucky-axis must be placed in the cradle. The drive cradle box is marked green when the detector holder is correctly positioned.

---

1. Enter the *Bucky node view*.
2. Move the overhead tube crane (X- and Y-axis) until the light field of the collimator is aligned with the center of the detector holder.
3. Press the *Calibrate* button in the *Bucky view*.
4. Check the position.

   If the table is installed in the X-direction the detector holder shall have the same position as the X-node.

   If the table is installed in the Y-direction the detector holder shall have the same position as the Y-node.
5. Move the bucky-axis, from the service application, in the positive direction. Place the detector approximately 1 cm from the mechanical end stop.
6. Press the *Set high* button to set the positive end stop.
7. Move the bucky-axis, from the service application, in the negative direction. Place the detector approximately 1 cm from the mechanical end stop.
8. Press the *Set Low* button to set the negative end stop.
9. Move the bucky-axis, from the service software with the blue arrows. Check that the system stops at the defined positions (the end stop positions that have been set).
10. Check that the value in the `Position` box increases when moving in positive X or Y direction.

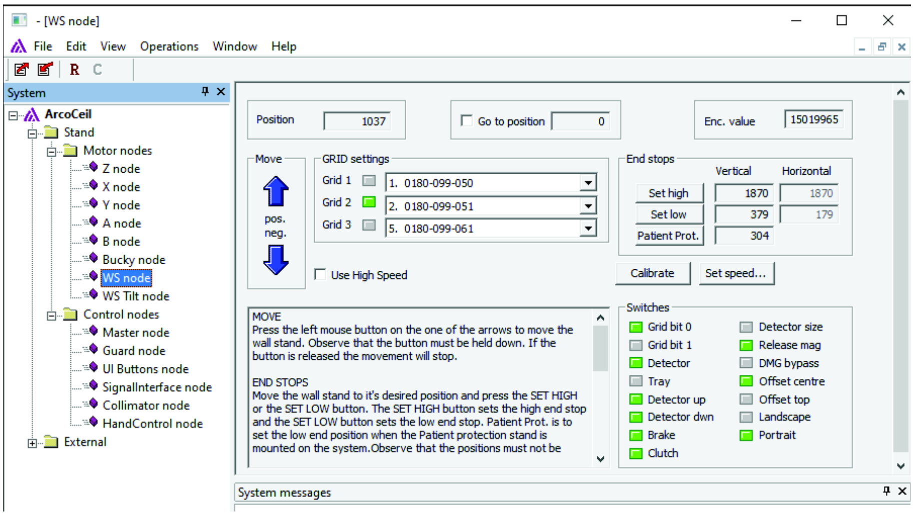
    If it does not increase, activate the inverted direction.

    The table can be installed in four directions in the room and the value in the `Position` box must increase when moving in positive X or Y direction for correct setting.
11. Define grid to be used.
    a Select the table grid, or short SID WS grid, as `Set Grid 1`.
    b Select the medium SID WS grid, as `Set Grid 2`.
    c Select the long SID WS grid, as `Set Grid 3`.

Note!

*`Set Grid 1` should be the same as defined under the table bucky node in step **8.** in **4.7.10 Calibration Of Wallstand***

4.7.10 Calibration Of Wallstand



4179

Fig. 4-132 WS node

1. Enter the *WS node* view.
2. Make sure the collimator is directed against the detector.

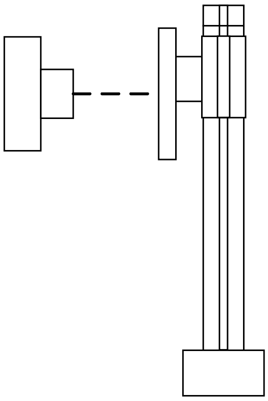


Fig. 4-133 Collimator directed against director

3. Make sure that the focal spot of the tube is aligned with the center of the detector.
4. Press *Calibrate*.
5. Check that the position of the wallstand has changed to the position of the Z-node.

Calibration of end stops:

6. High end stop.

   Move the wallstand to its highest position and then down approximately 2 cm. Press Set high.
7. Low end stop.

   Move the wallstand to 12 cm up of the floor and then up approximately 2 cm.

   Press set low.

Note!

The lowest position must be set so that there is a space between the lowest part of the stand and the floor of at least 12 cm, due to squeeze hazard.

4.7.10.1 GRID Settings

8. Define grids that shall be used
   a Select the table grid, or short SID WS grid, as `Set Grid 1`.
   b Select the medium SID WS grid, as `Set Grid 2`.
   c Select the long SID WS grid, as `Set Grid 3`.

Note!

`Set Grid 1` should be the same as defined under the table bucky node in ***4.7.9 Calibration of Bucky-Axis on Table****, step* ***11.***

4.7.10.2 Patient Protection End Stop

- Move the wallstand to a position where the distance between the lowest moving part and the floor is 2.5 cm.
- Press the *Patient Protection* button.
- Check that the *Patient Protection value* changed to the same value as the wallstand position.

4.7.10.3 Calibration Of Wallstand Tilt

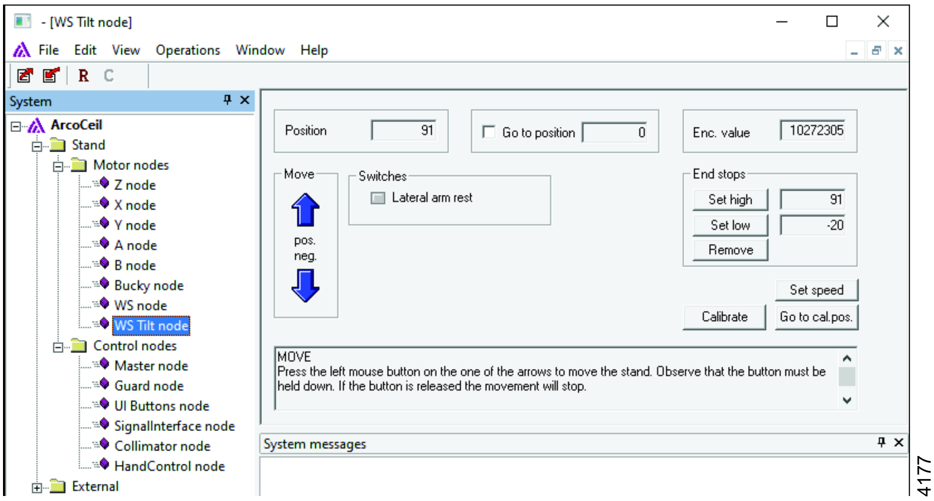


Fig. 4-134

Note!

If the present end stops inhibit the movement, press the Remove button.

If this button has been pressed, the end stops must be set again.

---

1. Enter `WS Tilt node` view.
2. Make sure the detector is in a vertical position.
3. Press `Calibrate`.
4. Check that the position of the wallstand tilt has changed to 0.

Calibration of End Stops

5. High end stop.
   Move the wallstand tilt to 91°. Press `Set high`.
   Move carefully, so as to not collide with the plastic cover.
6. Check that the `High end stop value` changed to the same as the `Position value`.

7. Low end stop.
   Move the wallstand tilt to -20°. Press `Set low`.
8. Check that the `High end stop value` changed to the same as the `Position value`.
9. Move the WS Tilt axis and check that the movement stops at the defined end positions.

4.7.11 Calibration Of Table

Note!

Observe that the room coordinates are critical to get the correct table position.

The Z-node, X-node, Y-node, A-node and B-node must have been calibrated before the Table position can be set.

To get the correct Table area, observe the Beta-rotation for each position.

The table calibration is made by the manufacturer. No further calibration is normally required.

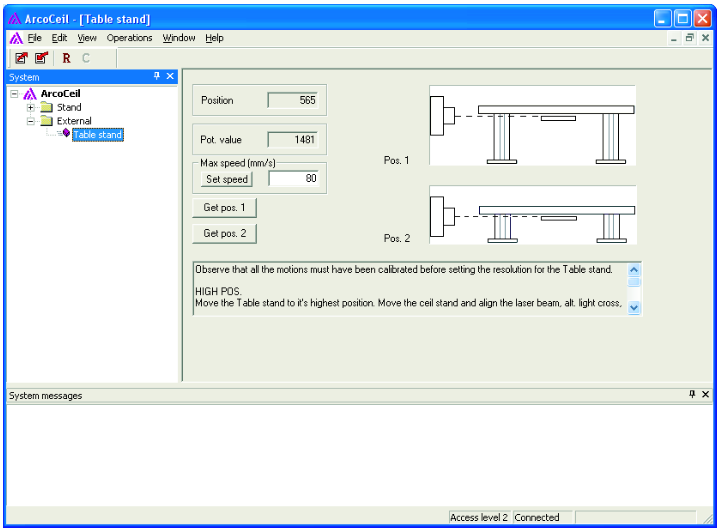


Fig. 4-135 Table stand

1. Enter the *Z Table view*.
2. Move the table to its highest position, and then down 2 cm.
3. Measure the height between the active image area and the floor.

4. Move the Z to the height corresponding to the measured height. Use the collimator measuring tape.

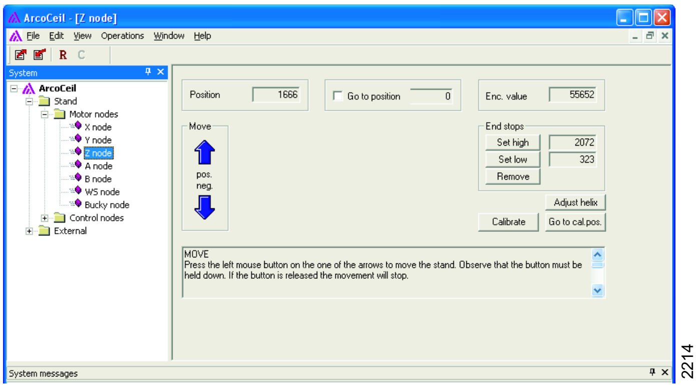


Fig. 4-136

5. Press the *Get pos.1* button.
6. Move the table to its lowest position, and then up 2 cm.
7. Measure the new height between the active image area and the floor.

Note!

It is important to measure the height at exactly the same spot at the detector.

8. Move the Z to the height corresponding to the measured height. Use the collimator measuring tape.

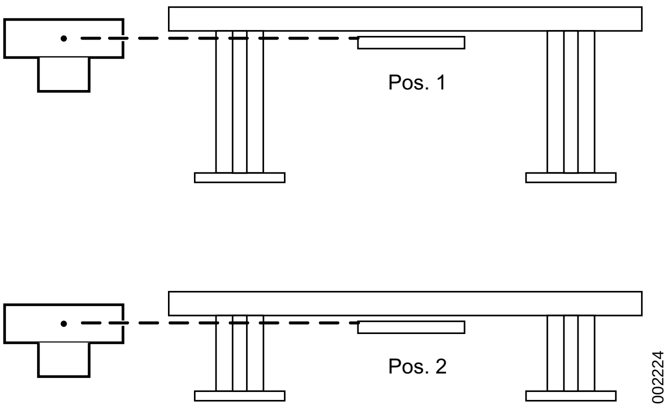


Fig. 4-137 Pos 1 and Pos 2

9. Press the *Get pos.2* button.
10. Check that the position of the Table has changed to the position of the Z-node.
11. Measure the speed of the table (mm/s) and multiply the value with 2.
12. Enter the value in the *Max Speed* edit box.
13. Press the *Set speed* button to store the value.

Note!

The height of the table stand is measured from the floor, to the active detector surface.

4.7.11.1 Table Safety Zone

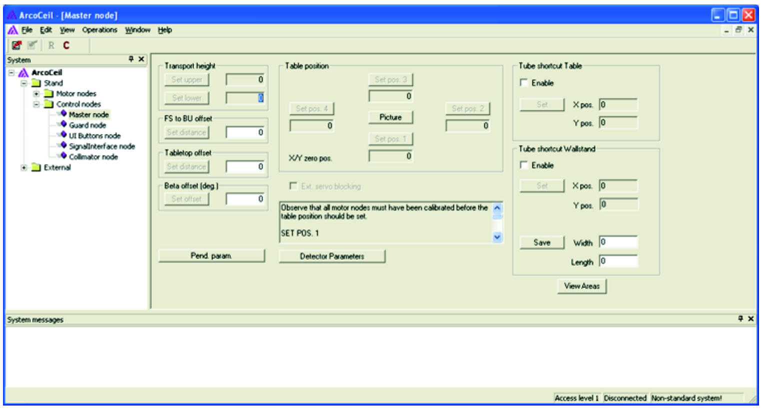


Fig. 4-138 Master node view

Note!

The table safety zone is for low speed area.

1. Enter the *Master node* view. *(Stand/Control nodes/Master node)*
2. Move the stand to position 1, see **Fig. 4-139**. Press the *Set pos. 1* button.
3. Move the stand to position 2, see **Fig. 4-139**). Press the *Set pos. 2* button.
4. Move the stand to position 3, see **Fig. 4-139**. Press the *Set pos. 3* button.
5. Move the stand to position 4, see **Fig. 4-139**. Press the *Set pos. 4* button.

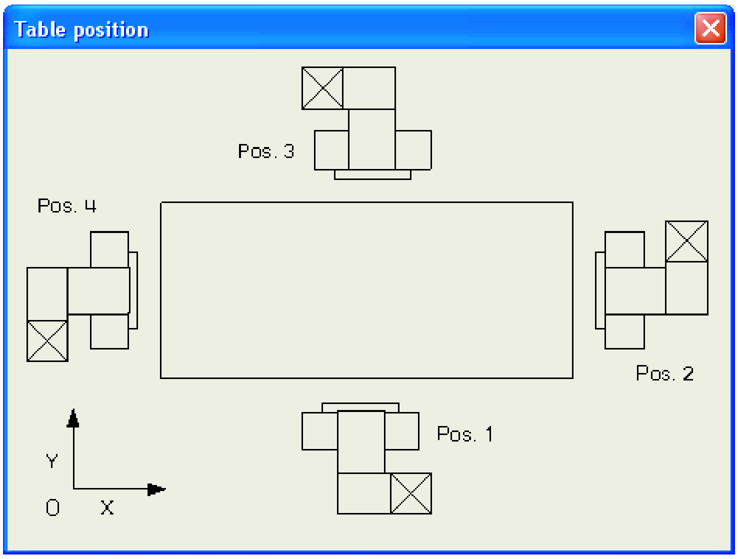


Fig. 4-139 Table position

There shall be a distance of 120 mm between the stand (front of the display) and the table top. If the table top is “floating”, consider the maximum and minimum position of the table top when setting the Table safety zone.

4.7.11.2 Transport Interval Zone

Movements between auto-positions is performed in a defined transport interval zone. The upper and lower limits are pre-defined from factory, but shall at installation be adjusted to the actual circumstances in the operating room.

- The upper transport height shall be set as high as possible, considering the cable hoses etc. See note below.
- The lower transport height, shall be set with consideration taken to the table.
- None of the values shall be 0.

Setting of the transport interval zone, must be done after the calibration of all axis.

To set the transport interval zone:

1. Enter the *Master node* view (Stand/Control nodes/Master node).
2. Move the Z-axis node upward to the desired position.

Note!

We recommend the upper limit, ***not*** *to be higher than when the inner segment of the column is 10 cm from the outer segment. See* ***Fig. 4-140****.*

See also **Fig. 4-138**.

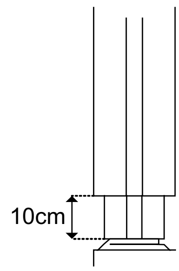


Fig. 4-140 Recommended highest limit

3. Press the *Set upper* button, for transport height.
4. Check that the upper value has changed to the position value of the Z-node.
5. Move the table upward until the table top has reached the maximum height of approximately 1 m. Move the Z-axis downward to the desired position for the lower transport height.

Note!

When the overhead tube crane is within the area above the table, the lower transport height shall be at least 30 cm over the highest point of the table.

6. Press the *Set lower* button.
7. Check that the lower value has changed to the position value of the Z-node.

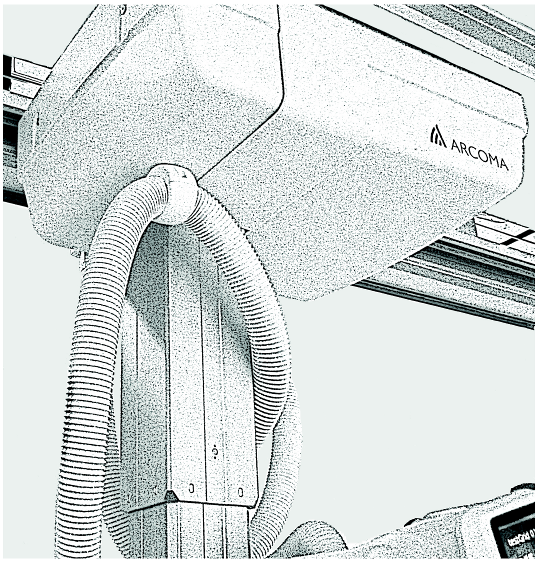


Fig. 4-141 The high voltage cable running freely

Take special care to confirm that the high voltage cable runs freely in all auto positions and does not obstruct or inhibit movements in any of the selected positions.

The cable can be adjusted in the cable holder to prevent the cable from being squeezed during positioning.

4.7.11.3 Focal Spot To Detector Holder Offset

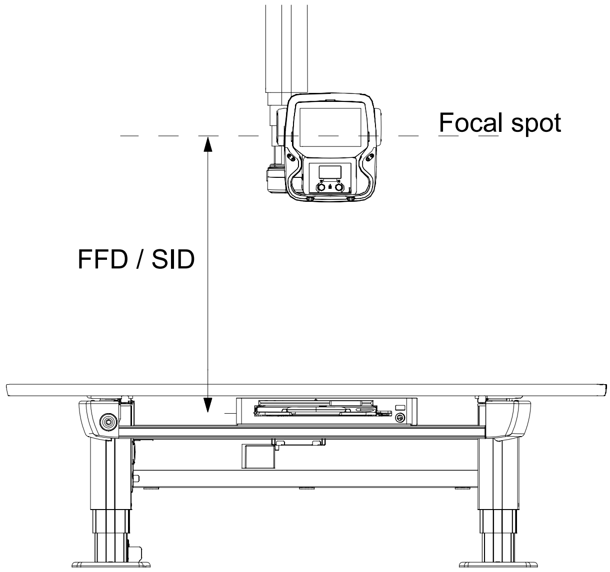


Fig. 4-142 Focal Spot To Detector Holder Offset

See **Fig. 4-138**:

1. Enter the *Master node view.*
2. Move the stand over the table.
3. Place the tube directly over the table top (the lowest point of the stand shall almost touch the table top).
4. Measure the distance between the focal spot and the active detector surface of the detector.
5. Enter the measured value in the *FS to BU offset* edit box in millimetres.
6. Press the *Set distance* button.
7. Move the stand (Z-axis) up at least 800 mm above the table top and down again.
8. Check that the system stops 500 mm above the table top (lowest point of the stand).
9. Press down again and check that the speed is reduced to half speed.

Note!

This distance must be set to secure that the safety distance (500 mm) is accurate.

4.7.11.4 Table Top Offset

See **Fig. 4-138**:

1. Enter the *Master node view*.
2. Measure the distance between the active detector surface of the detector, and the surface of the table top.
3. Enter the value (in mm) in the *Table top offset* edit box.
4. Press the *Set distance* button.

4.7.11.5 Movement Short-Cut Zones

At installation a movement short-cut zones shall be set up for the wallstand resp. the Table. The zones are defined as rectangular cubes. Inside these zones, short-cuts are allowed and there is no need for the overhead tube crane to attain the transport interval zone before moving.

Outside these short-cut zones, the overhead tube crane will first move in Z direction, to the transport interval zone, before moving to position.

The recommended transport height is set as: The first Table stop + SID.

Table Movement Short-Cut Zone

When defining the Table movement zone, it will be activated toward the direction of the light field.

1. Start the zone definition by setting the overhead tube crane alpha to 0.
2. Position the light field with the reticle at the middle of the Table head end, exactly where the cover ending and the middle seam cross each other. See **Fig. 4-143**. The overhead tube crane handle shall be positioned at the same direction as the front of the detector tray.

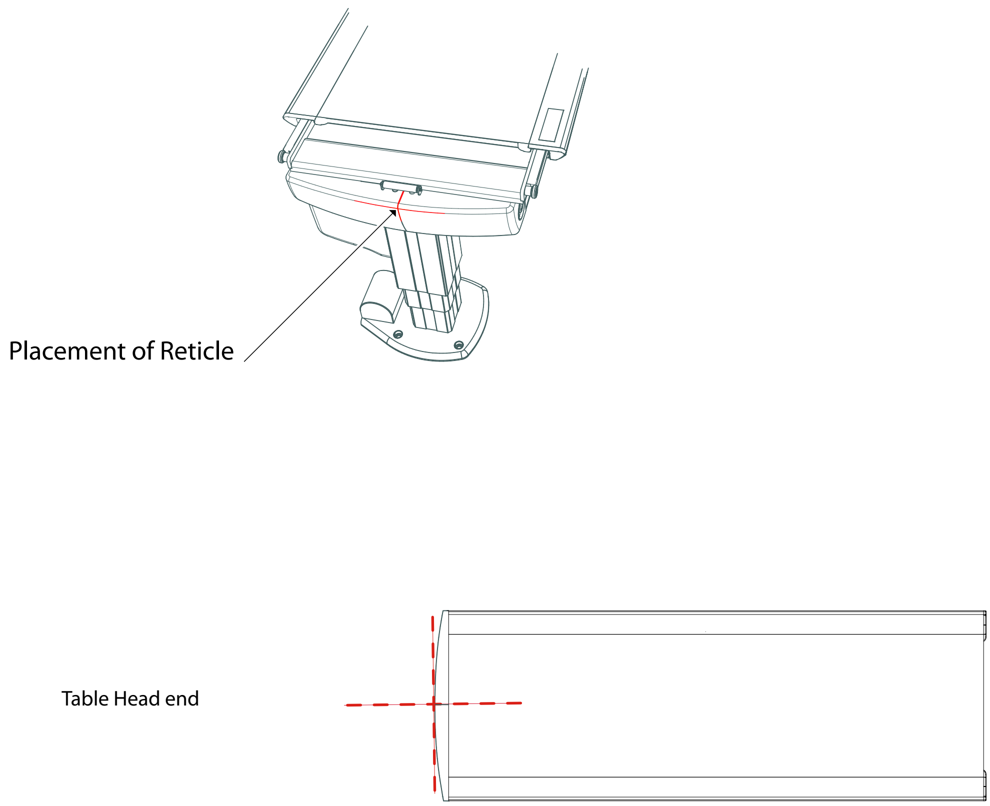


Fig. 4-143 Position light field

Also see **Fig. 4-138**.

Table Service Program

3. Move to the *Master view*. See Master node view in **Fig. 4-138** .
4. Mark the *Enable* box. Marking this box enables short-cuts.
5. Enter *Set*. The X-position and the Y-position for the area, will be saved as to the position of the overhead tube crane.

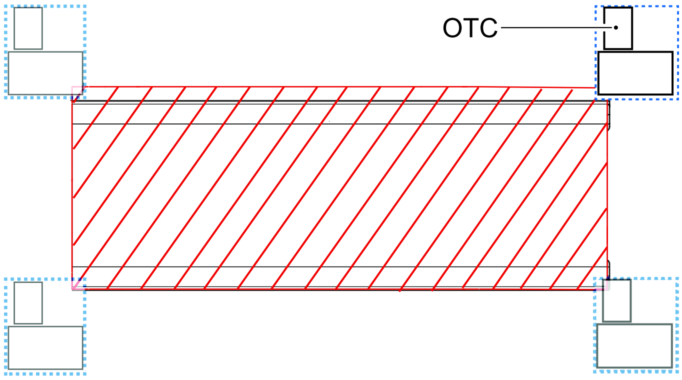


Fig. 4-144 Corners of the overhead tube crane in Table movement zone

As long as at least one of the corners of the overhead tube crane stays inside the Table movement zone, the overhead tube crane will perform a short-cut at positioning.

4.7.11.6 Wallstand Movement Short-Cut Zone

When defining the wallstand movement short-cut zone, it will be activated toward the direction of the light field.

1. Angle the overhead tube crane's light field against the floor.
2. Move the overhead tube crane's light field to the point where the area is to begin.
3. Angle the overhead tube crane's light field against the center of the wallstand detector.

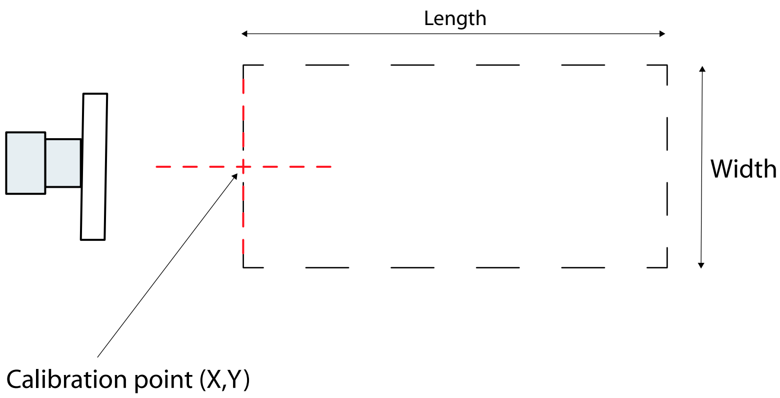


Fig. 4-145 Wallstand movement short-cut zone

WARNING!

The wallstand movement short-cut zone must not be set too wide. Consider the Table safety zone.

Setting Wallstand Safety Zone

See **Fig. 4-138**.

1. Tube short-cut wallstand: Mark the *Enable* box. Marking this box enables shortcuts.
2. When the overhead tube crane is positioned where the zone is intended to start, press *Set*.

The position of the short-cut zone can be seen by selecting *View Areas*.

If the settings shall be changed, define the width and length of the short-cut zone by setting the values *Width* and *Length* in mm. Press *Save*.

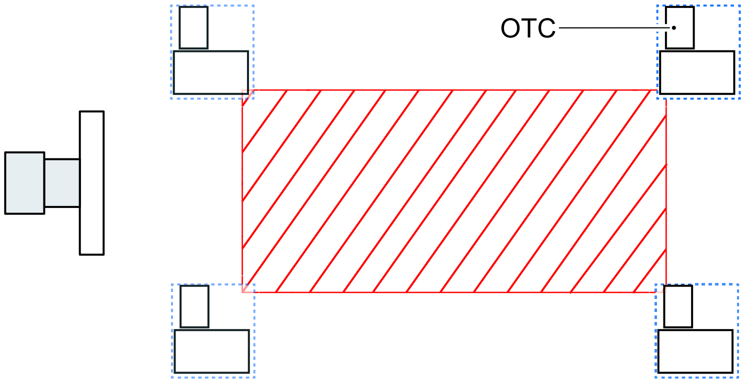


Fig. 4-146 Wallstand short-cut zone

4.7.11.7 Beta Offset

See **Fig. 4-138**:

1. Enter the *Master view*.
2. Move the B-axis to a typical working position.
3. Enter the current B-position value (deg.) in the Beta offset edit box.
4. Press the *Set to zero* button.
5. Check that the value, shown on the display, has changed to 0.

Note!

The Beta offset only manipulates the value shown in the display.

The actual position of the Beta-rotation will not be changed and the position in the service software will not be changed.

4.7.11.8 WallFlexible Parameters

Movements

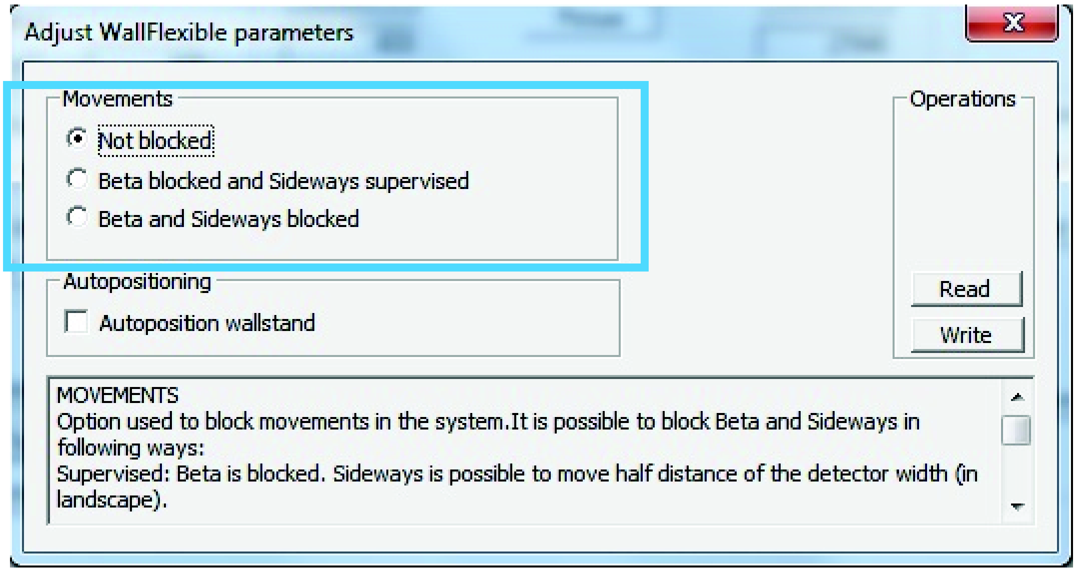


Fig. 4-147 Adjust WallFlexible parameters

There are 3 different Wall Flexible Modes, all accessible from the Arcoma Service program: *Adjust WallFlexible parameters*.

The active mode for the installation is selected in the Service program and applies for all autopositions with Wall Flexible Mode.

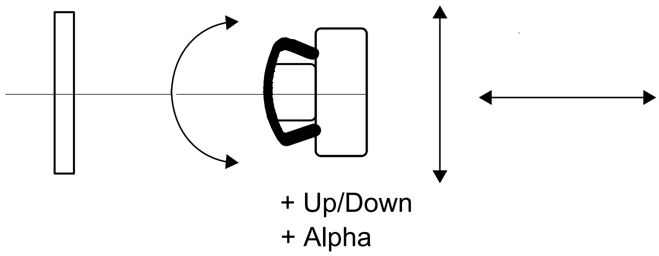


Fig. 4-148 Not Blocked

1. *Not Blocked* — All overhead tube crane movements are allowed.

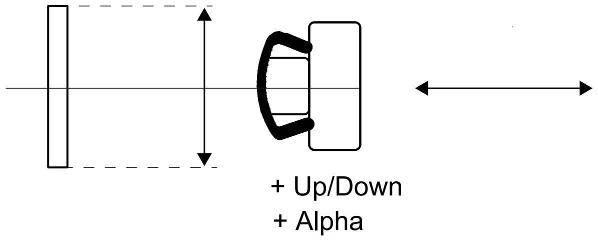


Fig. 4-149 Beta blocked and Sideways supervised

2. *Beta blocked and Sideways Supervised* — Beta movements are blocked. A beta rotation will turn the servo off and prevent exposure. The overhead tube crane can be moved sideways, for a distance of half the detector width (landscape position). When the overhead tube crane is outside this area, the servo turns off and exposures will not be possible. It is also possible to move the overhead tube crane in FFD-direction.

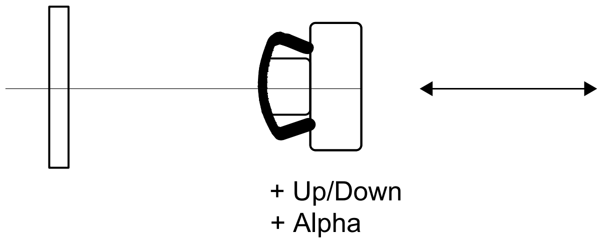


Fig. 4-150 Beta and Sideways blocked

3. *Beta and Sideways Blocked* — Beta movements and sideways movements of the overhead tube crane are blocked. It is only possible to move the overhead tube crane upward, downward and in FFD-direction.

   A movement will turn the servo off and block any exposure.

Autopositioning — WS

To enable the wallstand autopositioning, check the box *Autoposition wallstand*. Enabling this feature, means that the wallstand detector holder will move to the programmed position, at the autopositioning.

4.7.11.9 Detector Parameters

Define Table and Wallstand detector sizes.

Entered settings are mainly used for autocollimation.

See **Fig. 4-138** :

1. Enter the *Master node view* .
2. Press the button Detector parameters.
3. When the parameters are updated, press *Save* to return to the *Master node view*.

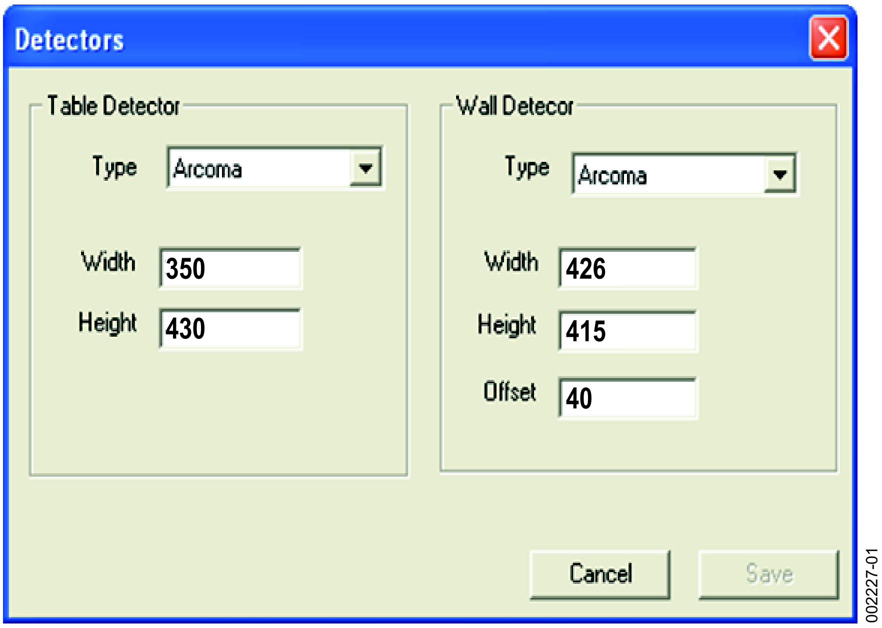


Fig. 4-151 Detectors

Note!

Refer to detector data sheets to set the correct size in mm. Incorrect detector size settings can affect automatic collimation and positioning.

4.7.11.10 Calibration Of Guard Function (Z-axis)

- Check the impact force.
  The force must not exceed 170+/-30 N (use a force gauge).
  If the force does not exceed 170+/-30 N (upward or downward), the following section may be skipped.

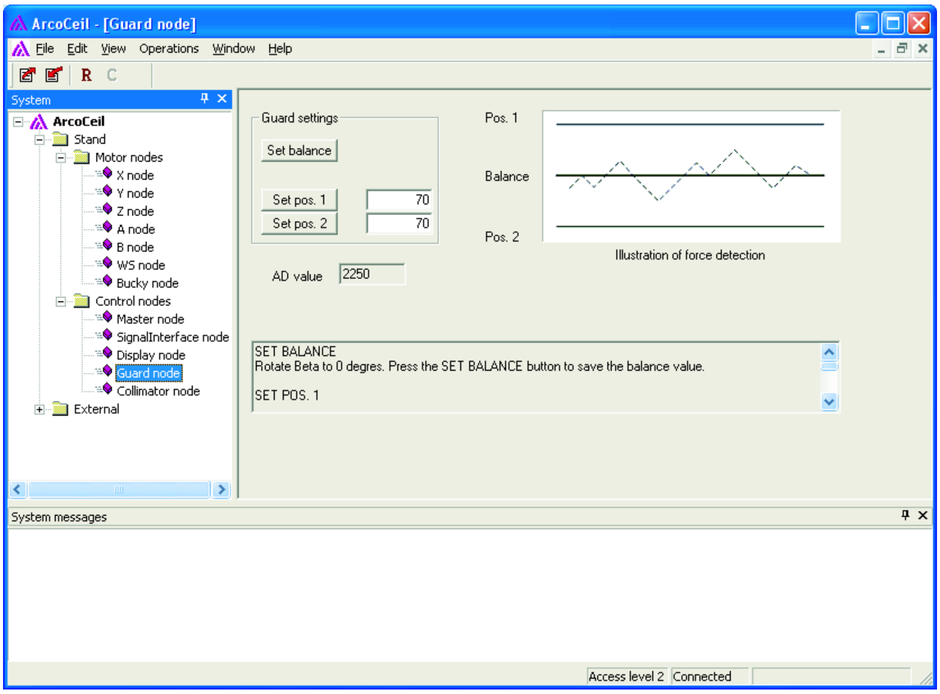


Fig. 4-152 Guard node

1. Enter the *Guard view*.
2. Place the stand in the specified position.

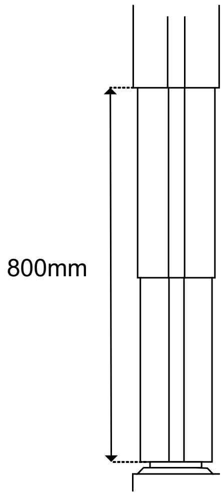


Fig. 4-153 Stand position

3. Press the *Set balance* button.
4. Reset the system.
5. Move the Z-axis downward.

6. Measure the force required to trig the collision guard (movement stops and an error message is displayed), when moving downward (use a dynamometer).
7. Adjust the value for Pos.1.
8. Press the *Set pos.1*—button to store the value to the stand.
9. Measure the force needed to trig the collision guard (use a dynamometer).
10. Move the Z-axis upward.
11. Measure the force required to trig the collision guard (movement stops and an error message is displayed) when moving upward.
12. Adjust the value for Pos.2.
13. Press the *Set pos.2* button to store the value to the stand.
14. Measure the force needed to trig the crash guard (use a dynamometer).

Note!

The required force for activation of the guard function must not exceed 170+/-30 N. The values displayed in the edit boxes are not directly compatible with the force. 2-3 points are approximately 10 N.

4.7.11.11 Calibration Service Software For Table

Note!

The table is calibrated at the Manufacturer's site. No further calibration is normally required.

WARNING!

Standard RS232 cable shall not be used. Service cable shall be ordered from Manufacturer.

Note!

The electrical plate is heavy. Be careful when the plate opens.

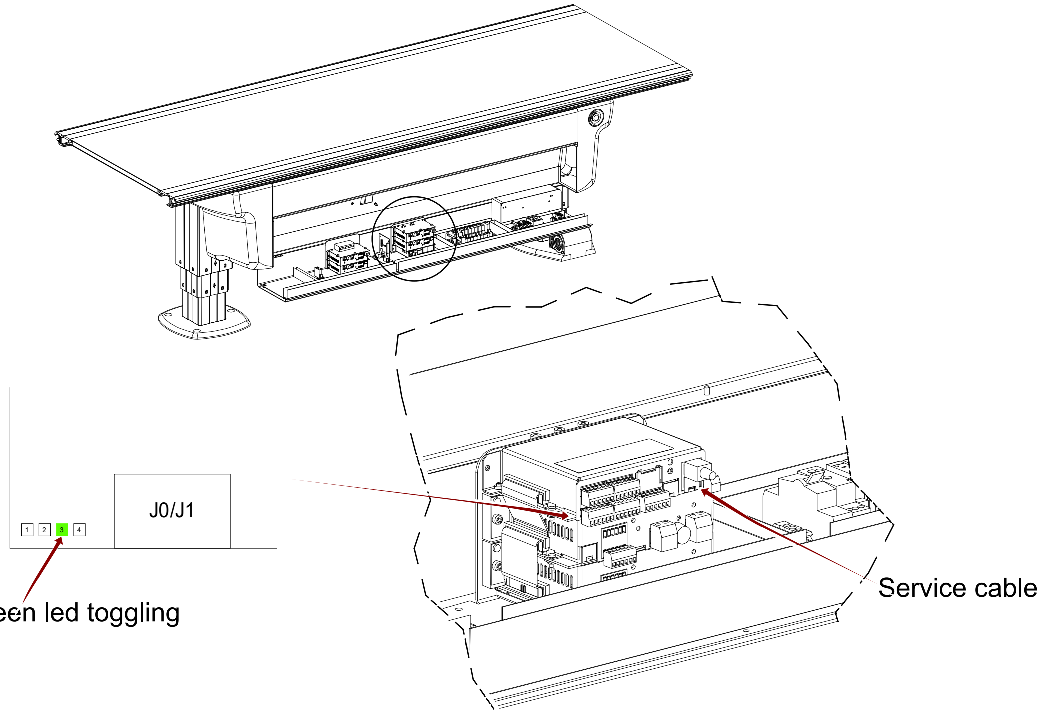


Fig. 4-154 Calibration service software for table

System setup

Before setting up the table:

1. Check that the table can go the entire stroke, up and down.
2. Check that the table stops at the correct end stops.
3. Check that the guard works. (Option)

- If the table works correctly, go to **4.7.6 Calibration Of Overhead Tube Crane, Page 190**.
- If the table needs further calibration:

Note!

Note that all the software nodes including service software and the parameters are tested and verified as a software package. The version on all nodes, service software and parameters must belong to the same software package for Manufacturer to guarantee the function of the table.

Note!

Parameters shall always be saved before any adjustments are made. The parameter settings shall always be physically stored nearby the System.

4. Verify that all nodes are alive (a green LED is toggling on the control board).
5. Connect the service cable from the lap top (PC) to the serial interface port (COM). (The service cable can be ordered as a spare part).
6. Start the service software (enclosed). Check that the version of the service software and the version on the System software belong to the same software package. Check against the enclosed accompanying documents.
7. Select COM-port and enter password. See **Fig. 4-155**.
8. Verify that the User Level in **Fig. 4-155**, changes from 0 to 1, when entering the correct password.
9. Verify that all nodes are in enable state, see **Fig. 4-156**.

Note!

The state also depends on the System configuration, thus the system might be fully functional even if an optional node is in another state.

If a node is not present, the text “NO CONNECTION” is displayed.

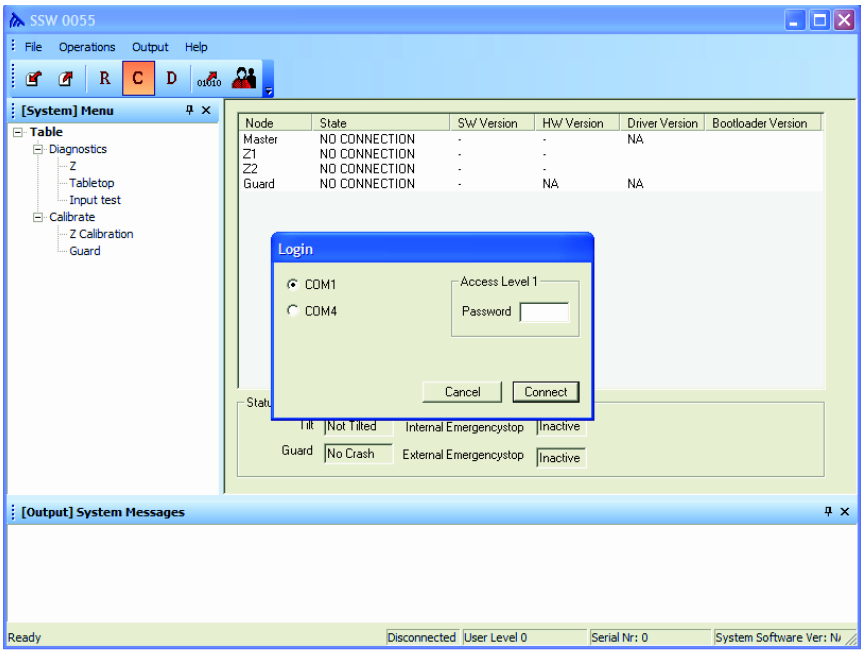


Fig. 4-155 Login

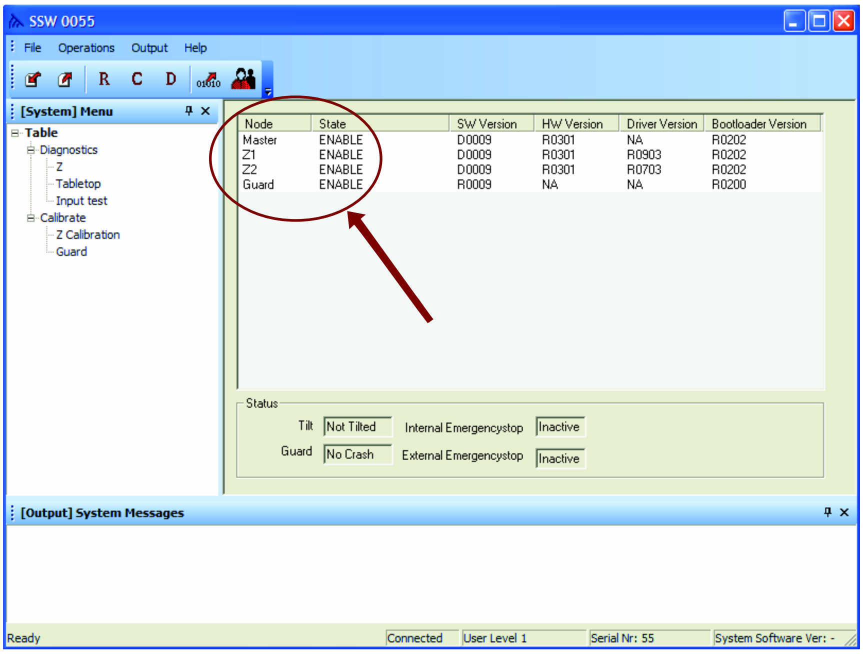


Fig. 4-156 SSW 0055

Calibration Of The Tilt Sensor

1. Enter the *Calibrate Z view*.
2. Place a spirit level on the table top.
3. On condition that the floor is horizontal (±1 mm), level the table top by moving one of the columns. See also **4.7.3 Horizontal Alignment Of Table, Page 187**.
4. Press the *Tilt Calibrate*¨button (lower left corner of the view).

Note!

Be careful when moving the columns separately. If the angle of the table top exceeds 7º the Table might be damaged.

5. Adjust the tilt sensor mechanically.
   a Measure the voltage between J4:4 and J4:6 on the control board. If the voltage is 3 V ±0.2 V, re-install the cover and go the step **6.**
   b Remove the left back cover by removing the bolts (A) shown in **Fig. 4-157**. Observe the placement of the cable chain before removing the cover.

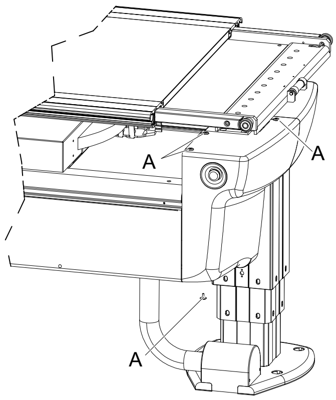


Fig. 4-157 Removing left back cover

   c Loosen the bolts (B), see **Fig. 4-158**, and angle the bracket (**C**) until the output of the tilt sensor (**D**) is 3V +/-0.2V.

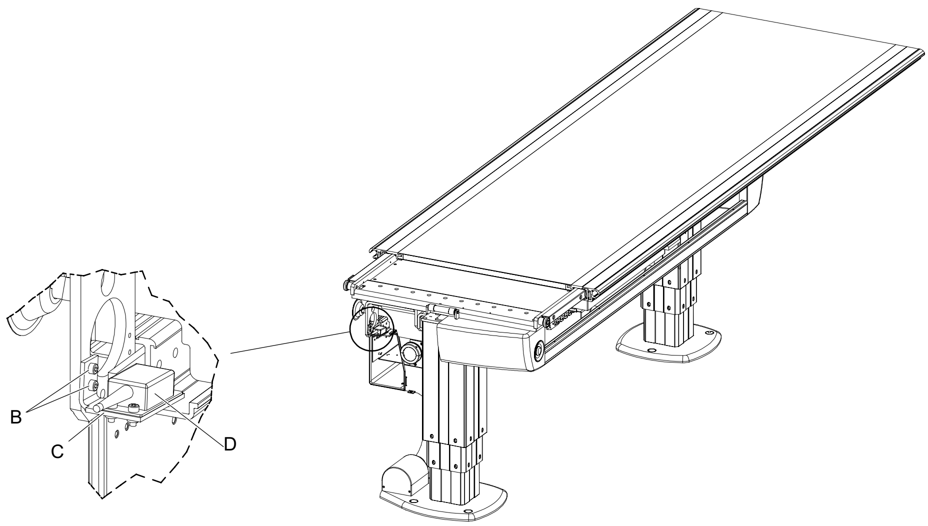


Fig. 4-158 Angle the bracket C

   d Tighten the bolts (**B**), use Loctite 243, see **Fig. 4-157**.

e Install the cover.

Note!

Beware of the cable chain when installing the cover.

---

6. Press the *Tilt Calibrate* button (lower left corner of the view), see **Fig. 4-159**. The displayed angle shall now be set to 0.0º.
7. Press the reset button (R), see **Fig. 4-159**.

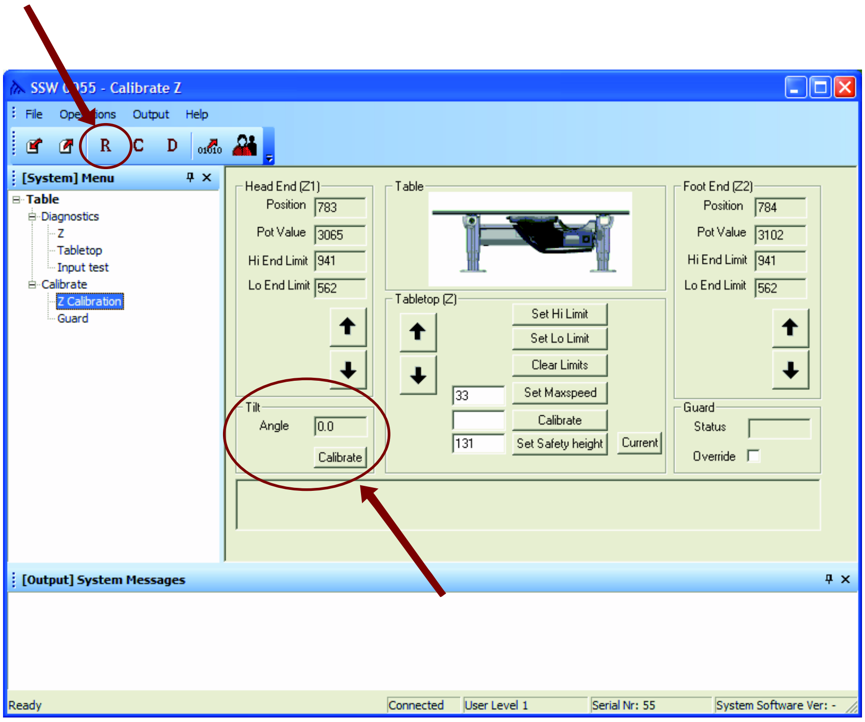


Fig. 4-159 Reset button

Calibration Of Table Height

1. Enter the *Calibrate Z view*.
2. Place a spirit level on the table top.
3. Level the table top by moving one of the columns.

Note!

Be careful when moving the columns separately. If the angle of the table top exceeds 7º the Table might be damaged.

4. If the displayed angle of the tilt sensor exceeds 0.4º the tilt sensor has to be re-calibrated, see .
5. Measure the distance between the floor and the surface of the table top.
6. Enter the distance (in mm) in Edit box beside the Calibrate button of the table top (Z), see **Fig. 4-160**.
7. Press the Calibrate button.
8. Press the reset (R) button.
9. Verify that the position of the Head End column and the Foot End column is changed to the entered value.

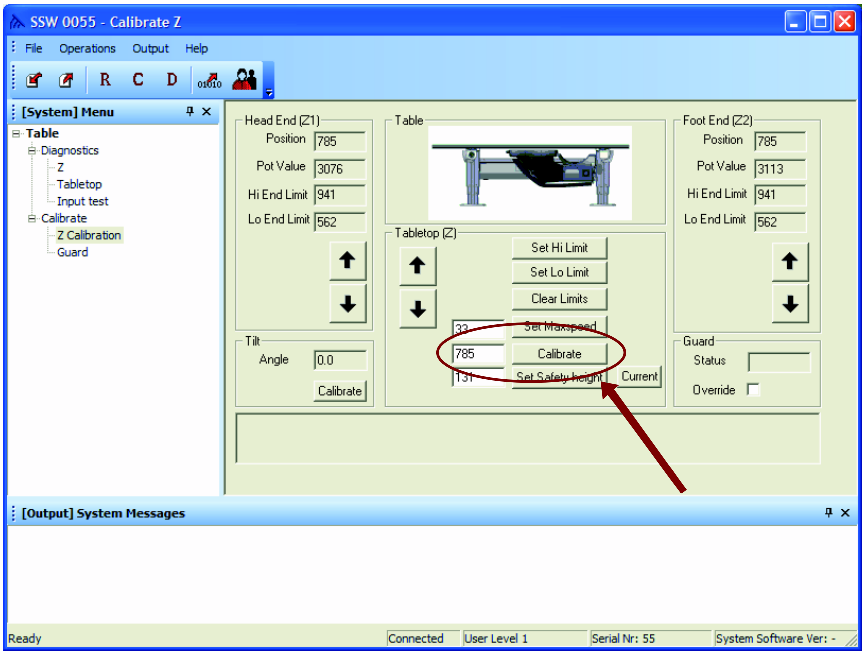


Fig. 4-160 Calibration Table height

Calibration Of Software End Stops

Note!

Calibrate the software end stops, to prevent collision whit external objects.

---

1. Enter the *Calibrate Z view*.
2. Enter the value “20” in the *Edit box* beside the *Set Max Speed* button.
3. Press the *Set Max Speed* button.
4. Press the *Clear Limits* button, see **Fig. 4-161**.

   Note!

   Be aware that the end stops now are removed. Be careful when moving the Table.

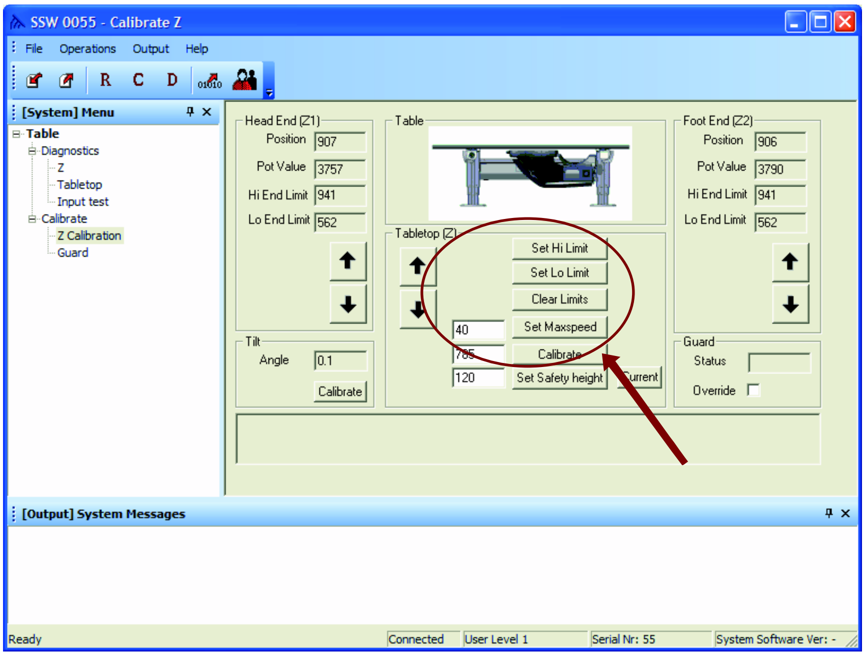


Fig. 4-161 Setting the Table top limits

5. Enter the *Z view*.
6. Press the *Arrow Down* button and keep it pressed until the movement stops. The text “DOWN” shall now be visible in the *Blocking edit* box for both the *Head End* and the *Foot End*.
7. Press the *Arrow UP* button and keep it pressed until the text “NO” is visible in the *Blocking edit* box for both the *Head End* and the *Foot End*.
8. Enter the *Calibrate Z view*.
9. Press the *Set Lo Limit* button.
10. Enter the *Z view*.
11. Press the *Arrow Up* button and keep it pressed until the movement stops. The text ‘UP’ shall now be visible in the *Blocking edit* box for both the *Head End* and the *Foot End*.

12. Press the *Arrow Down* button and keep it pressed until the text “NO” is visible in the *Blocking edit box* for both the *Head End* and the *Foot End*, see **Fig. 4-162**.

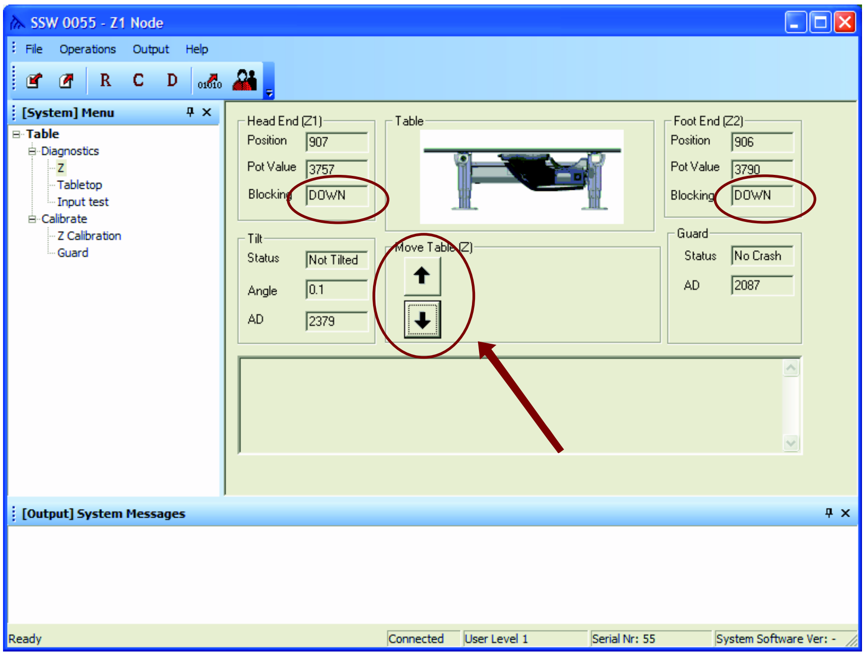


Fig. 4-162 Press Arrow Down

13. Enter the *Calibrate Z view*.
14. Press the *Set Hi Limit* button.
15. Enter the value “40” in the *Edit box* besides the *Set Max Speed* button.
16. Enter the *Z view* and move the Table up and down, to verify the functionality. The text in the *Blocking Edit box* shall say “NO” at all times.

Note!

The software end stops shall be set at minimum 4 mm +/-1 mm from the mechanical end stops.

Calibration Of Max Speed

1. Enter the *Calibrate Z view*.
2. Enter the new speed value (mm/sec) in the *Edit box* beside the *Set Max Speed* button, see **Fig. 4-163**. Observe that 40 mm/sec is the maximum speed.
3. Press the *Set Max Speed* button.

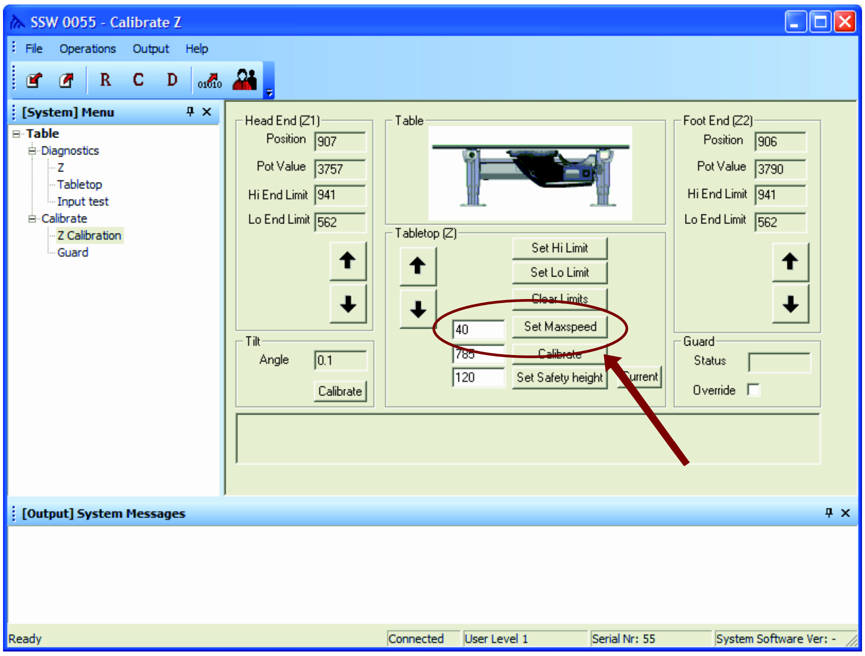


Fig. 4-163 Calibration Table Max Speed

Calibration Of Safety Zone

The safety zone is the distance (120 mm) from the lowest moving point of the Table to the floor.

1. Enter the *Calibrate Z* view.
2. Move the Table until the height for the safety zone is reached.

Note!

It shall always be at least 120 mm between the lowest moving point of the Table and the floor.

3. Press the *Current* button beside the *Set Safety Height* button, see **Fig. 4-164**.
4. Press the *Set Safety Height* button.
5. Verify the functionality by moving the Table up and down. The movement shall stop when entering the safety zone and when the downward button is pressed again it shall proceed at half speed.

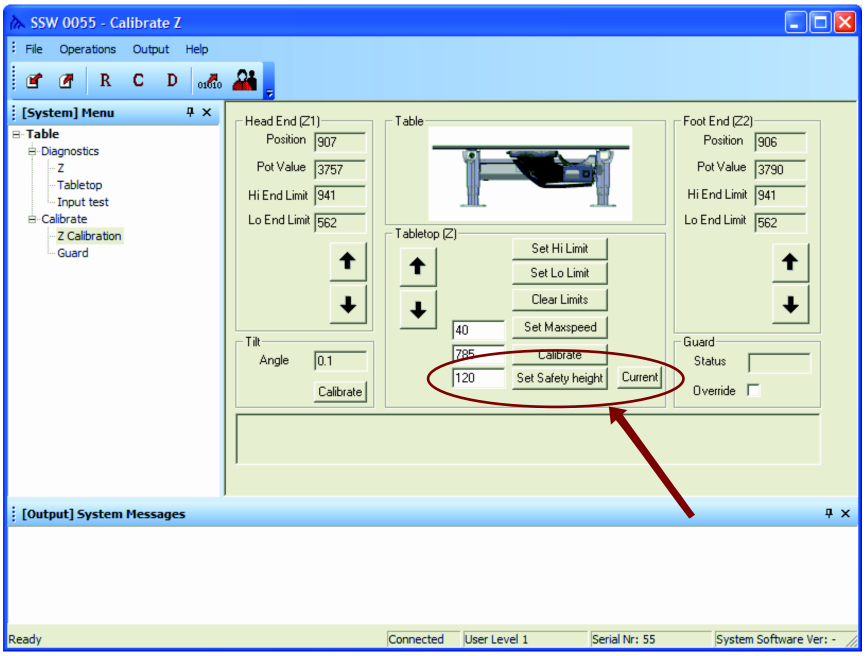


Fig. 4-164 Set Safety Height

Calibration Of Crash Guard Detection

1. Enter the *Guard* view.
2. Press the *Calibrate* button.
3. Check the value displayed in the *AD value Edit* box. The value shall be 2500 +/-500, see **Fig. 4-165**.
4. Use a dynamometer to check the impact force by moving the table top upward and downward. The needed force of impact shall not exceed 200N +/-70N before movements is stopped.
5. If necessary adjust the trig levels by entering a new value Guard settings Edit boxes and pressing the coherent button (Set Trig level 1 and/or Set Trig level 2) see **Fig. 4-165**. 2-3 points are approximately 10N.
6. Check the guard function in each corner of the table top.

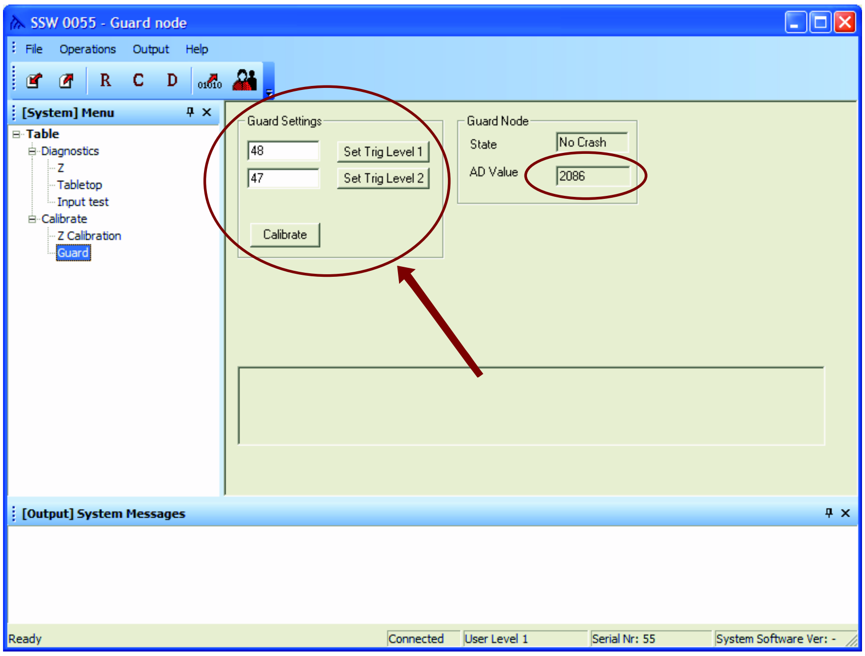


Fig. 4-165 Guard Setting

4.7.11.12 Save Parameters (Settings) Table

If there are problems with the Table functionality, calibrate and save back up described below.

In case of failure, the Table may be restored to the same state as it was initially.

1. Open the *Table service software* program.
2. Press *Operations* in menu and select *Save Parameters*, see **Fig. 4-166**.
3. Select folder to where the parameters shall be saved.
4. Press the *Save* button.

Note!

Parameters shall always be saved before any adjustments are made. The parameter settings shall always be stored near by the System.

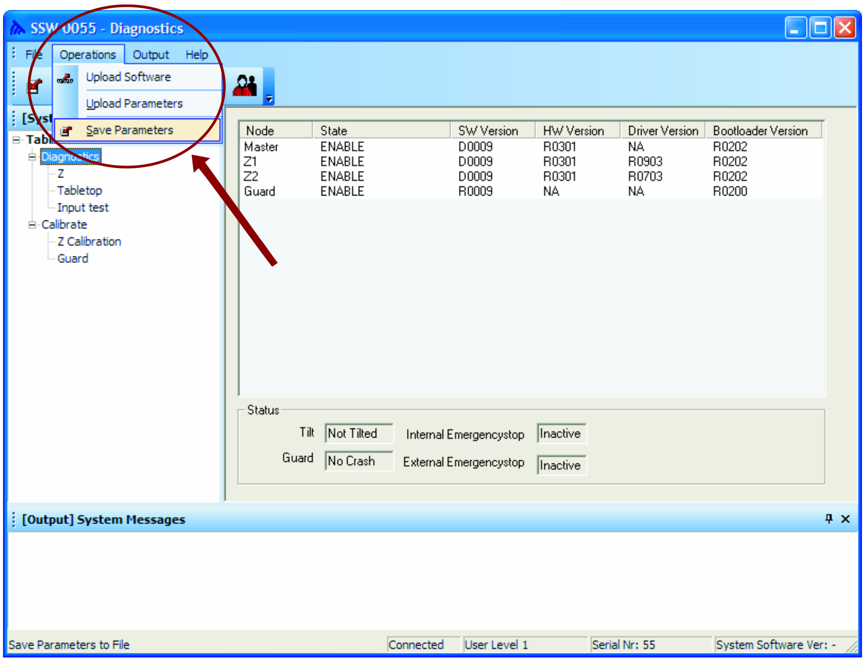


Fig. 4-166 Save Parameters

4.7.12 Calibration Of Collimator

The collimator is preset from factory. See **Fig. 4-188** for possible collimator settings.

4.7.12.1 Detector X/Y Orientation

The X/Y orientation of the table and wallstand detectors are defined in **Fig. 4-167**.

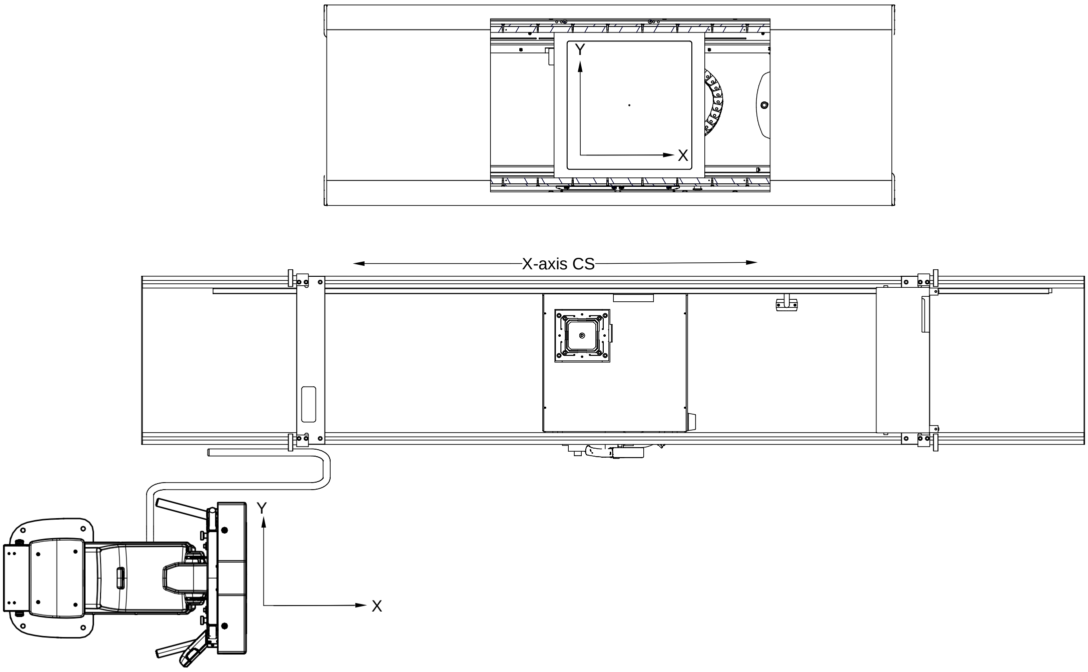


Fig. 4-167 Detector X/Y Orientation

4.7.13 Calibration of Tube

The tube calibration is done at manufacture and shall be done once again at the installation.

For tube calibration, see *Generator documentation*.

4.7.14 Installation of AEC

For Systems with a detector holder for a portable detector, the AEC is pre-mounted at factory.

If applicable, install and calibrate the AEC according to manufacturer’s instructions. A chamber of ionic type, has to be flatly mounted. If it should be mounted in any tension, the result cannot be guaranteed. Adjust the chamber brackets until a flat position is reached.

CAUTION!

Make sure the AEC back-up values are properly defined.

4.7.15 Gain Adjustment of AEC

Note!

For adjusting the exposure settings, see the Image System User Manual, Section C, “Adjusting Technique Settings”.

When adjusting AEC, remember to check against the dose value.

4.7.15.1 Wallstand

The description below relates to a left-loaded detector holder. When using a right-loaded detector holder, the adjustments screws are in the opposite order.

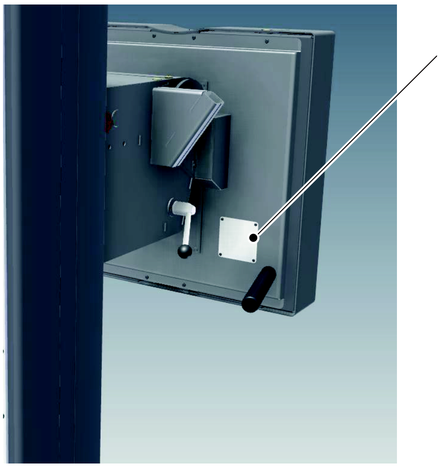


Fig. 4-168 Cover at the back of the detector holder,

1. Remove the 4 screws from the cover at the back of the detector holder, and remove the small cover.
2. Adjust AEC gain from the adjustment hole to the AEC amplifier using a precision standard screwdriver.
3. Adjust from the MASTER adjustment hole.
   – Adjusting in the clockwise direction increases sensitivity = reduces time = reduces dose = reduces exposure index.
   – Adjusting in the counterclockwise direction reduces sensitivity = increases time = increases dose = increases exposure index.

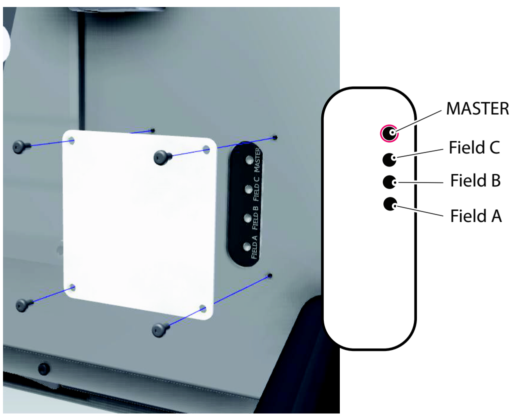


Fig. 4-169 Gain Adjustment of AID (ICX-3922) AEC

Note!

In case of a right-loaded detector holder, adjustment holes are Field A, Field B, Field C, and MASTER in order from the top.

4.7.15.2 Table

Adjust AEC gain from the adjustment hole to the AEC amplifier on the side of the reader part (detector holder) using a precision standard screwdriver.

- Adjust from the MASTER adjustment hole.
- Adjusting in the clockwise direction increases sensitivity = reduces time = reduces dose = reduces exposure index.
- Adjusting in counterclockwise direction reduces sensitivity = increases time = increases dose = increases exposure index.

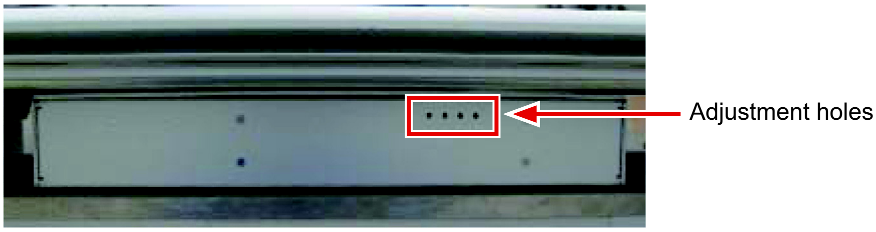


Fig. 4-170 Adjustment holes

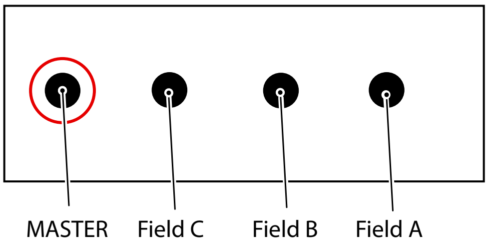


Fig. 4-171 Adjustment holes, enlarged view

4.7.16 Calibration of Auto Positions

1. Enter the *Positions* view (Operations => Positions).
2. Move the ceiling tube support (A, B, X, Y, Z, detector holder/wallstand) to the position.
3. Press a position, in the *Pos. column*, with the cursor.
4. Select mode (check which modes that are valid for the System).
5. Enter the *Offset Z* value.

   The offset Z value is only available in *Table Flexible mode*.
6. Enter the SID value (in *Free mode* and the *Auto position* mode the SID value is only used for the automatic collimator).
7. Check or uncheck *NoWait* , depending on desired function.

   See the *System Operator’s Manual, Chapter 4, Operating the System and Wall Flexible mode* for description of *NoWait configuration*.
8. Press the *Write* button to save the position.

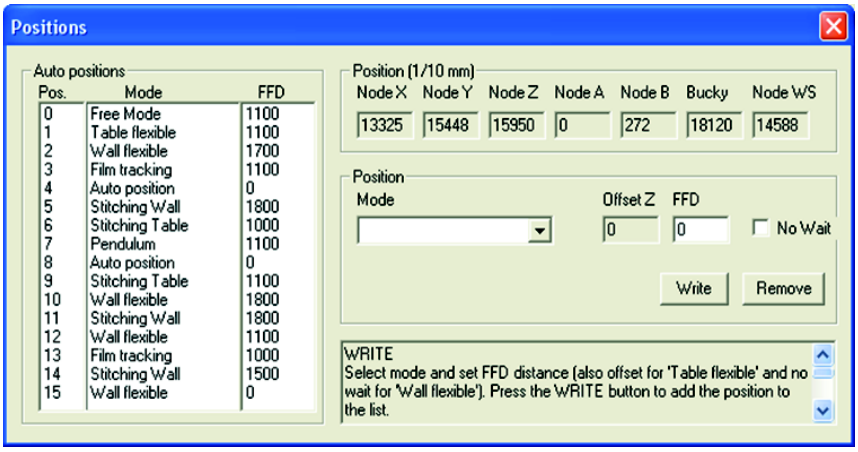


Fig. 4-172 Calibration of auto positions

9. After saving the *“Auto positions”* , check the X-ray field alignment with the detector and adjust if necessary.

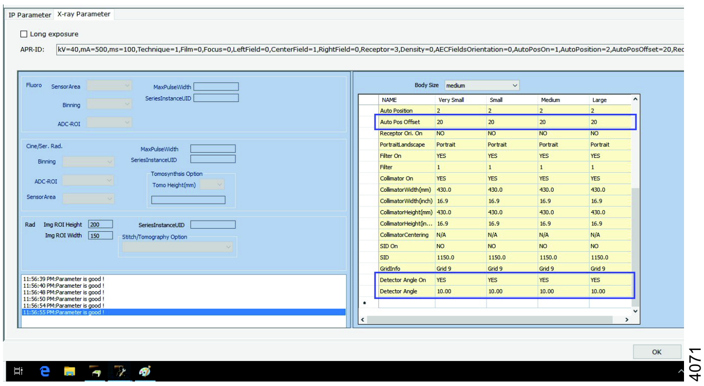


Fig. 4-173 Protocol Editor

Note!

Wallstand detector angle and tube angle can also be controlled from the Protocol Editor.

4.7.17 Tomo/Pendulum Parameters

1. Enter the *Master* view.
2. Press the *Tomo/Pend. parameters* button.
3. The *Tomo/pend. parameters* view will appear.
4. Enter the *Sweep length* for the tomo-movement.
5. Enter the *Trig time* for the tomo-movement (the value shall be entered in milliseconds).
6. Enter the wanted *Speed* for the pendulum-movement (the value shall be entered in millimetres per second).
7. Enter the wanted Rotation offset (cut line height) for the pendulum-movement (the value shall be entered in millimetres, measured from the tabletop).
8. Press the *Write* button to save the values.

Note!

The Sweep length is the movement range, calculated from the point where the position was stored (if the Sweep length is set to 500 mm, the total sweep length will be 1000 mm). The Trig time is the preparation time that the detector needs before imaging.

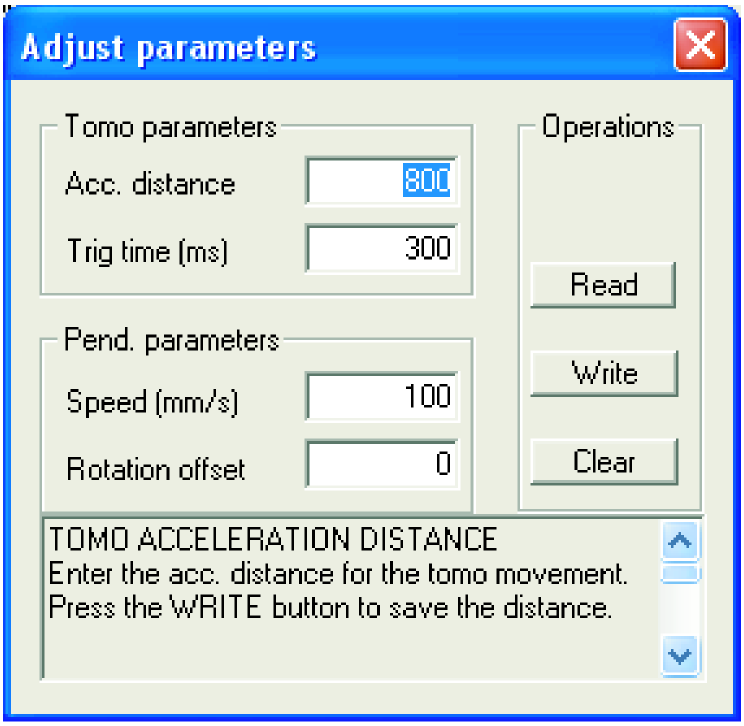


Fig. 4-174 Tomo/Pendulum Parameters

4.7.18 Tests

4.7.18.1 System Test

Perform a number of X-ray examinations.

Exposure Parameters

Check the Exposure parameters.

Auto Positioning

Check the auto positioning.

4.7.18.2 Balancing The Wallstand Detector Movement

The wallstand is designed with a counterweight wagon inside the base column. Depending on system use and user preferences (detector type, grid and armrest) a rebalancing might be needed. Consult with end users and responsible person at customer site in order to decide if rebalancing is necessary.

To adjust the weight balance, perform the following steps:

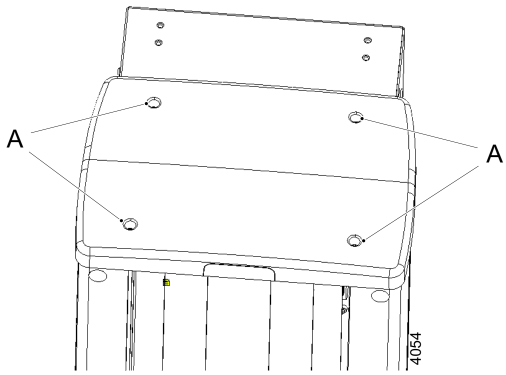


Fig. 4-175 Remove cover

1. Move the detector wagon to a low position.
2. Release the 4 screws (A) and remove the top plastic cover.

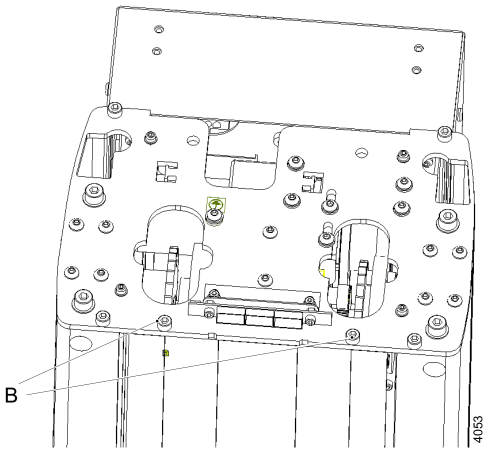


Fig. 4-176 Remove upper screws

3. Remove the 2 upper screws (B) holding the front aluminium plate.

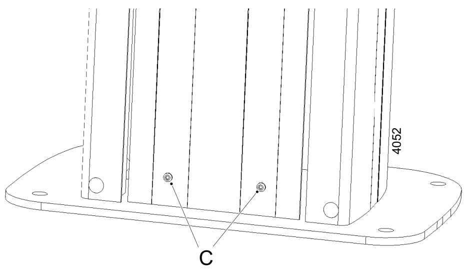


Fig. 4-177 Remove lower screws

4. Remove the 2 lower screws (C) holding the front aluminium plate.
5. Remove the front aluminium plate by lifting it upward.

Note!

Be careful not to scratch the aluminium plate in the narrow gap between base column and detector wagon.

Note!

*It is important to perform step **3.** before step **4.** in order to release mechanical tension on aluminium plate and avoiding any damage on screws.*

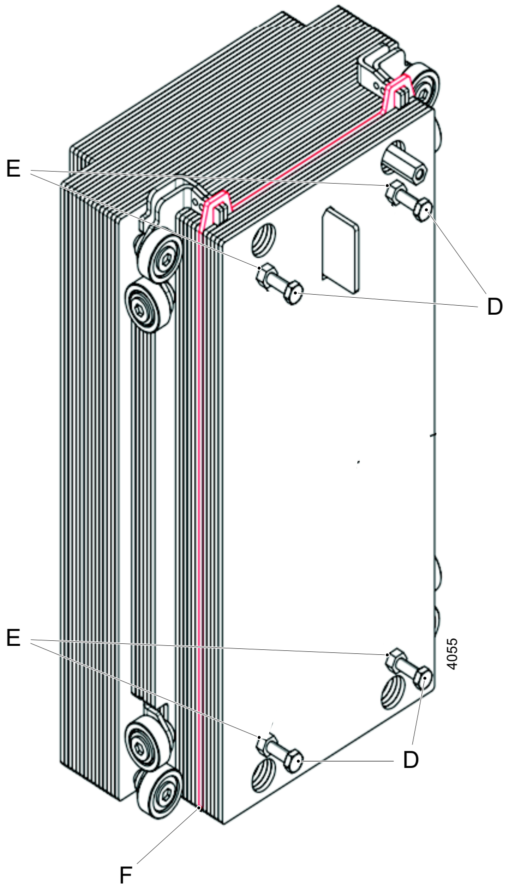


Fig. 4-178 Counterweight wagon

6. Move the counterweight wagon up/down to a convenient position to work with. *Note! Mind the squeezing hazard.*
7. Remove the 4 screws (D) with nuts (E) attaching the counterweights.
8. Add/remove one weight at a time.
9. Release the brake to allow manual Z movement and check the balance.
10. Repeat step **8.** and **9.** until balance between counterweight wagon and detector wagon is satisfactory.

Note!

*The guard plate (F, marked red) must always remain mounted, see **Fig. 4-178***

11. When balance is satisfactory, reattach the 4 screws (D) previously removed in step **7.**

    If weights have been added: Release the nut (E) on each screw (D) before tightening. Then tighten the screws (D) and finally tighten the nuts (E) to lock the position of the weights.

    If weights have been removed: Tighten the screws (D) and then tighten the nuts (E) to lock the position of the weights.
12. Move the detector wagon to a low position.
13. Remount the front aluminium plate by sliding it downwards behind detector wagon.

14. Insert and tighten the 2 lower screws (C) holding the front aluminium plate, see **Fig. 4-177**
15. Insert and tighten the 2 upper screws (B) holding the front aluminium plate, see **Fig. 4-176**.

Note!

Be careful not to damage the aluminium threads.

16. Attach the plastic top cover and tighten the 4 screws (A) see **Fig. 4-175**.

4.7.18.3 Emergency Button Test

The emergency buttons should be tested in order to see that they work properly.

See *Chapter 2 Safety* , for description on how the emergency stop should react on command.

4.7.18.4 Indication Light Test

Check that the indication lights on the table and the wallstand are lit when the respective receptor is selected.

4.7.18.5 Generator Software File

Check that the permanent license file is loaded into the generator.

4.7.19 Back-up Parameters

4.7.19.1 Save Overhead Tube Crane Parameters

1. Connect service laptop to the service cable of Arco Ceil (1.1Service).
2. Launch Service software from Arcoma system USB.
3. Connect the service program to the system using the appropriate COM port. Make sure that the connection state in the lower part of the screen changes from *“Disconnected”* to *“connected”*.
4. Check that all nodes are in enable state.

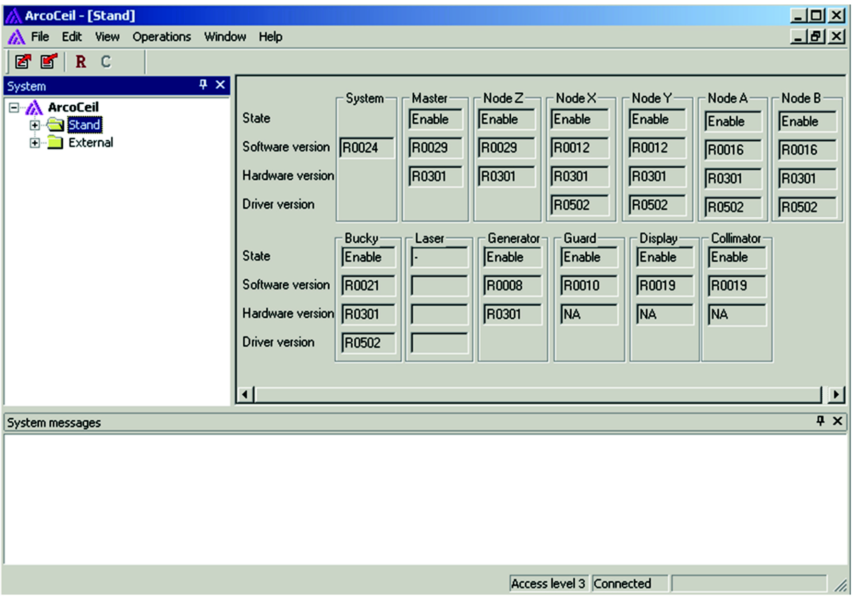


Fig. 4-179 Check enable state

5. Select *File* and *Save parameters As.*
   The file is saved as a .txt-file.

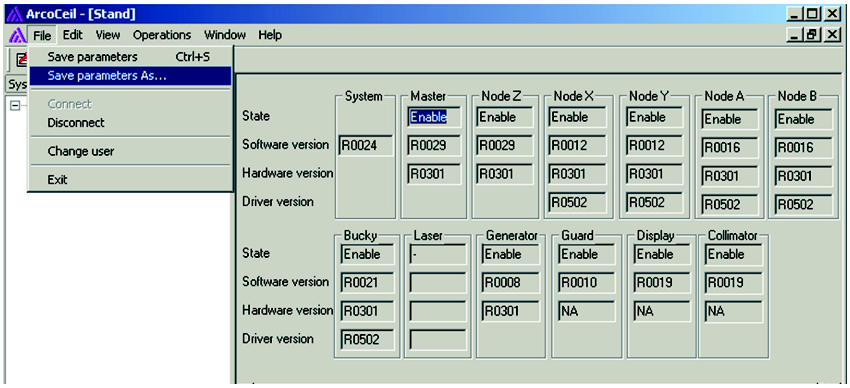


Fig. 4-180 Save parameters as

4.7.20 Collimator Light and X-Ray Field Alignment

The collimator light field and the X-ray field are normally adjusted at delivery.

However, check the following when installing.

1. Align the tube with the detector.
2. Attach some suitable objects on the detector holder cover (within the active detector area).
3. Perform an exposure and evaluate the alignment (images vs. the collimator light field) using the references applied in the previous step.

   Rail (B) has to be installed on the front.
4. The maximum deviation between light field and X-ray field is ±1% of SID, see figure.
5. Adjust the collimator light field according to the Collimator Manual.

Note!

Be aware of the difference between the two rails (A) and (B).

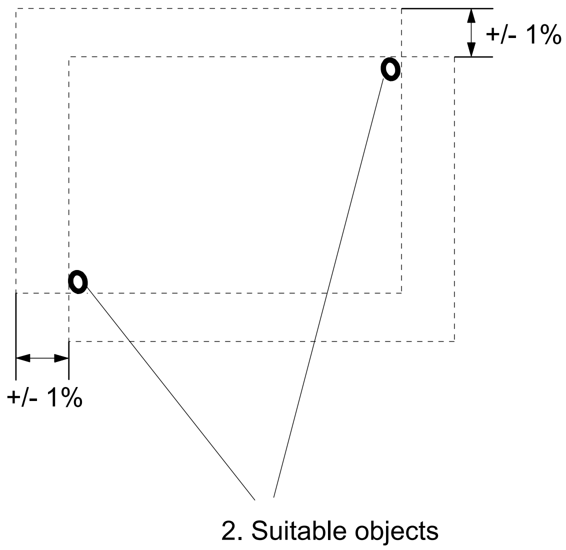


Fig. 4-181 Alignment

4.7.21 Collimator Adjustments

4.7.21.1 Accuracy Of The Light Field Indication To X-Ray Field

The Collimator X-ray field and the light field are factory calibrated. Ensure the calibration meets local legislation.

Calibration setting:

- The total discrepancies between the edges of the X-ray field and the corresponding edges of the Light Field do not exceed 2% of the distance of the measured plane of the Light Field from the Focal Spot.

4.7.21.2 Verification Of The Light Field Indication To X-Ray Field

The X-ray images taken are used to verify the light field to X-ray field accuracy.

In case the light field does not match the X-ray field, perform the following:

- Check the if distance (spacing) from the focal spot of the X-ray tube to the collimator mounting plane is 80 ± 1 [mm] (3.15 " ± .039 "):
  1. Light field larger than X-ray field:

     Remount the collimator to the X-ray system using less spacer(s) and repeat the test image procedure and verify the sizes.
  2. Light field smaller than X-ray field:

     Remount the collimator to the X-ray system using additional spacer(s)and repeat the test image procedure and verify the sizes.

4.7.21.3 Field Light Size Fine Adjustment

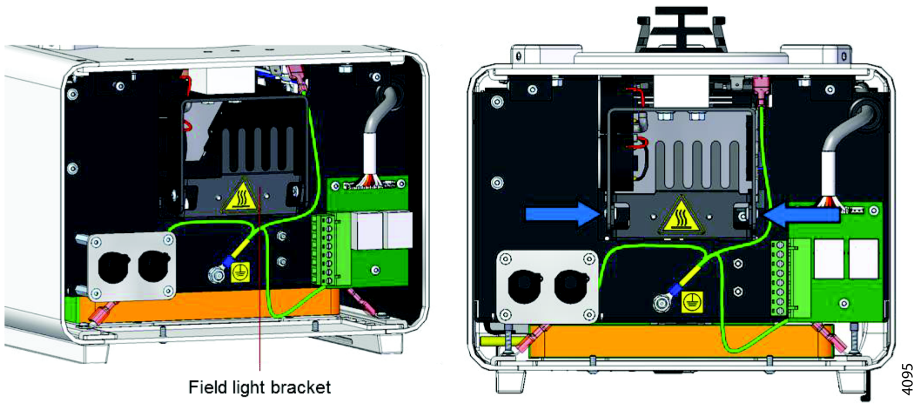


Fig. 4-182 Field light adjustments

Fine adjustment of the field light size can be done after removal of the rear panel. The field light size can be adjusted by loosening the positioning screws of the field light bracket as indicated **Fig. 4-182**. Adjusting is done by means of 2 screws, socket head wrench (size 2).

After the field light size is adjusted, carefully tighten the positioning screws without moving the field.

4.7.22 AEC Calibration

4.7.22.1 Measurement Of System Attenuation Factor

On delivery of the system, the AEC is pre-calibrated and should only need minor corrections. In case a new AEC chamber is to be installed, proceed as following:

Installation Of New AEC Chamber

1. Turn all four gain potentiometers on the amplifier (not the AEC board in the generator) completely to minimum.

   Turn clockwise until you can hear a click on every turn, max 15 turns.
2. Turn all four gain potentiometers approx. 3.5 turns positive (3.5 turns anti clockwise).
3. All master gain adjustments need to be performed on the generator AEC board.
4. Make sure the central beam is perpendicular and centered relative to the image receptor.
5. Ensure the X-ray field completely covers all three AEC fields.
6. Ensure the size of the used phantom is larger than the X-ray field.
7. All AEC post exposure times should be between 30 and 100 ms.

   Adjust tube current if necessary.
8. Only one film speed is activated on delivery (medium).

4.7.22.2 Check of AEC Chamber Field Versus Image System AEC Fields

Check that all three AEC fields on both table and wallstand correspond to the selected fields in the image system.

1. Activate AEC on the image system.
2. Make sure that only the left field is activated.
3. Completely cover the left field on the table or wallstand with a suitable object with high attenuation, e.g. a lead apron.

   Make sure the other two fields are not covered, here center and right field.
4. Make an exposure with suitable exposure parameters, e.g. 50 kV, 10 mAs, no phantom, SID according to grid focal distance, X-ray beam covering all three AEC fields.

   The exposure should be finished by the backup timer.
5. Remove the object mounted in front of the relevant field and repeat the exposure. Now a very short exposure time should be the result.
6. Repeat on all fields of the table and wallstand.

4.7.22.3 Adjustment Of Balance Between The Three Fields

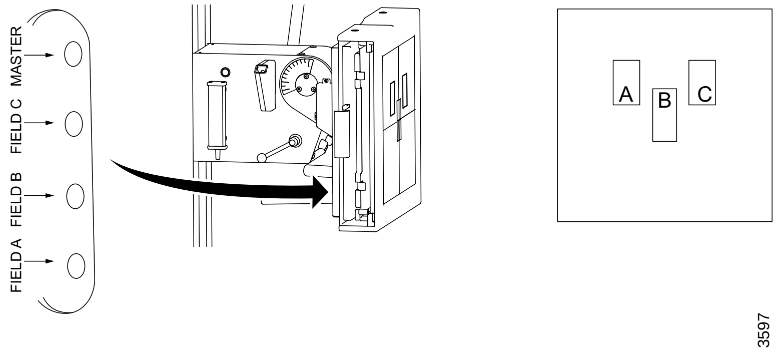


Fig. 4-183

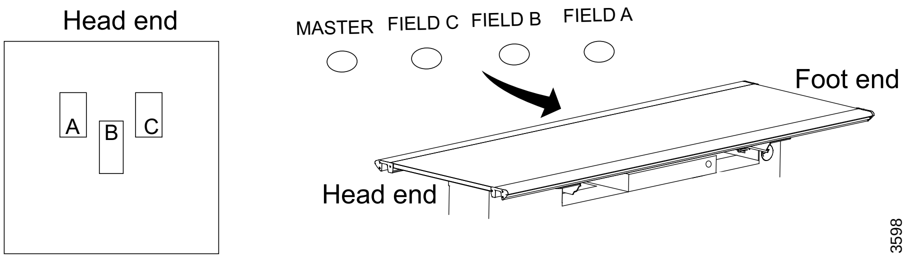


Fig. 4-184

Balance Calibrations In GenwareMP

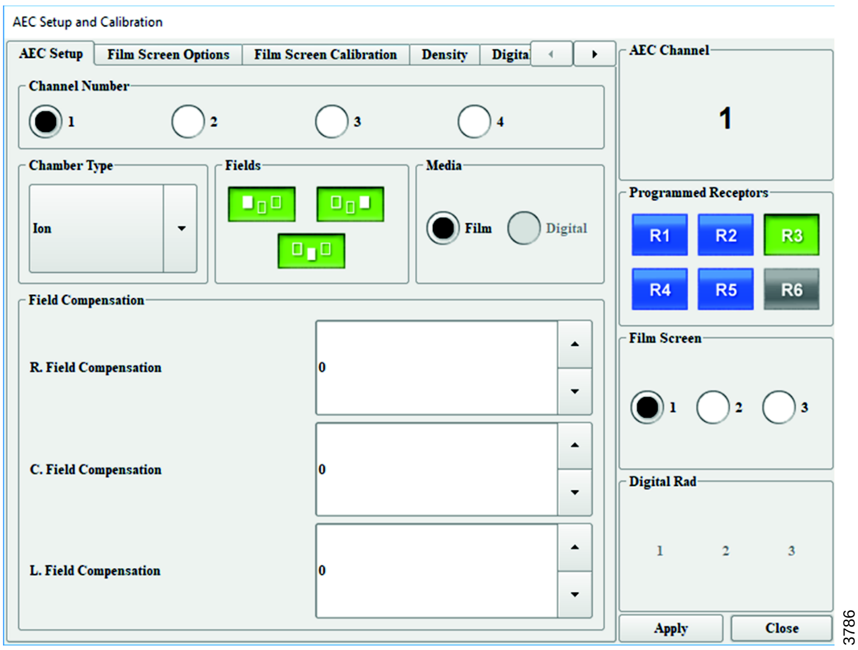


Fig. 4-185

Field Balance Check

Exposure parameters:	SID 100 cm
	80 KV
	25 mAs backup mAs
	25 mm aluminum Phantom in front of collimator
	AEC ON
	Collimator filter off = 0 mm AL and CU
	X-ray field set to cover all three fields
	Grid mounted. If more than one grid is available, mount the one with the highest ratio.

1. On the image system, activate only the left field (C).
2. Expose and note the mAs (or measure the radiation dose).
3. Repeat 1–2 for both the center (B) and right field (A).
4. Compare the three mAs (or µGy) results and if necessary adjust the corresponding gain potentiometer (field A-C potentiometer) until all three mAs values are the same. As accurate as possible, max deviation is ±10%.

   During this procedure, do not change the master gain potentiometer.

4.7.22.4 Fine Tuning of kV Compensation

Determination Of AEC Cut Off EI

The required EI (Exposure Index) value is depending on detector type. The detector entrance dose is depending on the detector type/manufacturer and can be regulated by national requirements, if unknown, a suitable value is 180 (corresponds to ca 1,8 µGy detector entrance dose).

The CXDI software has AEC protocols used for calibration installed, which are used to calibrate the cut off EI level. The below exposure parameters might need to be adjusted for your own needs.

Exposure parameters:	SID according to grid focal distance
	75 kV
	Set the value in the 75 kV dialog box to 4.50, see **Fig. 4-186** for the relevant AEC channel and film screen
	25 mAs backup mAs
	15 cm PMMA in front of the collimator, alternatively a suitable thickness of aluminium or a water phantom can be used.
	AEC ON
	Collimator filter off = 0 mm AL and CU
	X-ray field covering all AEC fields but smaller than the Phantom.
	Grid mounted (If more than one Grid is available, mount the one with the highest Ratio).
	Center field

1. Make an exposure.
2. Note the resulting EI value.

   Make sure the post exposure time is between 30–100 ms, adjust tube mA if necessary
3. Adjust the master gain on the generator AEC board and repeat the procedure until the correct EI value is reached.

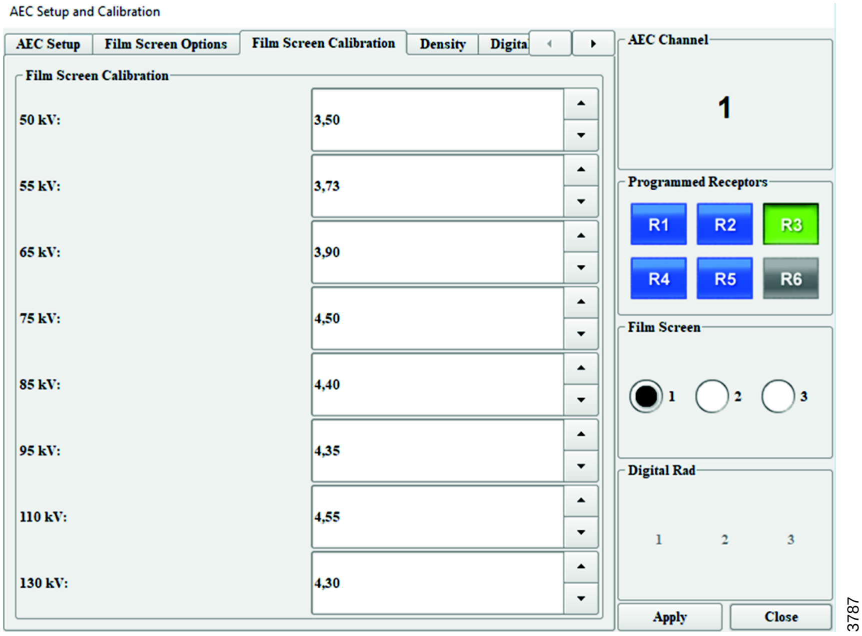


Fig. 4-186 AEC setup and calibration

kV Compensation Calibration

In this procedure, do NOT to change the nominal input value, only the correction values of their corresponding kV.

1. Repeat the **Determination Of AEC Cut Off EI** procedure, with the kV levels (except 75 kV) shown in **Fig. 4-186**, using the phantom sizes in the table:

kV	Acrylic Phantom (cm
50	10
55	10
65	10
75	15
85	15
95	15
110	20
130	20

2. For every kV level (except 75 kV), adjust the corresponding dialog box value until the correct EI is reached.
3. Make sure the post exposure time is between 30–100 ms, adjust tube mA if necessary.
4. Repeat for both the table and wallstand.

   Remember to adjust the SID according to the grid focal distance when changing between table and wallstand.

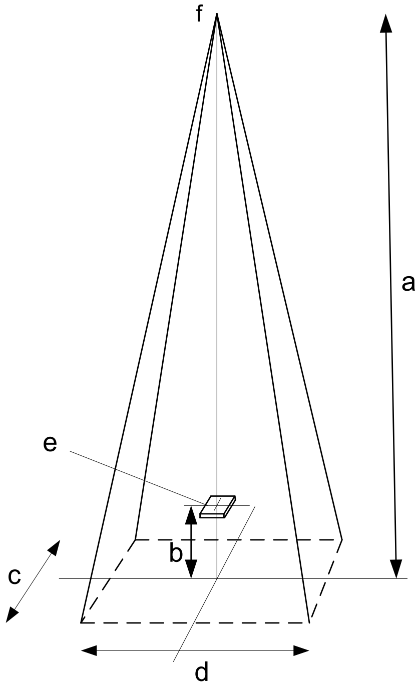
4.8 Image System

For further information, see the *Image system manual*.

4.9 Configuring The Protocol Settings In Protocol Editor

For Configuring the protocol settings in Protocol Editor, see the *Image System Service Manual, Chapter “Configuration”*.

4.10 DAP Test



$$k = \frac{D*c*d*((a-b)/a)^2)}{DAP}$$

Fig. 4-187 DAP test

a Focus distance (cm)
b Distance to active detector area of air kerma meter (cm)
c Height of xray (cm)
d Width of xray (cm)
e Active detector area air kerma meter
f focus

k= DAP correction factor, where DAP = DAP value (mGycm^2)

D = Measured dose with air kerma instrument (mGy)

A DAP value test is performed at manufacture and needs to be checked again after the installation. The DAP shall be tested in accordance with the hospital-preferred settings.

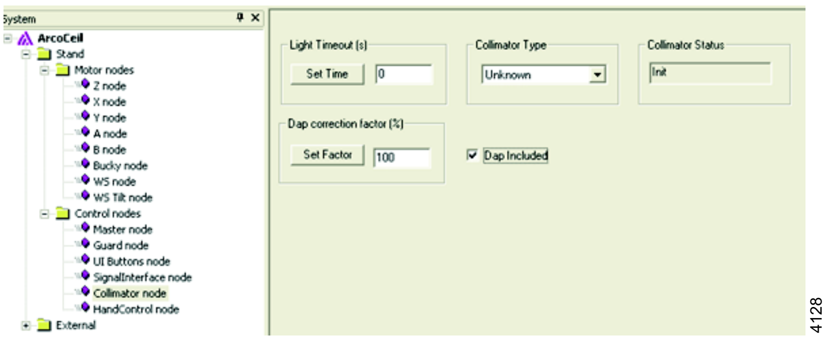


Fig. 4-188

If adjustment is needed:

1. Choose the collimator view in the service software.

2. Change the DAP correction factor according to the previously calculated DAP correction factor value (k).
3. Reset the system.
4. Repeat the test to verify the result.

4.11 Install Table Top

Note!

When sliding the table top in place, make sure the friction pads of table top brakes are not damaged.

1. Remove one of the table top end stops.
2. Switch on the power to the table and release the X/Y brake.
3. Press the brake pad against the magnets. Keep the brakes released (button pressed) when carefully sliding the table top in place.
   Rail (B) has to be installed on the front.
4. Install the mechanical stop (A), use Loctite 243. Tighten the bolts with 24 Nm.
5. Check that the table top runs smoothly.
6. Check that the brakes are working in a correct way.
7. Check that the table top runs smoothly. If not, see **6.6 Two Column Table** .

Note!

Be aware of the difference between the two rails (A) and (B).

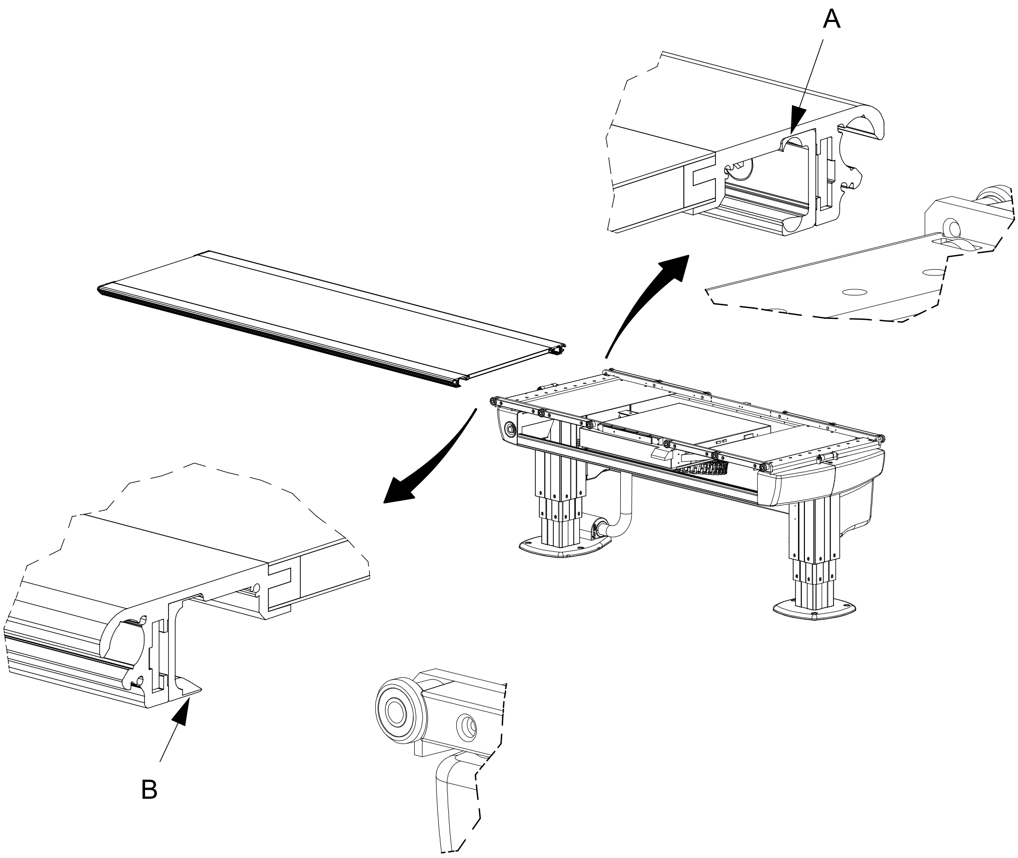


Fig. 4-189 Difference between rails (A) and (B).

4.12 Automatic Collimator Test

1. Check collimator handlebar functions.
2. Check collimator function for top/bottom alignment.
3. Check collimator light on/off signal (typical from table top release).

4.13 Display Test

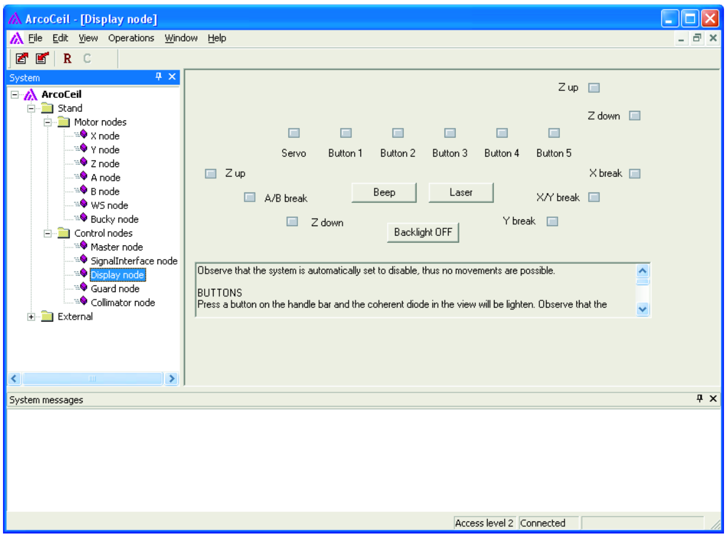


Fig. 4-190 Display node view

1. Enter the Display node view, see **Fig. 4-190**.
   The system is automatically set to disable to inhibit any movements during tests.
2. Press a button on the system handlebar.
   The corresponding "LED" turns green and stay green as long as the button is pressed.
3. Press the *Beep* button.
   The display beeper sounds for short time.
4. Press the *Laser* button.
   The handlebar laser is activated for approximately three seconds.
5. Press the *Back light* button.
   The display back light is turned off or on.

Note!

The laser and the back light is set to a normal state when the view is closed.

4.14 System Communication

System communication is configured at the manufacture. See Chapter **5 Setup** for details.

4.15 Image Quality Test

The image quality shall be tested when the system is finally installed.

For further information, see the *Image System Manual*.

4.16 Send Installation Report To Arcoma Service

Fill in the Installation Report and send it to Arcoma Service: service@arcoma.se

5 Setup

5.1 Computer Network Settings

Make sure that the 1000 system is connected to the Canon NE PC (Ethernet cable). *See SBD_1000_C* for reference.

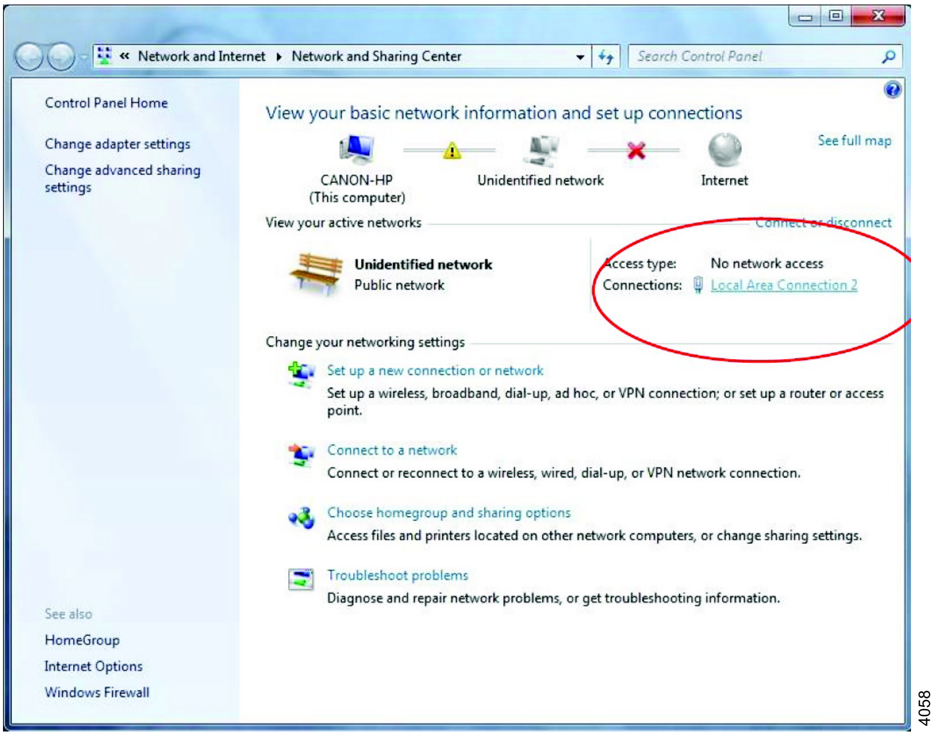


Fig. 5-1 Network and Sharing Center

1. Open the “Network and Sharing Center” from the “Control Panel”.
2. Click the Connection name, can be other than “Local Area Connection 2” as in **Fig. 5-1**.

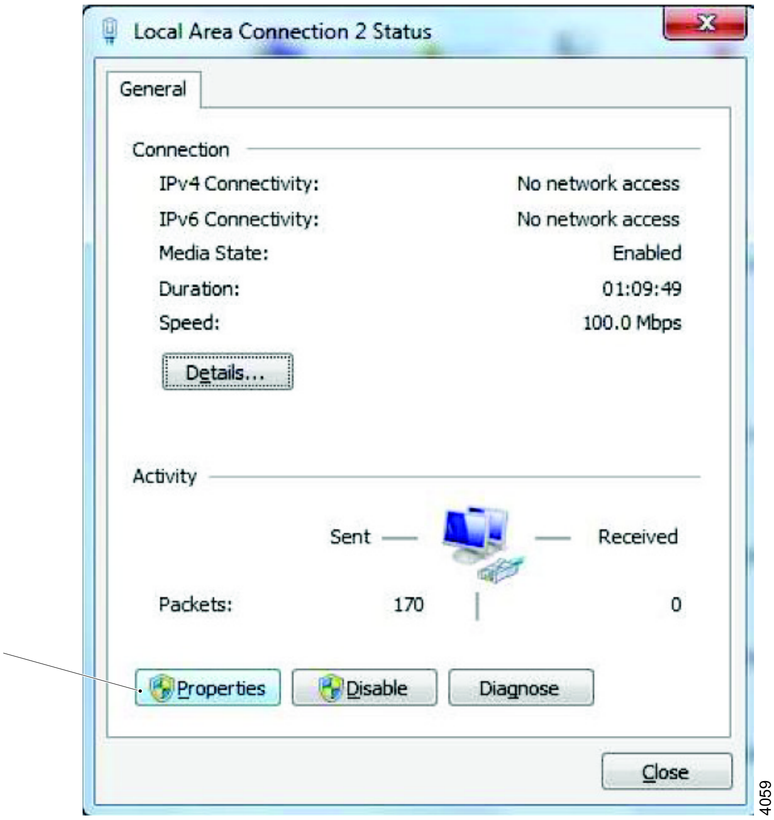


Fig. 5-2 Local Area Connection 2 status

3. Click `Properties`.

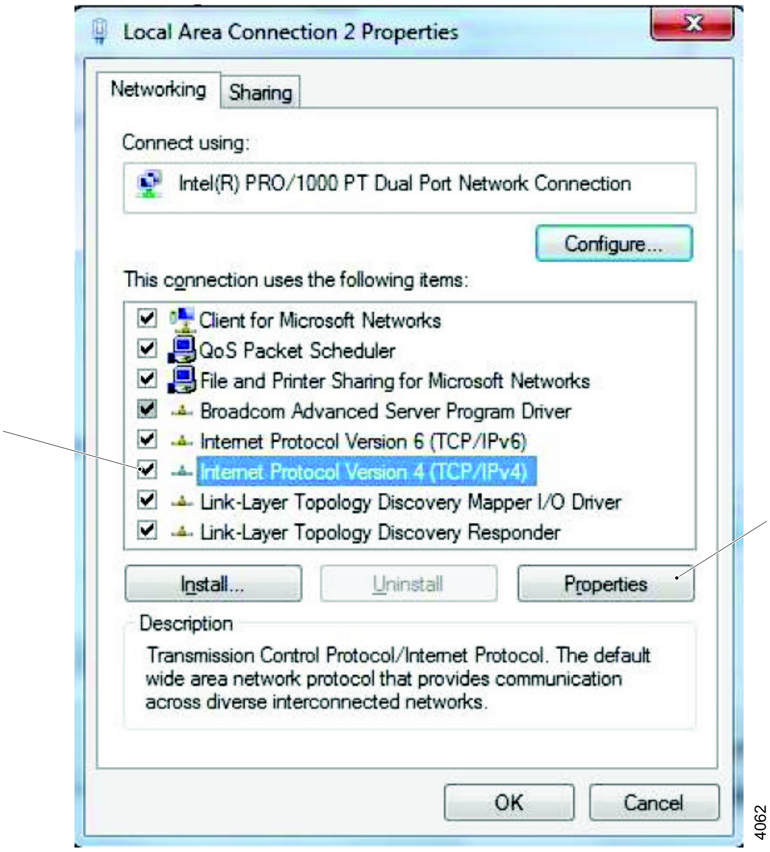


Fig. 5-3 Local Area Connection 2 Properties

4. Select `Internet Protocol Version 4 (TCP/IP)` and click `Properties`.

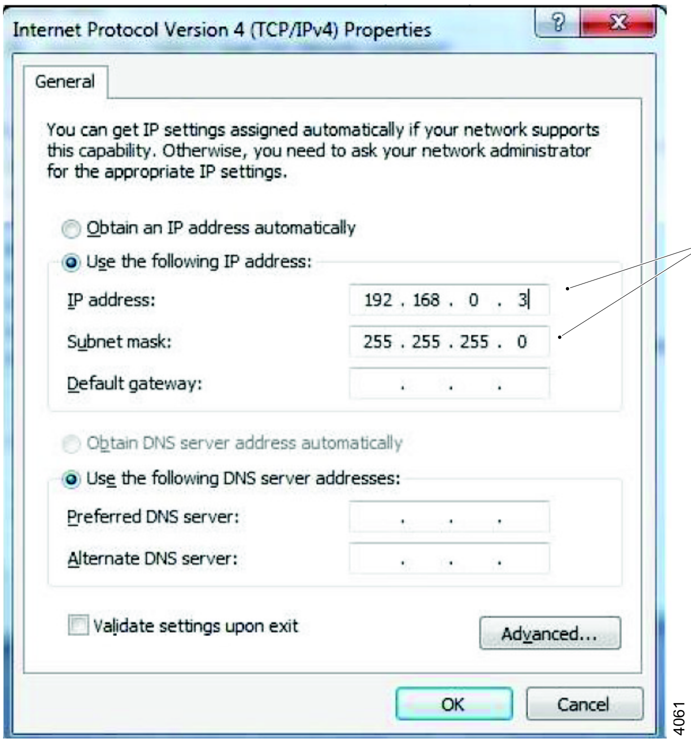


Fig. 5-4 Internet Protocol Version 4(TCP/IP) Properties

5. Enter settings for the IP address as in **Fig. 5-4**, and then click `OK`

5.1.1 Canon Software IP Settings

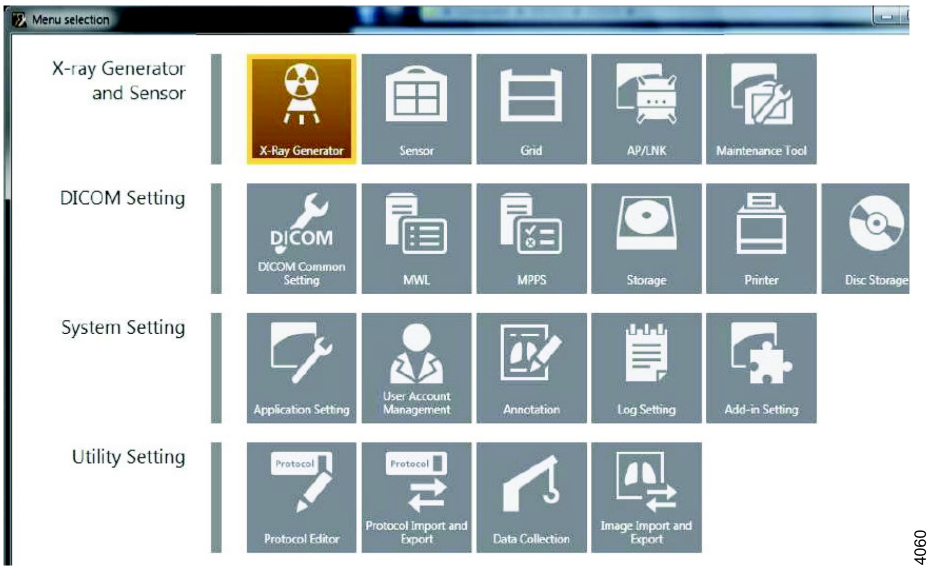


Fig. 5-5 Canon Service tool

1. Start Canon Service tool
2. Select `X-Ray Generator`.

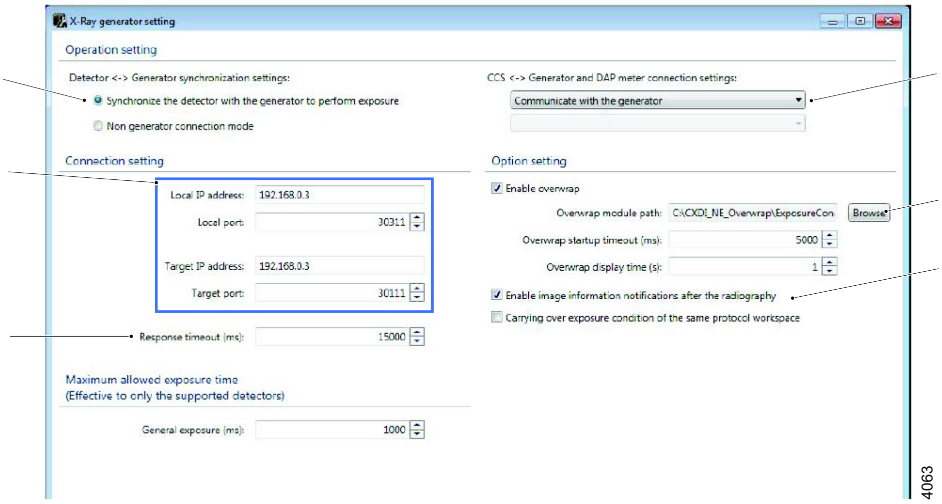


Fig. 5-6 X-Ray Generator setting

3. In `Operation setting`:
   - Select `Synchronize the detector with the generator to perform exposure`
   - Select `Communicate with the generator`
4. In `Connection setting`:
   - Set Local IP addresses and ports according to **Fig. 5-6**.
   - Set `Response timeout (ms)` to 15000.
5. In `Option setting`:
   - Select `Enable overwrap`
     Click `Browse` at line `Overwrap module path` and select: `C:\CXDI_NE_Overwrap \ExposureCondition.exe`.
   - Select `Enable image information notification after the radiography`”
6. Click `OK`.

5.1.2 Generator Settings

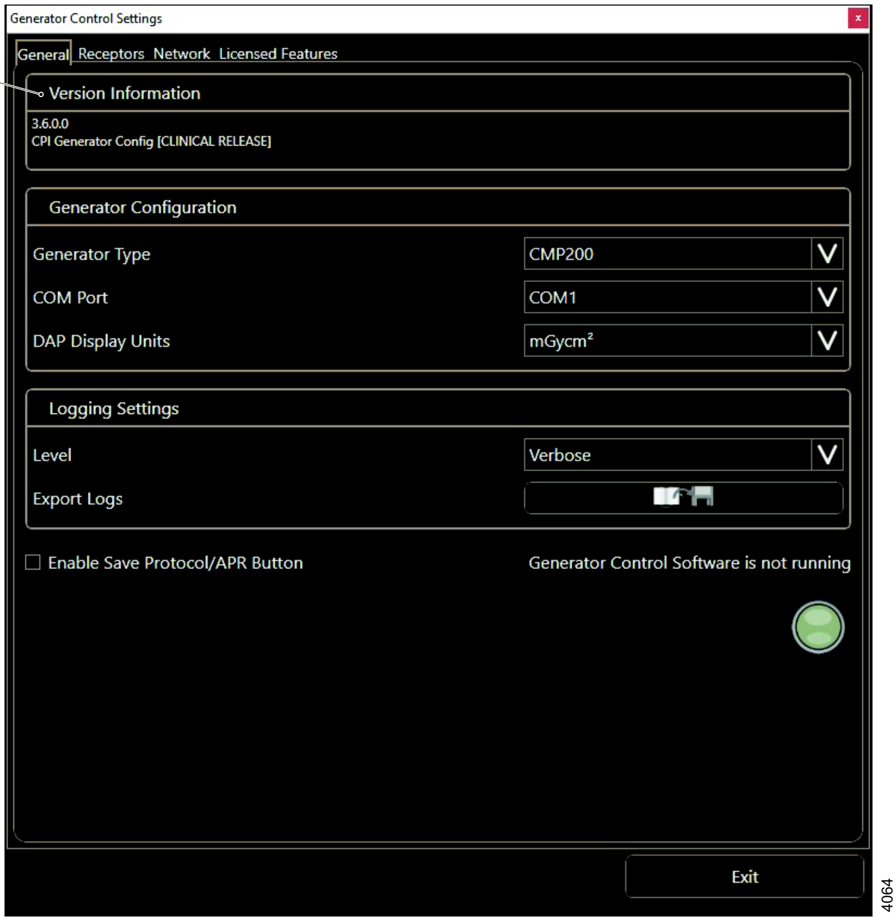


Fig. 5-7 Generator Control Settings, tab Genereal

1. Select tab `General`
2. Check `Version information` to confirm that the version corresponds with the software. See Release Note *SwRLN_0072-C_System_x.x* for further reference.
3. Start the generator control software: GenConfig.exe (folder C:\CXDI_NE_Overwrap\)

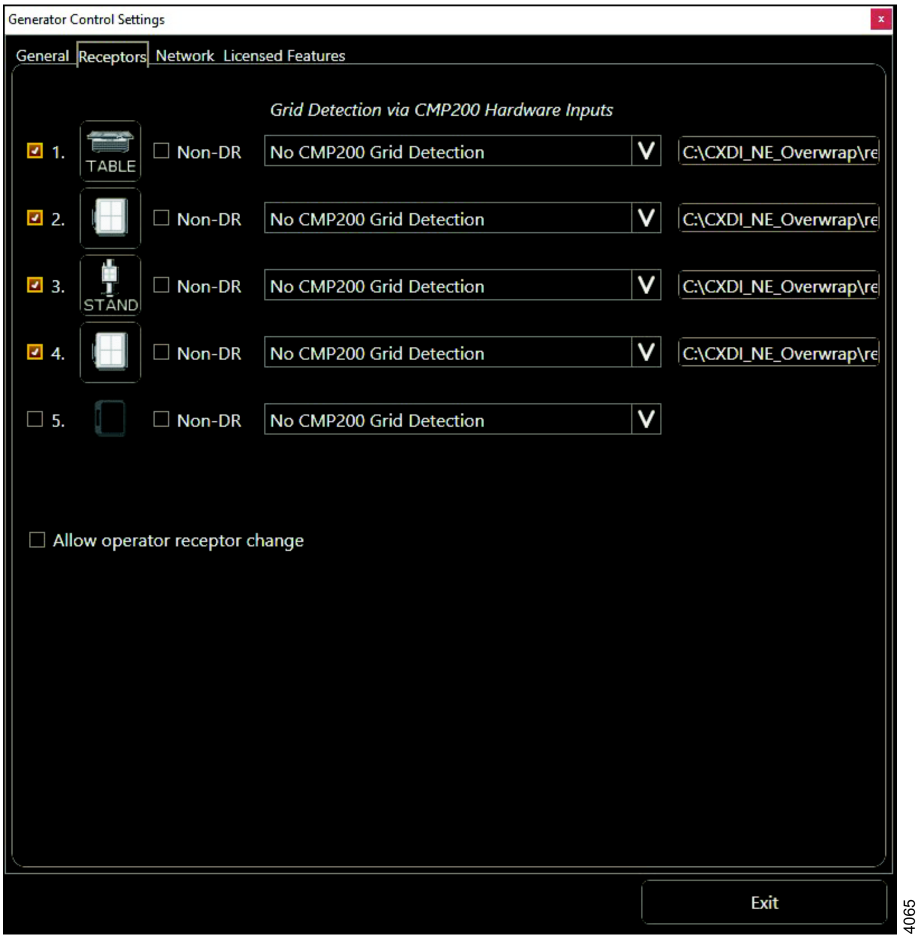


Fig. 5-8 Generator Control Settings, tab Receptors

4. Select tab `Receptors`.
5. Check all receptors active in the system, and select an icon.
   Grid detection via CMP200 Hardware inputs is not used.

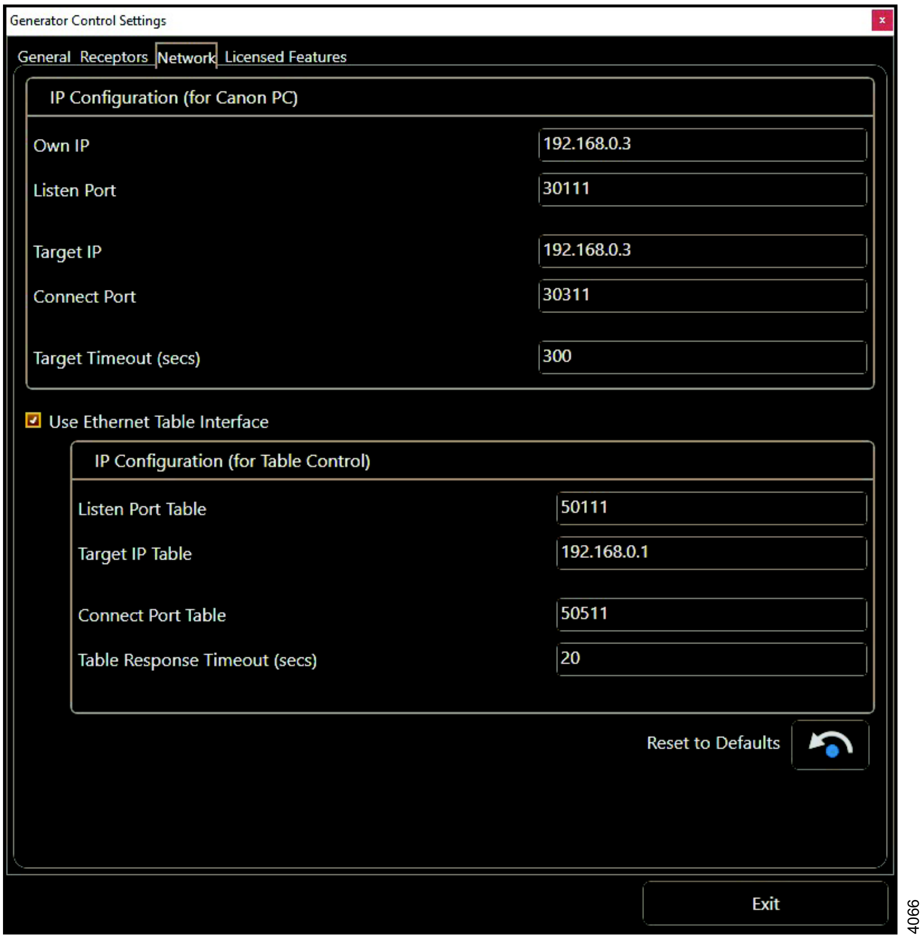
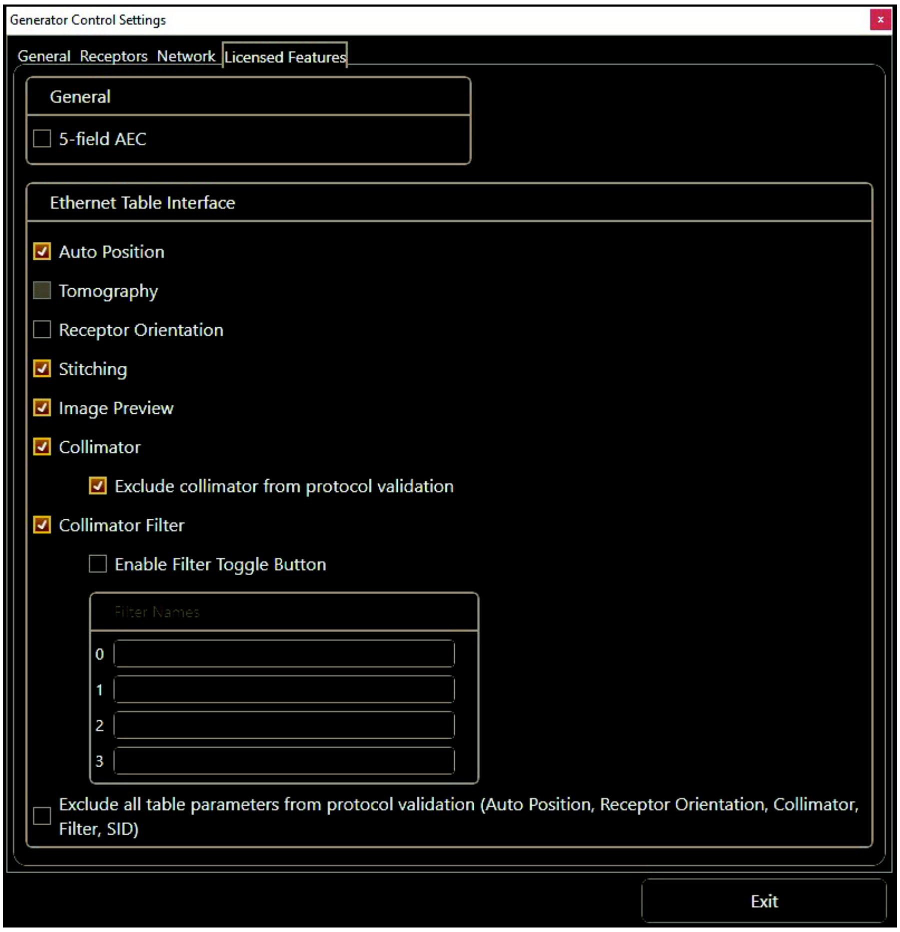


Fig. 5-9 Generator Control Settings, tab Network

6. Select tab `Network`.
7. The network settings shall be configured according to **Fig. 5-9**.



4067

Fig. 5-10 Generator Control Settings, tab Licensed Features

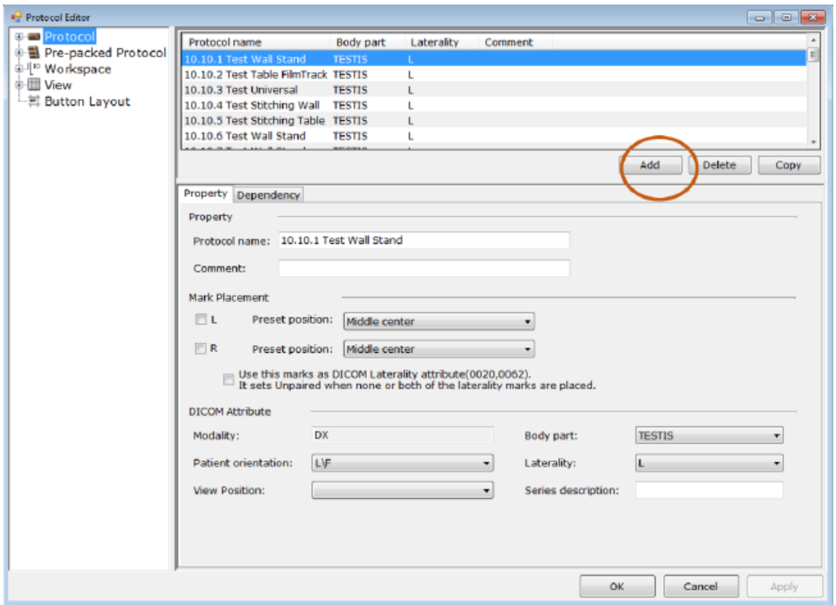
8. Select tab `Licensed Features`.
9. The licensed features settings shall be configured according to **Fig. 5-10**.
   Depending on the license installed in the system, some features may not be available.

5.2 Static Protocol Setup

3515

Fig. 5-11 Canon ServiceTool

1. Enter Canon ServiceTool.
2. Select `Utility Setting/Protocol Editor`.



3516

Fig. 5-12 Protocol Editor

3. Define a protocol and then click `Add`.

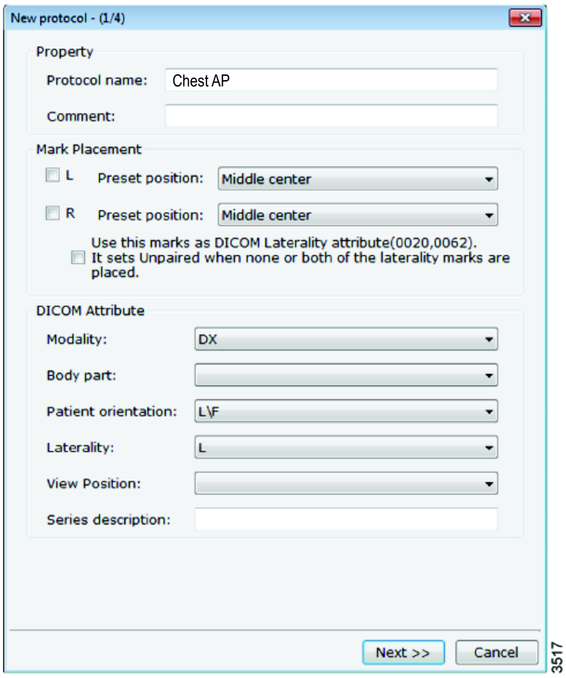


Fig. 5-13 New protocol 1/4

4. Assign a `Protocol name` to the new protocol, and then click `Next`.

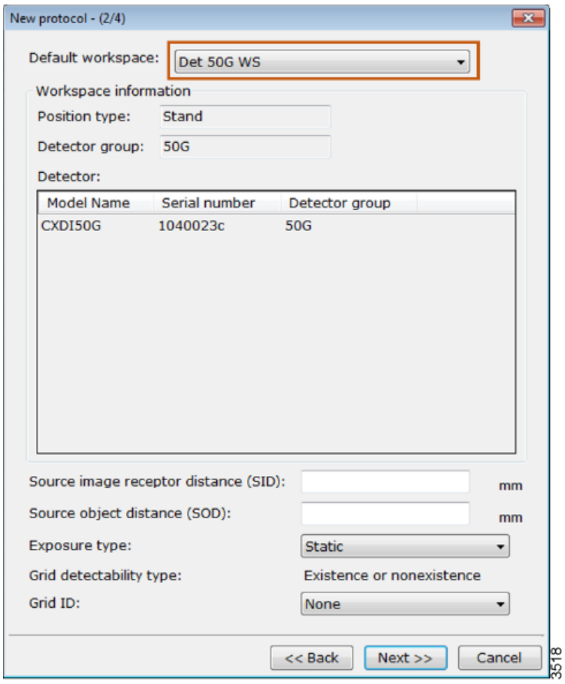


Fig. 5-14 New protocol 2/4

5. Select an appropriate `Default Workspace`.
6. Select `Static` as `Exposure Type`.
   Click `Next`.

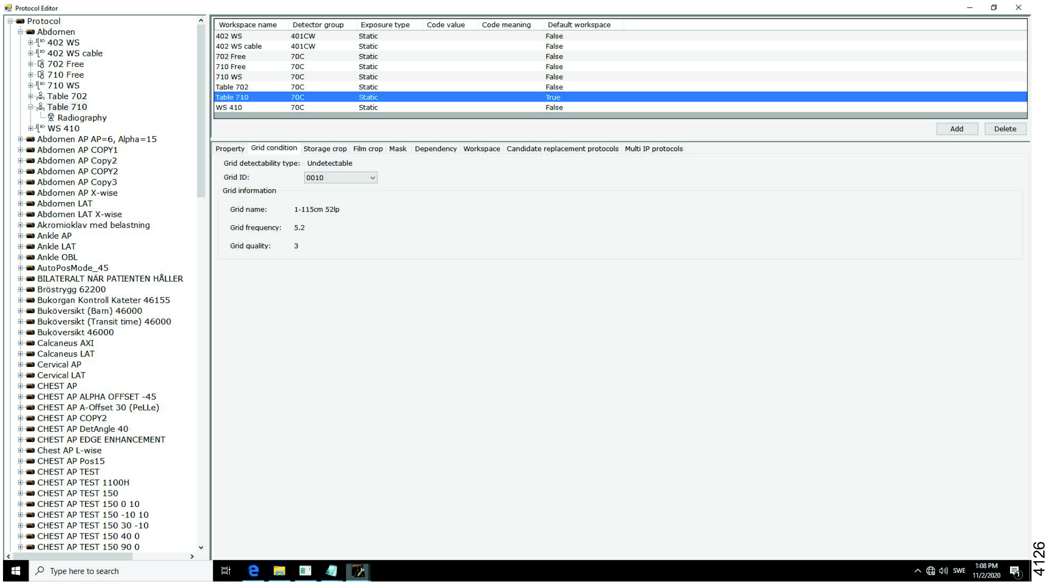


Fig. 5-15 Grid Abdomen Table

Grid type is defined under under `Grid condition`

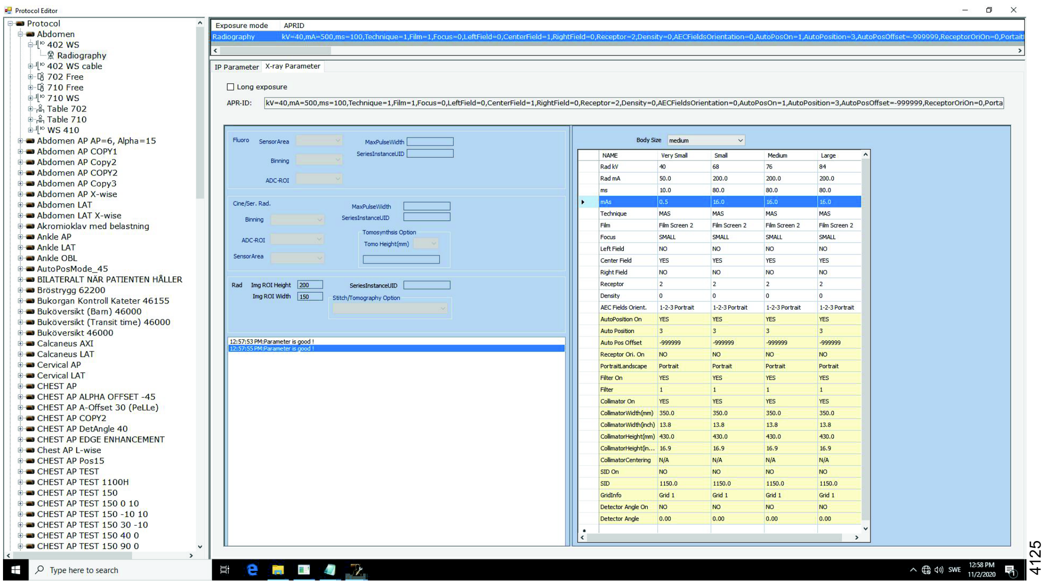


Fig. 5-16 X-ray Parameter_Service

7. Define Exposure parameters for the new protocol.

For Auto positioning functionality, the following settings are important:

- Define the appropriate `Receptor` number.
  - 1- Table, 2- Free, 3- Wall stand, 4- Free
- Set `AutoPosition On` to `YES`.
- Define the appropriate `Auto Position` number.
- Define an `Auto Pos Offset`, if applicable
- Define a `Detector angle` value, if applicable.

For Automatic collimator functionality, the following settings are important:

- Set `Filter On` to `YES`.

- Define the appropriate `Filter` number.
- Set `Collimator On` to `YES`”.
- Define `CollimatorWidth` and `CollimatorHeight` (mm). Values are limited by actual detector size.
- Set `CollimatorCentering`, if required.

For Grid identification functionality, the following settings are important:

- Set `GridInfo` to `No grid`, `Grid 1`, `Grid 2` 2 or `Grid 3`

See also needed settings in step **6.**

Note!

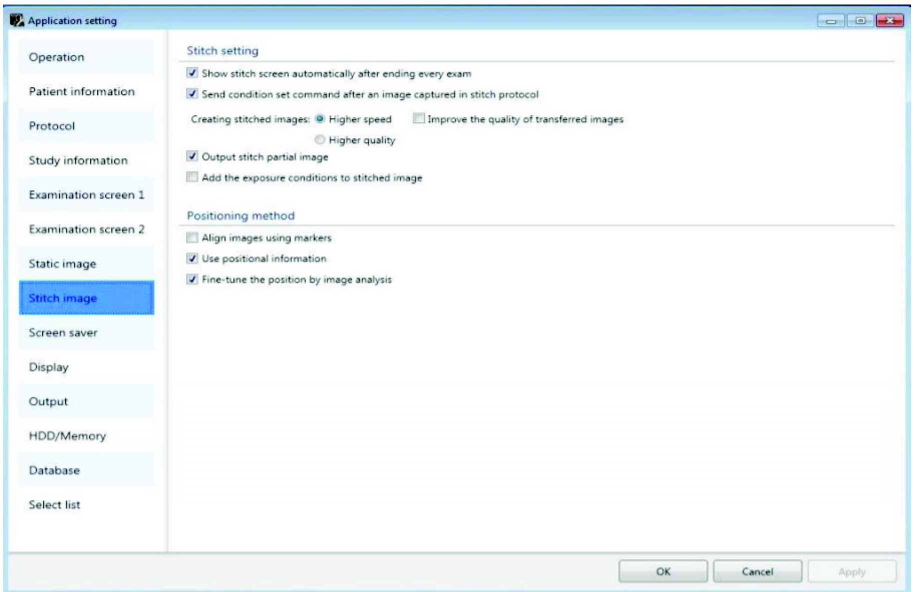
Settings for `SID on` are not used.

5.3 Stitching Protocol Setup (Option)

4068

Fig. 5-17 Canon Service Tool

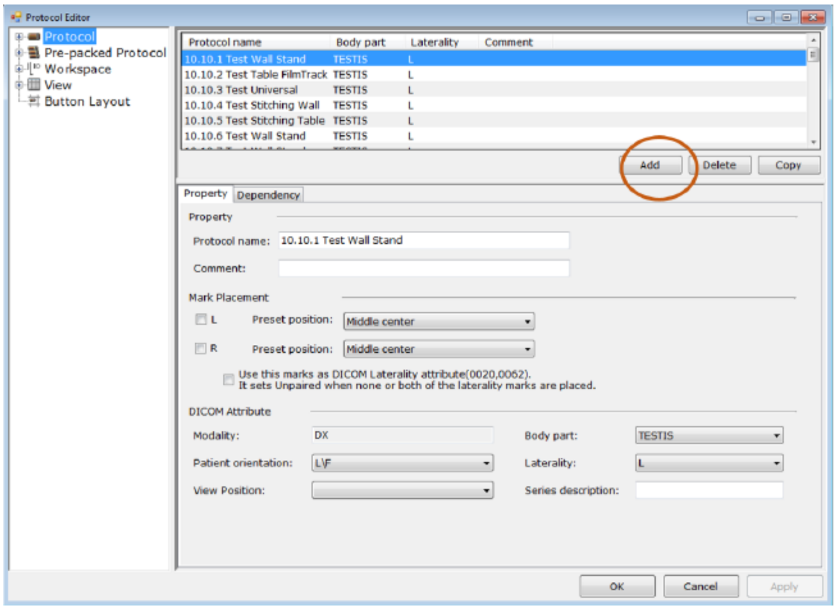
1. Enter Canon Service Tool.
2. Select `System Setting/Application Setting`.



4069

Fig. 5-18 Application Setting/ Stitch image

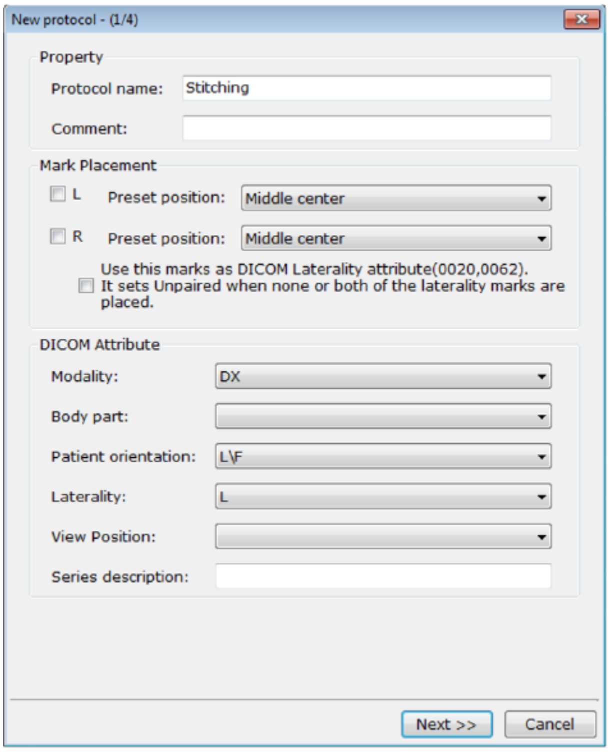
3. Select `Stitch image` and confirm that settings are according to **Fig. 5-18**.



3516

Fig. 5-19 Define a stitching protocol

4. Define a stitching protocol, and then click `Add`.



3517

Fig. 5-20 New protocol 1/4

5. Assign a `Protocol name` to the new protocol, and then click `Next`.

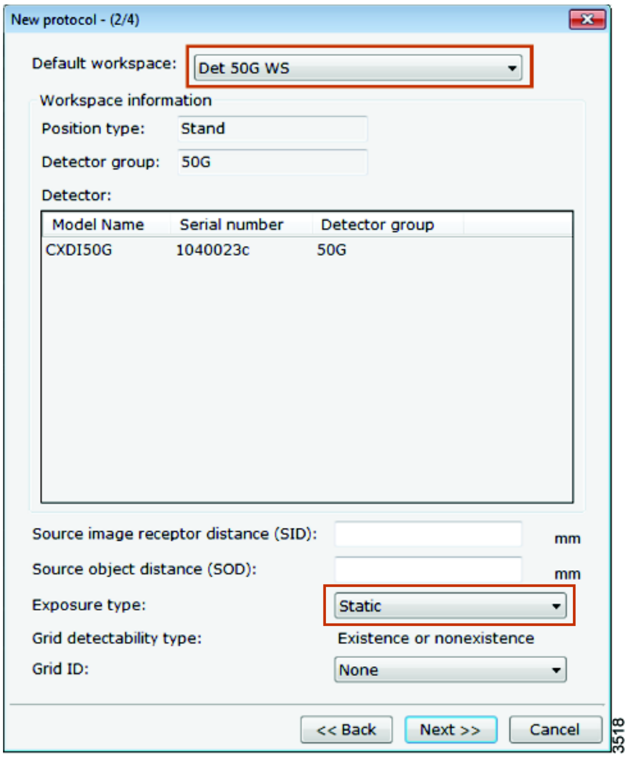


Fig. 5-21 New protocol 2/4

6. Select an appropriate `Default Workspace` for the protocol.
7. Select `Stitch` as `Exposure Type`, and then click `Next`.

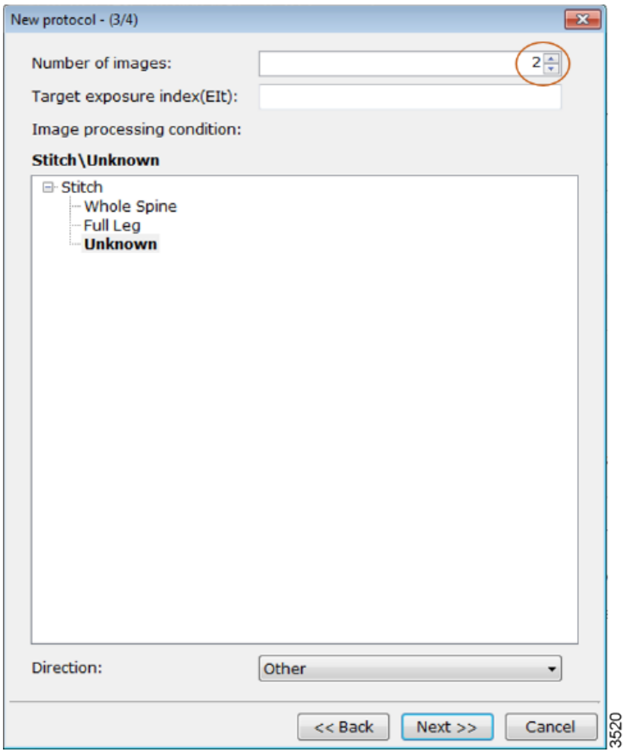


Fig. 5-22 New protocol 3/4

8. Define `Number of images` included in the stitching sequence.

   It is better to define one image more than expected than too few images. Based on the size of the region of interest the system will calculate the number of images needed and remove protocols for images that are not exposed.

   Click `Next`.

   A stitching protocol is now defined containing the number of protocols (Radiography) corresponding to the selected number of images.

   Exposure values shall be defined for all included protocols/images.

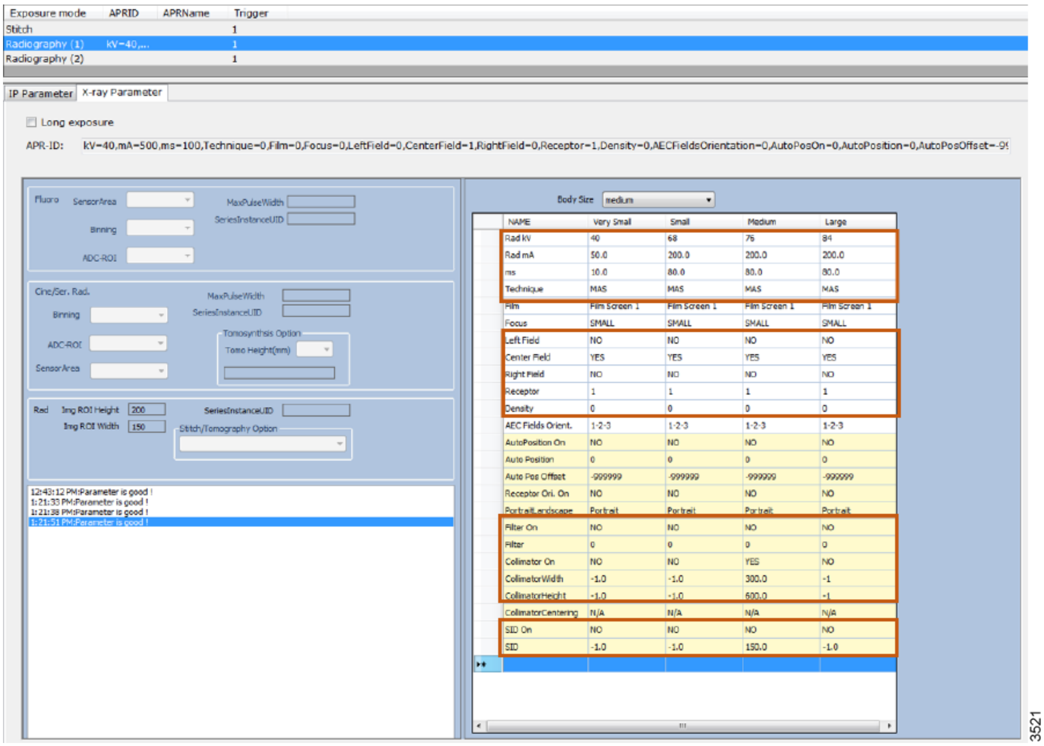


Fig. 5-23 Intuition system parameters

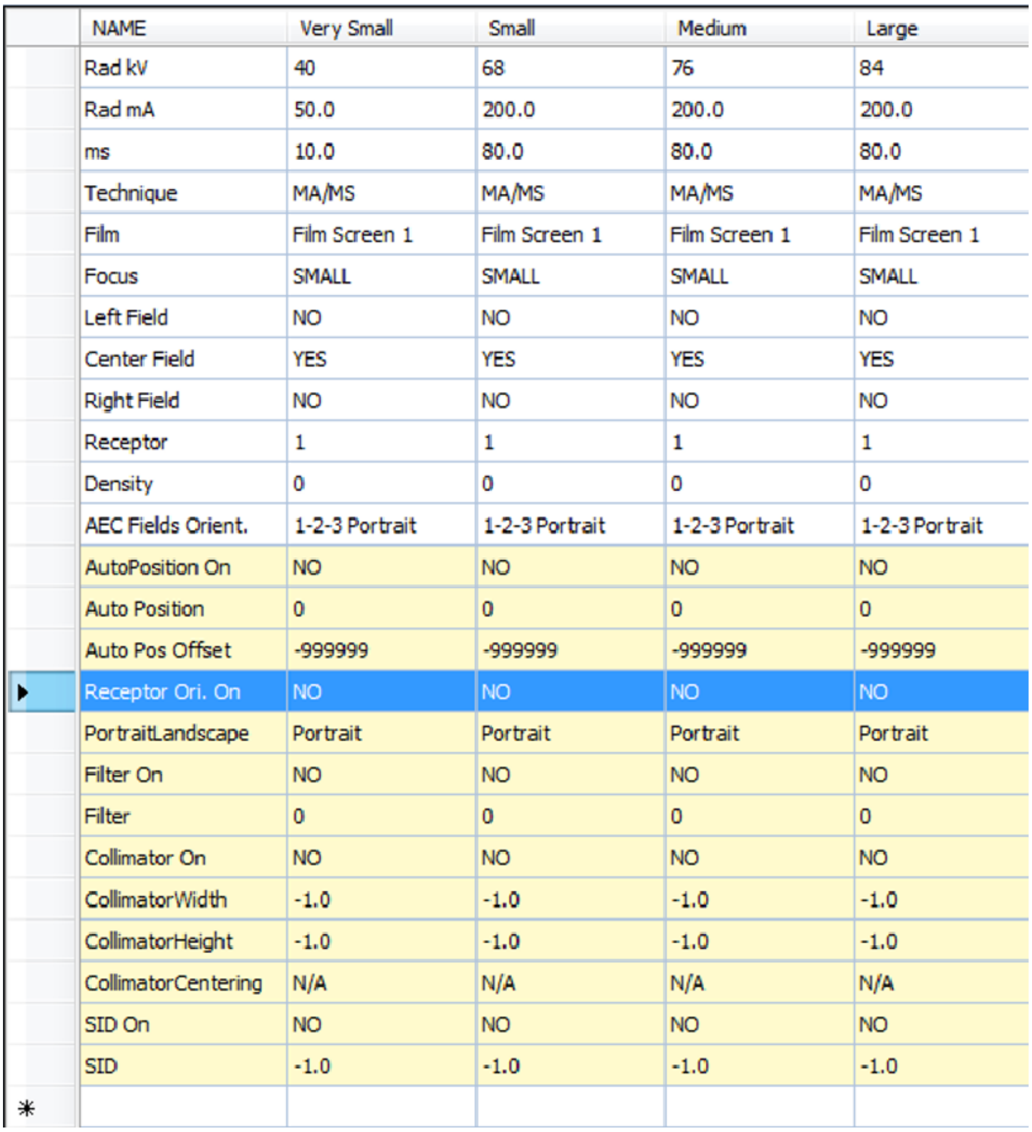
9. Define exposure parameters for the first protocol/image.
10. First protocol (Radiography 1):
    Define exposure parameters using the same method as for static protocols.
    For stitching functionality, the following settings are important:
    - Set `AutoPosition On` to `YES`.
    - Define the appropriate `Auto Position` number.
    - Set `Collimator On` to `YES`.
    - Define `CollimatorWidth` and `CollimatorHeight` (limited by actual detector size).
    - Leave `SID On` set to `NO` .

NAME	Very Small	Small	Medium	Large
Rad mA	50.0	200.0	200.0	200.0
ms	10.0	80.0	80.0	80.0
Technique	MA/MS	MA/MS	MA/MS	MA/MS
Film	Film Screen 1	Film Screen 1	Film Screen 1	Film Screen 1
Focus	SMALL	SMALL	SMALL	SMALL
Left Field	NO	NO	NO	NO
Center Field	YES	YES	YES	YES
Right Field	NO	NO	NO	NO
Receptor	1	1	1	1
Density	0	0	0	0
AEC Fields Orient.	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait
AutoPosition On	NO	NO	NO	NO
Auto Position	0	0	0	0
Auto Pos Offset	-999999	-999999	-999999	-999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	NO	NO	NO	NO
Filter	0	0	0	0
Collimator On	YES	YES	YES	YES
CollimatorWidth	-1.0	-1.0	300.0	-1.0
CollimatorHeight	-1.0	-1.0	600.0	-1.0
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	YES	YES	YES	YES
SID	150.0	150.0	150.0	150.0

3522

Fig. 5-24

11. Following protocols (Radiography 2-4):
    - Set `AutoPosition On` to `YES`.
    - Define the appropriate `Auto Position` number.
    - Set `Collimator On` to `NO`.
    - Leave `SID On` set to `NO`.



NAME	Very Small	Small	Medium	Large
Rad kV	40	68	76	84
Rad mA	50.0	200.0	200.0	200.0
ms	10.0	80.0	80.0	80.0
Technique	MA/MS	MA/MS	MA/MS	MA/MS
Film	Film Screen 1	Film Screen 1	Film Screen 1	Film Screen 1
Focus	SMALL	SMALL	SMALL	SMALL
Left Field	NO	NO	NO	NO
Center Field	YES	YES	YES	YES
Right Field	NO	NO	NO	NO
Receptor	1	1	1	1
Density	0	0	0	0
AEC Fields Orient.	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait	1-2-3 Portrait
AutoPosition On	NO	NO	NO	NO
Auto Position	0	0	0	0
Auto Pos Offset	-999999	-999999	-999999	-999999
Receptor Ori. On	NO	NO	NO	NO
PortraitLandscape	Portrait	Portrait	Portrait	Portrait
Filter On	NO	NO	NO	NO
Filter	0	0	0	0
Collimator On	NO	NO	NO	NO
CollimatorWidth	-1.0	-1.0	-1.0	-1.0
CollimatorHeight	-1.0	-1.0	-1.0	-1.0
CollimatorCentering	N/A	N/A	N/A	N/A
SID On	NO	NO	NO	NO
SID	-1.0	-1.0	-1.0	-1.0

3523

Fig. 5-25

6 Maintenance

6.1 General

WARNING!

Before working with service and maintenance that does not require power: Turn off the power and lock the main switch.

WARNING!

High voltage!

Risk of serious personal injury or death!

Only trained service technicians may install, service and maintain the system.

No unauthorized personnel may remove any covers.

WARNING!

Risk of electrical shock.

If covers are removed, live parts are exposed.

WARNING!

Squeezing hazard can occur between the vertical lift segments when moving in Z-direction.

WARNING!

Squeezing hazard can occur between detector holder and detector wagon when tilting the detector holder.

WARNING!

Reduced safety when intentionally disabling of safety mechanism.

WARNING!

Remaining energy may exist when the equipment is switched off.

Wait at least 15 seconds before working on the system.

WARNING!

Be aware of possible squeezing hazards when the covers are removed.

CAUTION!

When the mini console is turned OFF, the detector holder cannot be moved up or down using the brake release for Z-movement.

The detector holder must be fixed to the main unit frame while the parts of the detector holder are being replaced.

CAUTION!

Use gloves when in contact with grease.

Note!

For maintenance of components attached to the system (tube, generator, collimator etc.), refer to chapter 1 and system documentation.

This chapter contains the instructions necessary for annual maintenance:

- Alignments and settings
- Preventive maintenance
- Performance testing

To guarantee the safety of the patient and to ensure the functions and availability, the operator and third parties shall follow the instructions in this chapter.

If any malfunction is detected or if there is any abnormal noise, the entire equipment must be taken out of use until the malfunction is eliminated or usage of the system is approved by a service technician from the supplier or by the local technical staff trained by the supplier.

The Manufacturer recommends use of the **18 Appendix B, Page 523**.

Annual checks shall be performed either by local technical staff trained by the supplied or authorized service representatives. Daily and monthly checks are normally performed by the user/operator and is found in the Operator’s Manual.

6.2 Generator

Refer to the *Regular Maintenance* chapter of the Generator manual.

6.3 Imaging System

Refer to the Canon Manual Service documentation.

6.4 Detector

Refer to the Canon Manual Service documentation.

6.5 Overhead Tube Crane

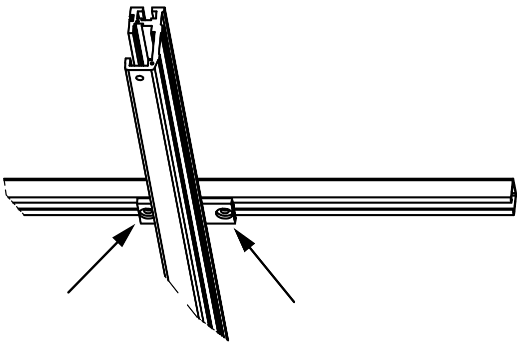


Fig. 6-1 Check installation bolts

1. Clean all wheel tracks.
2. Clean all wheels.
3. Check that the installation bolts for the ceiling rails are tightened with 47 Nm.

   Check the rest of installation, all the way up to the ceiling.

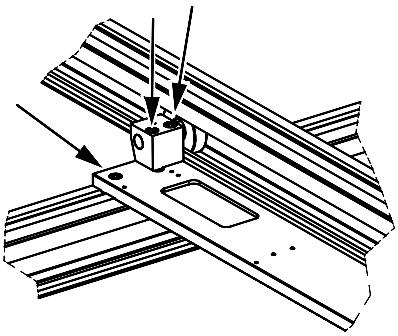


Fig. 6-2 Check installation bolts

4. Check the installation bolts (12 pcs) for the transverse rails with an Allen key.

   Note!

   Do not turn the bolts if they are not loose. They are fastened with Loctite.

   If the bolts are loose, tighten them to 47 Nm. Use Loctite 243.

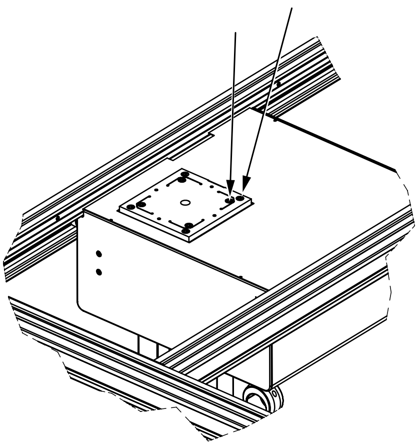


Fig. 6-3 Check installation bolts

5. Check the installation bolts (8 pcs) for the Z-column with an Allen key.

   Note!

   Do not turn the bolts if they are not loose. They are fastened with Loctite.

   If the bolts are loose, tighten them to 47 Nm. Use Loctite 243.

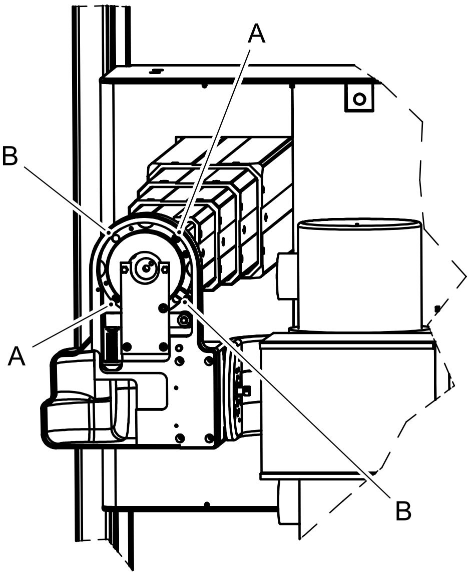


Fig. 6-4 Check installation bolts

6. Check the installation bolts (4 pcs) for the turning plate with an Allen key.

Note!

Do not turn the bolts if they are not loose. They are fastened with Loctite.

If the bolts are loose, tighten them to 9.8 Nm. Use Loctite 243.

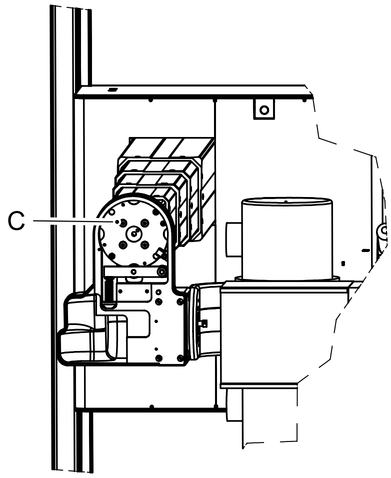


Fig. 6-5 Check installation bolts

7. To reach the bolts, remove the cover under the horizontal turning plate, the gearbox and the magnets, see **Fig. 4-104**, then the two bolts are visible (**A**).
8. Turn the plate 90° to view the other two bolts (B).
9. Remove the magnet and check the installation bolts (**C**, 4 pcs) for the attachment flange.
10. After the installation, check the Beta according to **Calibration of Beta-axis, Page 205**.
11. Check the wedge-lock between the tube and collimator installation. You should be able to move the collimator 45° without any play.

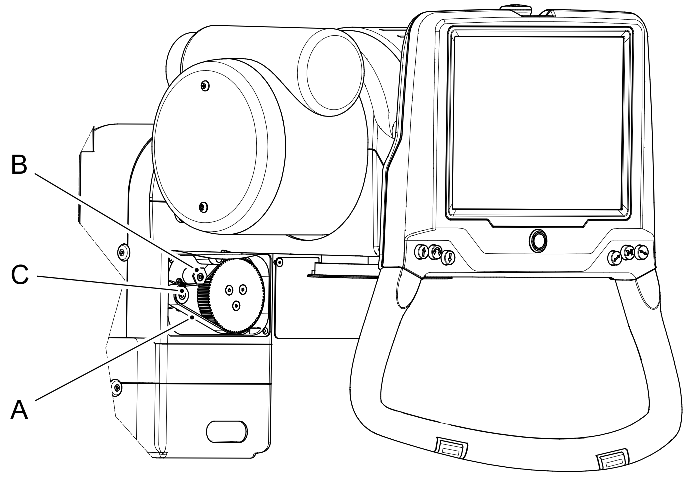


Fig. 6-6

12. Remove the cover and check that the belt is tightened. The tooth belt can be flexible +/-2 mm. If the tooth belt has to be tightened see the instruction below.

    The tooth belts are adjusted by the manufacturer and no further adjustments are normally required.

    - Loosen the bolt (**B**).
    - Turn the eccentric bolt (**C**).
    - The tooth belt (**A**) should be flexible +/- 2 mm.

      If the tooth belt is too tight, the alpha will be heavy to move manually.

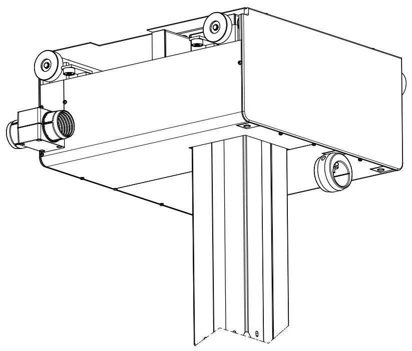


Fig. 6-7 Check lifting cord

13. Check the lifting cord for damage and make sure that is runs smoothly. It might be subject for exchange when tension gets to low.

14. Check all outer cabling for damage.
15. Check the protective earth resistance, refer to **4.3 Measure Protective Earth** for further instructions. Measure protective earth resistance on open metal on the following points:
    - X-ray tube
    - collimator
    - alpha (1.3 PE)
    - display
    - alpha/beta arm (1A PE)
    - column phase
    - ceiling wagon
    - frequency converter plate
    - electrical plate

- electrical plate 1.1 traverse
- traverse wagon Y
- Measure according to IEC 60601-1
- Measurement on more points may be needed depending on the installation

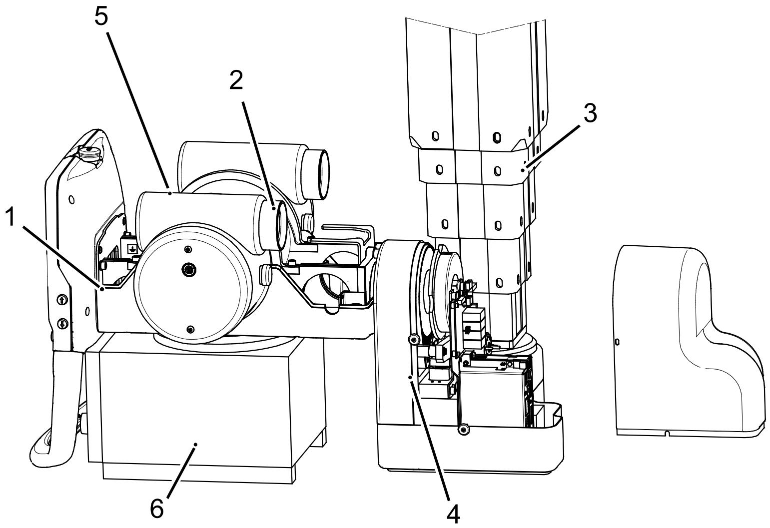


Fig. 6-8 Measure points, protective earth.

1. *Display*
2. *Tube*
3. *Column phase*
4. *Alpha/Beta arm (1A PE)*
5. *Alpha (1.3 PE)*
6. *Collimator (Option)*

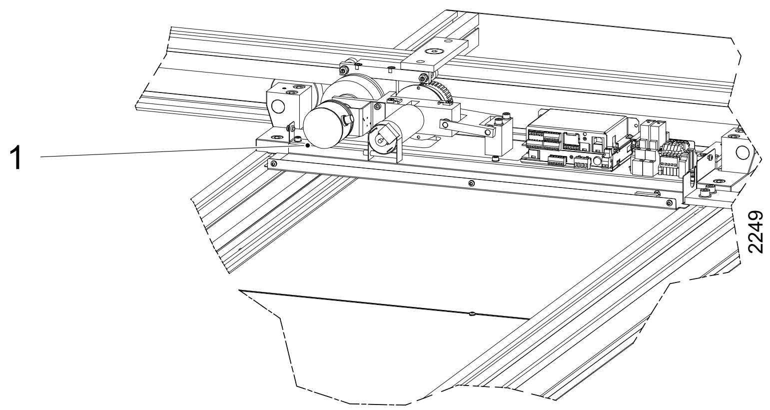


Fig. 6-9 Measure point, protective earth traverse wagon Y.

1. *Traverse wagon Y*

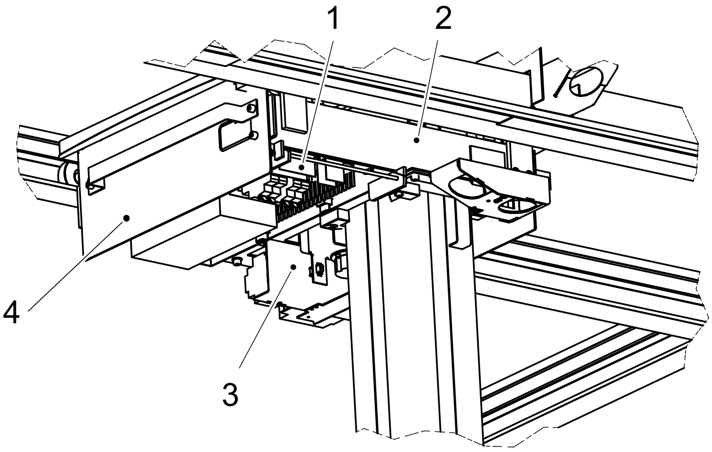


Fig. 6-10 Measure points, protective earth ceiling wagon.

1. *Electrical plate*
2. *Electrical plate 1.1 traverse*
3. *Frequency converter plate*
4. *Ceiling wagon*

16. Measure leakage current < = 0.5 mA. Measure according to IEC 60601-1.
17. Test the emergency buttons and see that they work properly.

    See *Chapter 2 "Safety"* for description on how the emergency stop should react on command.
18. Check the guard function with a force gauge. Fix the force gauge to the maneuver handle and resist when the overhead tube crane runs upward respective downward.

    The guard function shall activate by 170 N ±30 N.

    If the guard function activates by 170 N ±30 N adjust the guard function according to **4.7.11.10 Calibration Of Guard Function (Z-axis), Page 225**.
19. Check the column segments on the OTC (full stroke).

    The column segments should run smoothly without noise. Lubricate the columns if necessary. Use grease Castrol Alpha SP 220.
20. Check that there are no oil leak from the gear box or motor.

    If any of those problems occur, please contact dealer.
21. Check the brake for the column motor. The brake shall activate when:
    – the movements have stopped or
    – the emergency stop activates during movement.
22. Move the ceiling suspended unit manually to all positions and make sure it runs smoothly.
23. Check the read-outs for tube rotation. Turn the alpha and beta to the index stop and check that correct measurement is displayed.
24. Check the read-outs for the SID in a Table position. Measure between the X-ray tube focal spot and the active detector surface of the detector. The measured value shall correspond with the displayed value.
25. Check the read-outs for the SID in a Wallstand position. Measure between the X-ray tube focal spot and the active detector surface of the detector. The measured value shall correspond with the displayed value.
26. Check the buttons on the maneuver handle, they shall not be damaged or stuck when they are pressed. To check the function of the manoeuver buttons use the service software, see **4.12 Automatic Collimator Test, Page 262**.

27. Read and follow the chapter *Operating the System* in the *Operator's Manual* .
    - Check that the overhead tube crane functions according to the description.
    - Check all the functions and motorized movements.
    - Different installations could have different options installed.

6.6 Two Column Table

1. Check the tightening of bolts fixing the table to the floor.
   Tightening torque 25 Nm.
2. Check the function and clean the table top ball bearings.
   Remove the table top, see **4.11 Install Table Top, Page 261**.
   The ball bearings shall be secured to the table and run smoothly.
3. Clean the table top profiles.

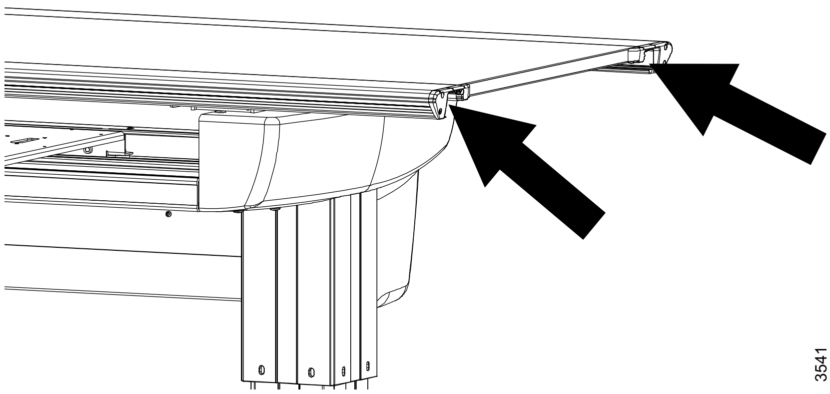


Fig. 6-11 Table top profiles

4. Clean the profiles for the image receptor tray and detector wagon wheels.

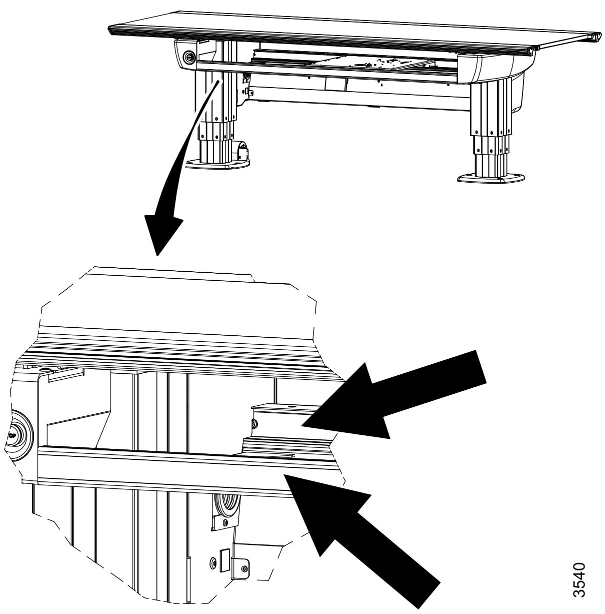


Fig. 6-12 Profiles for the image receptor tray

5. Check the cabling to the table top brakes.
   Remove the cover.
   Check the condition of the cables and the cable chain. Replace if necessary.

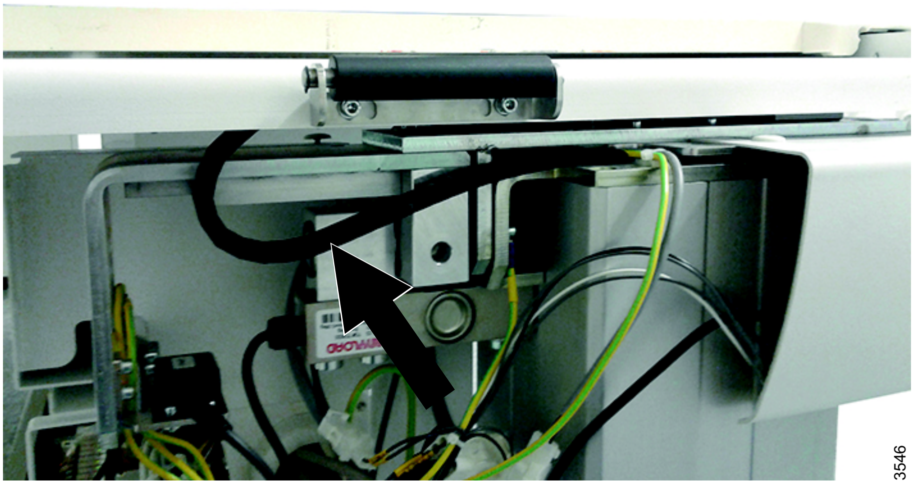


Fig. 6-13 Cabling to the table top brakes

6. Check the condition of the table top brake pads.
7. Check the X-Y function of the table top brakes.
   a Install the table top, see **4.11 Install Table Top, Page 261**.
   b Release the table top brakes and place a dynamometer against the table top and push slowly.
   The table top should run smoothly in X or Y direction, it must be possible to move the table top with a force under 30 N.
   c Lock the brakes and place a dynamometer against the table top and push slowly.
   No movement of the table top using a force under
   X-direction < 200 N
   Y-direction < 300 N
   Turn off the power to the system and the table top shall be locked.
   Adjust the brakes if necessary, see **6.6.1 Y-brakes, Adjustment, Page 300** and **6.6.2 X-Brakes, Adjustment, Page 302**.
8. Check the column segments on the table (full stroke).
   The column segments should run smoothly without noise.
   Lubricate the columns if necessary.
   Use grease Castrol Alpha SP 220.
9. Check the buttons on the foot control X/Y/Z.
   The buttons should not be damaged or get stuck when pressed.
10. Batteries in the wireless foot control (option).
   The batteries shall be changed at a minimum once a year, see **Table 6-1**.
   When changing the batteries, visually inspect the gasket for signs of degradation.
11. Check the table guard function (option).
   a Fix a dynamometer to the table top.
   b Lower the table.
   c The guard function should activate when the force exceeds 200 N +/-70 N.

6.6.1 Y-brakes, Adjustment

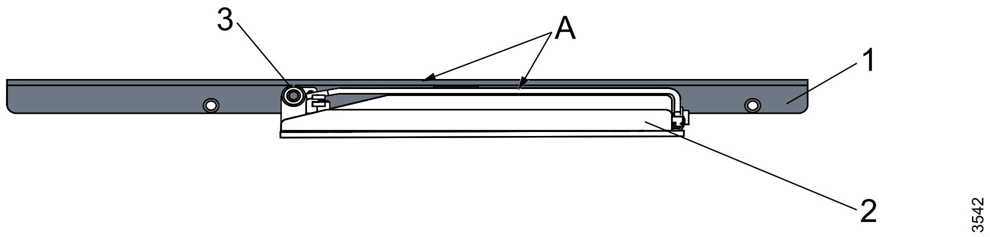


Fig. 6-14 Y-brakes, Adjustment

1. *Brake plate*
2. *Brake unit*
3. *Wheel*

1. Move the rail up and down.
   - The brake plate (1) should be aligned (A) with the brake unit (2).
   - The wheel must (3) be in contact with the brake plate (1).

   The spring underneath the brake unit lifts up the brake unit when the distance between the brake unit and the brake plate is correct. The small gap (approx. 1 mm) ensures that the brake works correctly.

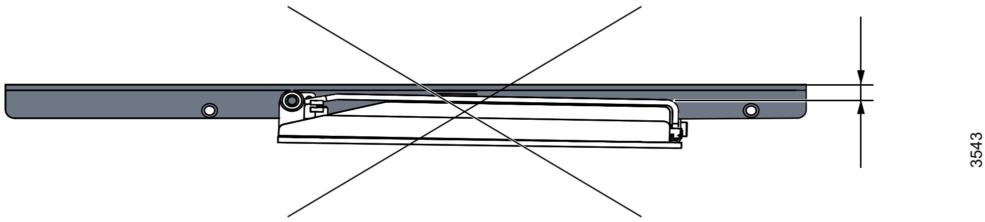


Fig. 6-15 Brake plate and brake unit not aligned

The brake force depends on the distance between the magnets and the brake bar.

6.6.1.1 Low Brake Force Or Brake Release Problems

Larger distance in the rear end than in the front end will reduce the braking force.

The distance between the brake unit and the brake plate is too large

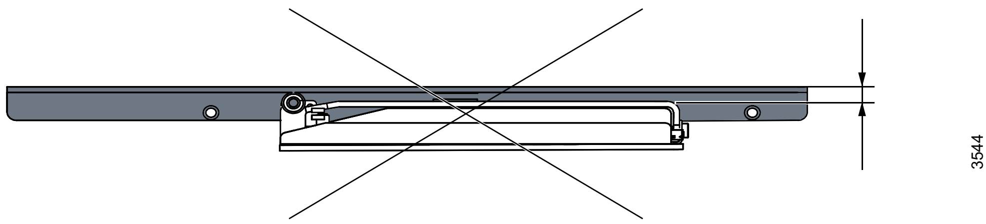


Fig. 6-16 Too large distance between brake unit and brake plate

If the brake unit does not releases correctly and get stuck, adjust the distance:

1. Align the brake unit and the brake plate when the magnets are active (i.e. the brake is released).
2. Make sure the gap is approx. 1 mm underneath the brake unit.

6.6.1.2 High Brake Force

A larger distance in the front end than in the rear end increases the braking force.

The distance between the brake unit and the brake plate is too small.

The table top tends to jam when the brake unit is released.

1. Align the brake unit and the brake plate when the magnets are active (i.e. the brake is released).
2. Make sure the gap is approx. 1 mm underneath the brake unit.

6.6.2 X-Brakes, Adjustment

The brake force depends on the distance between the magnets and the anchor in the brake unit..

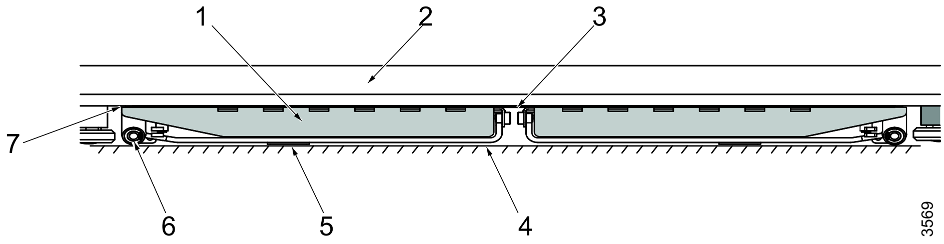


Fig. 6-17 X-Brakes, Adjustment

1. *Brake unit*
2. *Table top frame*
3. *Shim*
4. *Table top profile*
5. *Brake Lining*
6. *Wheel*
7. *Distance between brake unit and table top*

6.6.2.1 Low Brake Force Or Brake Release Problems

Larger distance in the rear end than in the front end will reduce the braking force.

The distance between the brake unit and the brake plate is too large

If the brake unit does not release correctly and get stuck:

1. Add another shim underneath the brake unit.
2. Make sure the gap is approximately 1 mm underneath the brake unit.

6.6.2.2 High Brake Force

Larger distance in the front end than in the rear end will increase the braking force.

The general distance between the brake unit and the brake plate is too small.

The table top tends to jam when the brake unit is released.

1. If the brake releases correctly, the distance between the brake unit and the table top profile is too small.

   Remove shim from underneath the brake unit to increase the distance.
2. If the brake does not release correctly the distance is too big

   Add shims to the brake.

6.7 Wallstand

1. Check the tightening of bolts fixing the wallstand to the floor.
   Tightening torque 15 Nm.
2. Check the Z-chain attachment.
   a Remove the front, back and top cover, see .
   b Check the chain locks **A** and **B**.
   c Check the circlips at the fastening of the axis **C**.

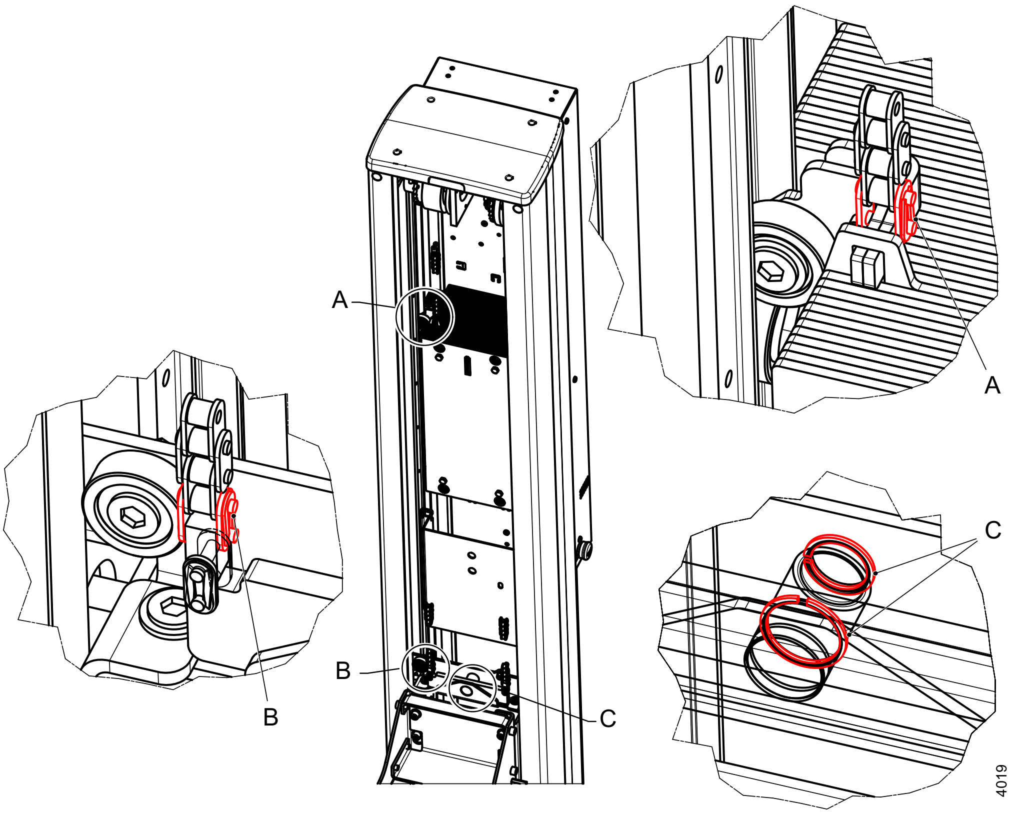


Fig. 6-18 Check the Z-chain attachment

3. Check the Z movement.
   The lift mechanism should be balanced and run smoothly without noise.
4. Check the Z-mechanical end stops.
   a Check the position and condition of the end stops.
   There are four end stops, two at the top and two at the bottom of the column.
5. Check the function of the Z-brake.
   a When in idle mode (Z-brake active), use a dynamometer to measure the force needed to move the detector wagon.
   No movement of the detector wagon using a force under 200 N .
   b The detector wagon should run smoothly when the brake is released.
6. Batteries in the wireless foot control (option).
   The batteries shall be changed at a minimum once a year, see **Table 6-1**.
   When changing the batteries, visually inspect the gasket for signs of degradation.
7. Check the buttons on the foot control Z.
   The buttons should not be damaged or get stuck when pressed.

6.7.1 Check Play In Tilting Joint

Check the play in the tilting joint every second year

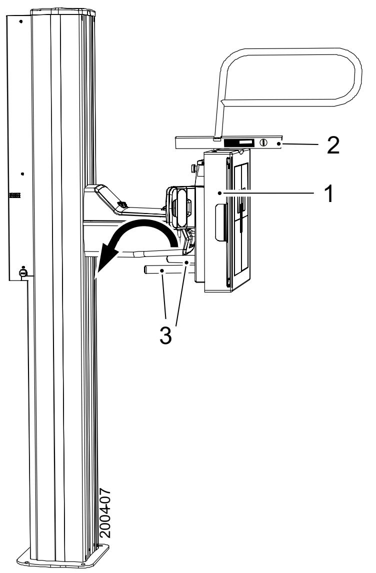


Fig. 6-19 Wallstand

1. Put the detector holder (**1**) on the wallstand in a vertical position as show in **Fig. 6-19**
2. Note the angle, using the display or with a digital spirit level (**2**).
3. Grasp and apply a light load to the patient hand grips (**3**) and lift/angle the detector holder counterclockwise in the direction of the arrow in **Fig. 6-19**.
4. Note the angle again.

   If the angle has changed more than 1.5° adjust according to **Adjust Tilting Joint**.

Adjust Tilting Joint

Fig. 6-20 Switch to manual mode

1. Demount the covers for the electrical panel on the back of the wallstand.
2. Switch the drive to gearbox to manual mode at the electrical panel. Disconnect the cable marked 3.1.J14.

Fig. 6-21 Remove upper housing

3. Tilt the detector holder to appr. -20° as shown in **Fig. 6-21**
4. Loosen the screws and remove the upper plastic housing (**4**).

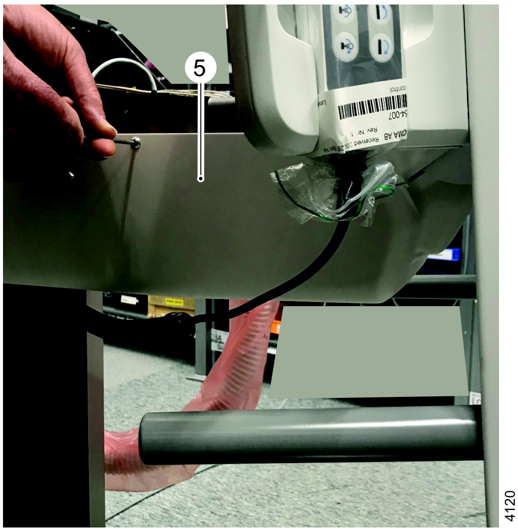


Fig. 6-22 Remove lower plastic housing

5. Tilt to +20°.
6. Loosen the screws and remove the lower plastic housing (**5**)

Fig. 6-23 Disconnect IR sensor

7. Disconnect the cable (**6**) to the IR sensor.
   The cable is marked 3.3.J01.

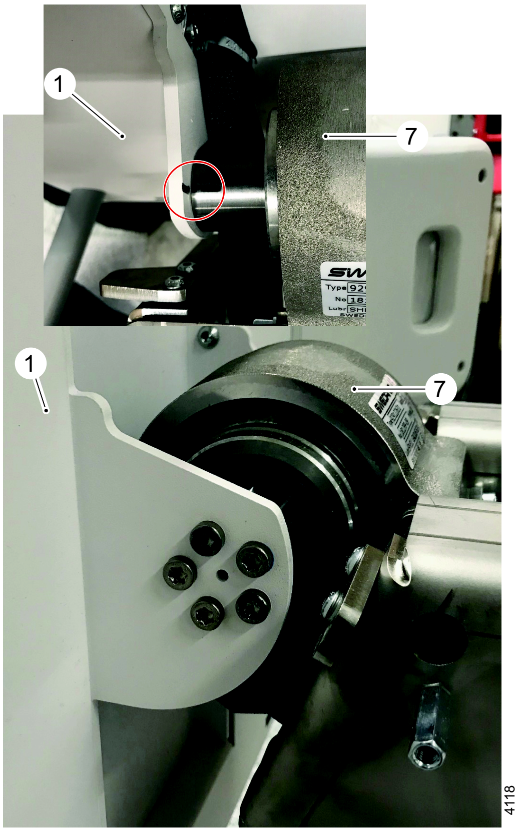


Fig. 6-24 Mark gear position

8. Mark the position of the gear (**7**) in relation to the detector holder (**1**).
9. Put the detector holder on a stable surface. The detector holder weighs appr. 30 kg.

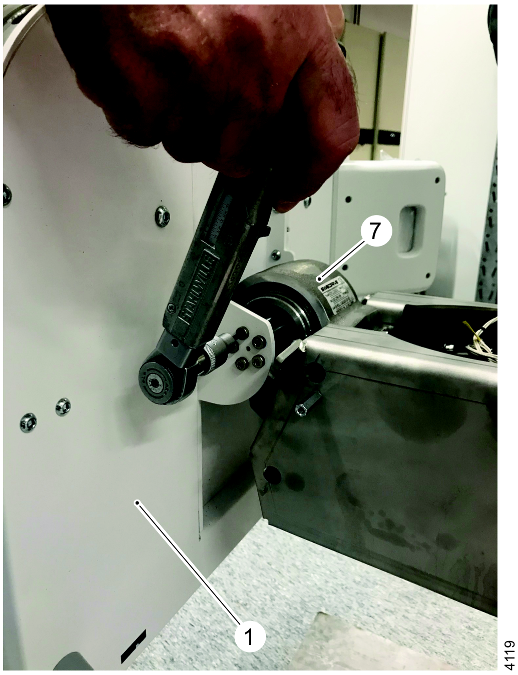


Fig. 6-25 Remove detector holder

10. Unscrew the ten M6 screws and remove the detector holder (**1**) from the gear (**7**).

    Run the gear manually 144°, which corresponds to two screw holes.

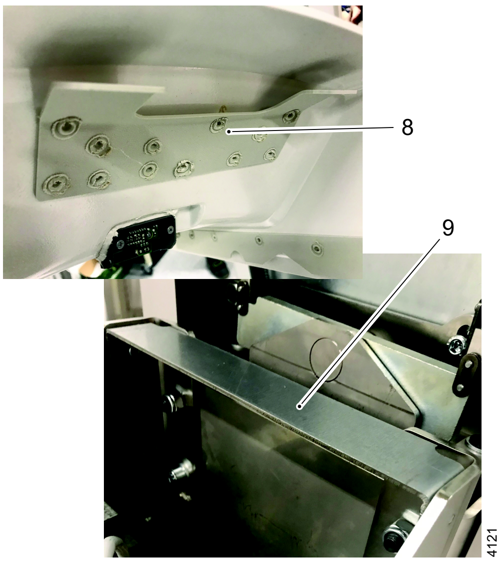


Fig. 6-26 Position plastic spring

11. Remount the detector holder and the housings in the reverse order.

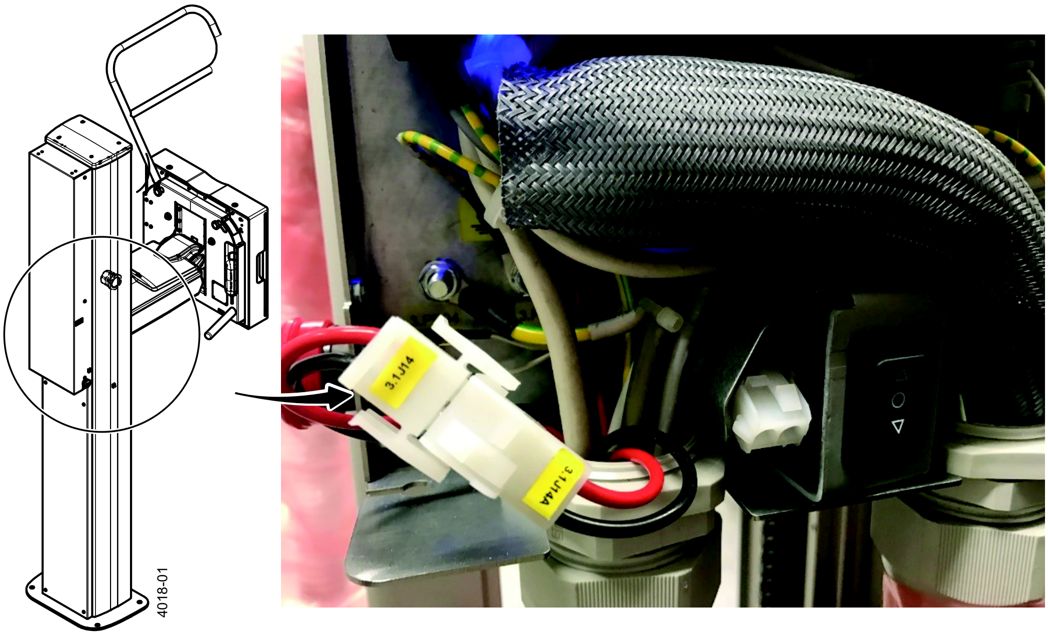
    Fasten the screws in step **10.** with torque 10 Nm.

    When remounting the upper housing, position the plastic spring (**8**) below the edge (**9**).

12. Note the angle of the detector holder using the display or a digital spirit level.
13. Grasp and apply a light load to the patient hand grips (**3**) to lift/angle the detector holder in the direction of the arrow in **Fig. 6-19**.
14. Check that the angle again. Repeat from 1 if the angle is greater than 1°.

6.7.2 Tiltable Wagon

1. Check the function of the detector tilt.



For service purposes, the WS detector tilt axis can be manually operated.

- Disconnect 3.1J14 from 3.1J14A and connect it to 3.1J14B.

  Switch 3.1SW01 can now be used to move the Tilt axis in positive and negative direction.

  Note!

  Be careful when moving the Tilt axis from 3.1SW01. Safety features are disabled.

  Note!

  Re-connect 3.1J14 to its original position after service intervention.

6.8 System

1. Measure the system protective earth.
   See **4.3 Measure Protective Earth, Page 163**.
2. Check the emergency stops.
   See **2.10 Emergency Stop, Page 22**.
3. Check the synchronization circuit.
   a Press the synchronization control (**1**) on the wallstand. The diode D17 (2) on 1.5SBB01 shall light up.
   The diode shall not light up when the synchronization control is deactivated.

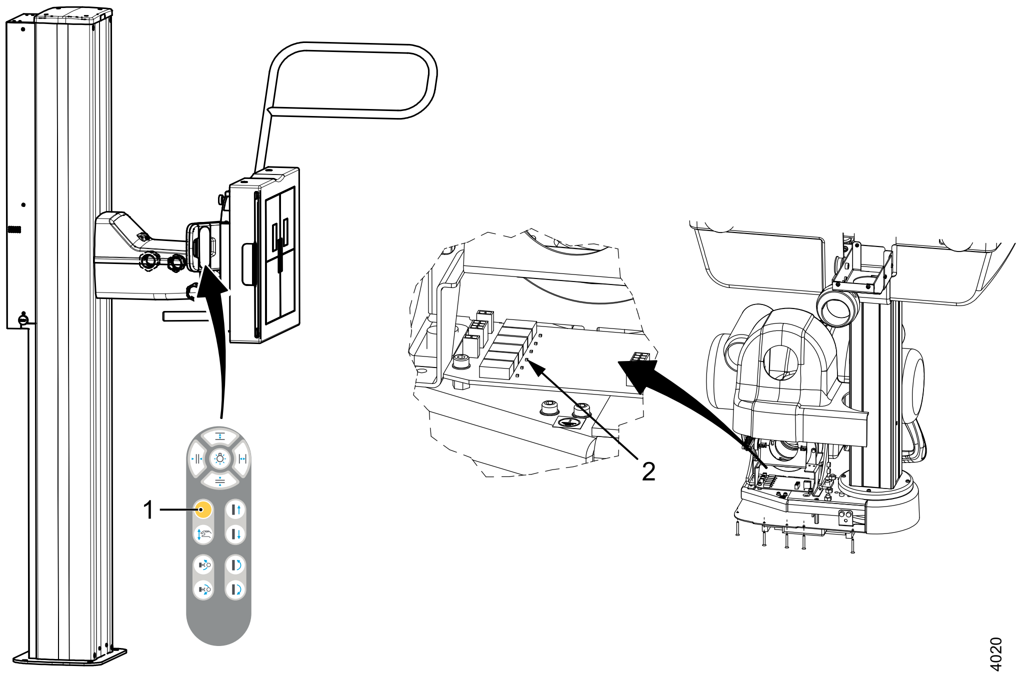


Fig. 6-27 Synchronization control and diode D17

   b Press the foot pedal (if present), the diode D17 (**2**) on 1.5SBB01 shall light up.
   The diode shall not light up when the foot pedal is deactivated.
4. Check the Z safety zone.
   Run the overhead tube crane and wallstand detector upward as high as possible.
   a Point the tube toward the detector at the wallstand.
   b Activate the wallstand tracking and sync the overhead tube crane with the wallstand detector (confirm that the servo light is permanent on).
   c Move the detector to the lowest position and the overhead tube crane shall follow the wallstand the whole stroke.
   Deactivate wallstand tracking and point the tube toward the floor.
   a Position the overhead tube crane over the table.
   b Position the table top 700 mm over the floor.
   c Activate the table tracking and sync the overhead tube crane with the table (confirm that the servo light is permanent on).
   d Drive the overhead tube crane to SID 100, servo light is flashing.
   e Drive the table downwards and the overhead tube crane shall follow the table and stop 1240 mm over the floor (the overhead tube crane Z safety height).

6.8.1 Check The Positioning Index Of Overhead Tube Crane

1. Check the positioning index of the overhead tube crane.
2. Check the table detector signals.
   Activate the table tracking.

- No detector present
  Remove the detector and slide in the detector holder tray.

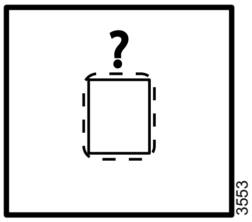


Fig. 6-28 No detector present

- Detector present
  Insert a detector and slide in the detector holder tray.

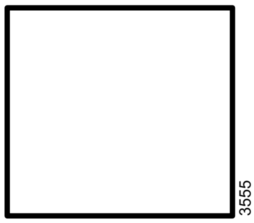


Fig. 6-29 Detector present

- Tray out of position (rotated)
  Push/rotate the detector out of position when it is in the detector holder.

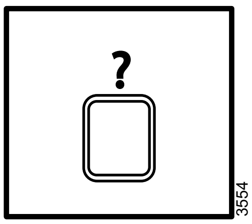


Fig. 6-30 Tray out of position

- Tray out of position
  Pull out the detector tray from the detector holder.

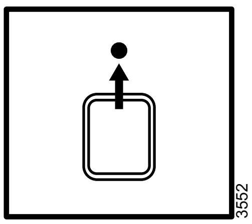


Fig. 6-31 Tray out of position

3. Check the wallstand detector signals.
   Activate the wallstand tracking.

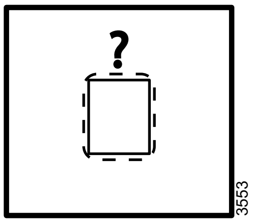


Fig. 6-32 No detector present

- No detector present
  Remove the detector and slide in the detector holder tray.

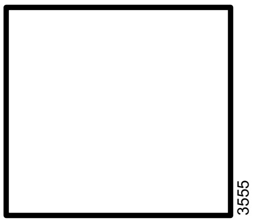


Fig. 6-33 Detector present

- Detector present
  Insert a detector and slide in the detector holder tray.

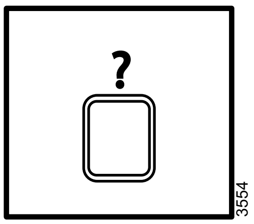


Fig. 6-34 Tray out of position

- Tray out of position (rotated)
  Push/rotate the detector out of position when it is in the detector holder.

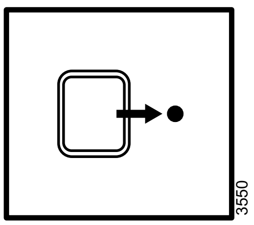


Fig. 6-35 Tray out of position

- Tray out of position
  Pull out the detector tray from the detector holder.

4. Check the table SID.
   a Activate the table tracking and sync the system (confirm that the servo light is on).
   b Measure between the X-ray tube focal spot and the active image receptor surface of the detector.
   c The measured SID shall correspond with the displayed SID.
   The SID must not differ more than ±1%.

5. Check the indication light and collimator light.

   Select table flexible mode on the image system:

   a Make sure the table indication light is lit or flashing and that the overhead tube crane display handle shows the corresponding mode.

   b Move the table top, the collimator lamp shall turn on.

   Select wallstand flexible mode on the image system:

   a Make sure the wallstand indication light is lit or flashing and that the overhead tube crane display handle shows the corresponding mode.

   b Move the wallstand Z up or down, the collimator lamp shall turn on.
6. Check the function of the AEC chamber.

   See **4.7.22 AEC Calibration, Page 252**.

   Calibrate if necessary.
7. Verify the measured DAP value (Area dose:dGycm2).

   a Measure the value with a dos meter.

   b Calculate the dap value.

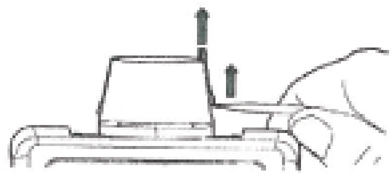
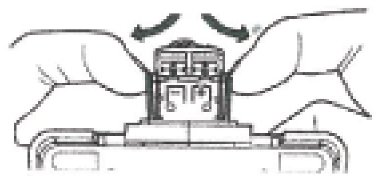
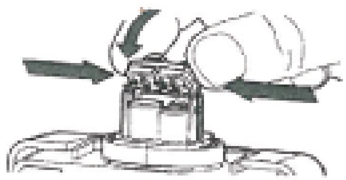
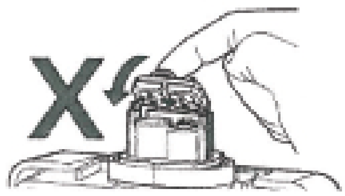
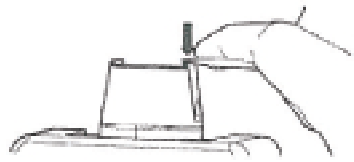
   c Compare the calculated value to the image system value.
8. Clean all outer surfaces.
9. Disconnect the power plug and wipe off dust and dirt with a dry cloth.
10. Check all outer cables for damage.
11. Make sure that the Operator’s Manual is present and up to date.

6.9 Battery Replacement

Batteries in wireless remote control and foot controls should be replaced annually.

6.9.1 Foot Control

Table 6-1 Battery Replacement

1. Remove the screw covers using a small flat bladed screwdriver or similar. Unscrew the lid.	
2. Release the battery clip hinge by firmly, but carefully, presing the clip posts outward.	
 	
3. Fit the batteries, taking care to observe the polarity as marked on the PCB. Push the clip back into place by holding the sides of the clip. Do **not** push on the antenna when clipping back into place.	
4. Screw the lid back into place. Press the screw covers back into place using the flat part of the flat-blade screwdriver or alternatively, loosely fit both covers. Press the whole assembly down onto a flat clean work surface.	

6.9.2 Remote Control

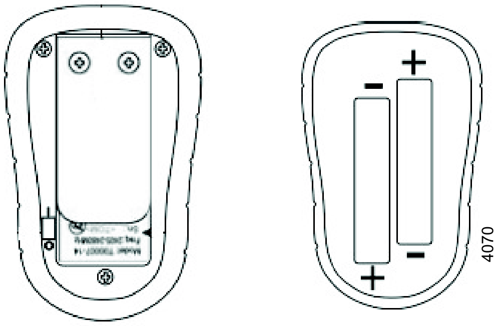


Fig. 6-36

Battery type 2 x 1,5V AAA / LR03

1. Turn OFF the transmitter.
2. Remove the belt clip (2 screws).
3. Remove the back cover (3 screws).
4. Replace 2 x 1.5V AAA batteries.
5. Remount back cover and belt clip.
6. Turn transmitter ON and confirm function.

6.9.3 Generator Control Board

Every five years:

- Replace the lithium battery on the generator control board. Refer to the generator manual for the battery replacement procedure. Battery type: Timekeeper SRAM

6.10 Software Version/Update

There are different software systems in the system.

1. Generator
2. Cabinet
3. Overhead tube support
4. Table
5. Wallstand

   The software can be updated as described in the upgrade instructions, attached to the update document.

6.10.1 Software And Its Update Location Point

The software is physically located according to the table below:

System software	Connection point for software upload*	Upgrade instructions (UDI)
1. Cabinet	See upgrade instruction.	See separate upgrade instruction for update of software.
2. Overhead tube support		
3. Table		
4. Wallstand		

7 Diagnostic

7.1 General

The overhead tube crane display will show error messages in case of fault.

7.1.1 Description

System messages are shown in the output view in the service software in the following format:

<Type><Node><Component><Reason><Extra>

Where:

- Type, defines the severity of the System message. This may be information, warning or error.
- Node, the node that sent the System message.
- Component, the component that caused the error.
- Reason, the cause of the message.
- Extra, four bytes of extra information. These bytes are always sent, even with messages that do not have any extra information.

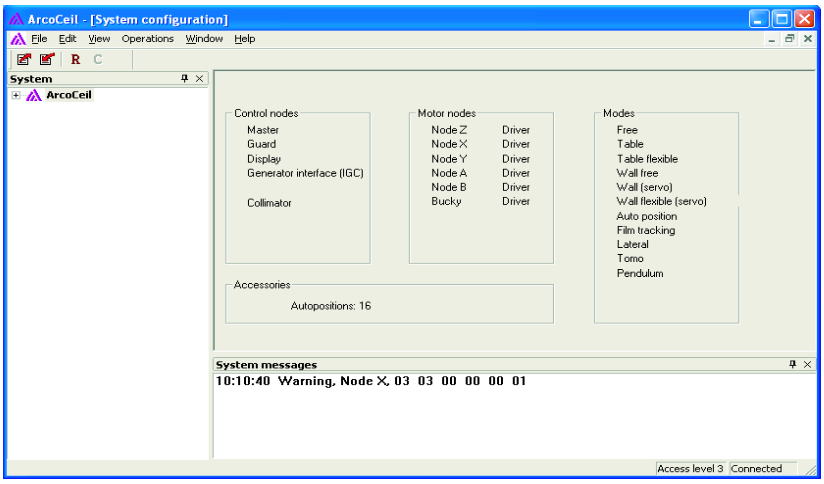


Fig. 7-1

7.1.2 Error Handling Two Column Table

A node is always in a specified state. When all nodes are working correctly and no errors have been detected the system, and the nodes, are in the ENABLE state. It is only possible to perform active commands in this state, if a node is in some other state is it only possible to request information from a node. As soon as a problem is detected the node changes its internal state. In the system two different error states are specified: one that it's possible to recover from (ERROR) and one that is not (UNRECOVERABLE ERROR). One special state is the DISABLE state that is used to force a node to not perform any active commands. It is possible to change to ENABLE state with just one command, for example in case of an emergency stop button pressed.

It is also possible to check state of the node via the LED-indication on the control board of the node. The CB-board have a number of diodes (LED) that are used as indication on different states and events in the system, following is a description on each diodes value.

Fig. 7-2 Placement of the diodes on the CB-board.

Table 7-1

Diode 1	Diode 2	Node State	Priority
Off	Off	Enable	4 = Low
Off	On	Disable	3
On	Off	Startup/Init	2
On	On	NonRecoverableEr-ror/Error	2 = High

- Diode 1 and 2 indicate the node state.
- Diode 3 shall toggle each time a message is received.
- Diode 4 indicates that logic power exists.

  The diode indication will always reflect the state priority for the physical node. A node that receives CAN messages for a number of nodes will indicate the state with the highest priority, for example if one logical node is in the enable state and the other is in the disable state shall the diodes show the disable state indication.

7.1.3 System Message Two Column Table

7.1.3.1 General

If the action says "Contact dealer" shall the entire error messages be noted and given to dealer.

That a valid System software release is used can be checked by the service software, the release should be shown in the lower right corner of the service software. It may also be checked by comparing the node and service software version shown in the service software with the versions stated in the RVL_0055S_SW document.

7.1.3.2 Description

A System message consists of the following parts, Type, Node, Component, Reason and Extra. Where:

- Type, defines the severity of the system message. This may be information, warning or error.
- Node, the node that sent the system message.
- Component, the component that caused the error.
- Reason, the cause of the message.
- Extra, four bytes of extra information. These bytes are always sent, even with messages that don't have any extra information. The extra information is shown as up to 4 parts, with the following format: <part number>:<description>< number of bytes used.>.

Definitions

The following ids are used to identify the node in a system message.

Table 7-2 IDs used To Identify the Different Nodes In a System Message

Node	ID
Master	1
Z1	2
Z2	3
Guard	4

7.1.3.3 All Nodes

Table 7-3 Component ID 01, Software Error

Reason	Description and status of System	Extra	Corrective action
01, Default error	Internal Software error.	N.a.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02, Error Value	Internal Software error.	N.a.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-4 Component ID 02, Base Node

Reason	Description and status of System	Extra	Corrective action
01, Watchdog timeout	The node has detected that a watchdog was not received in time.	1: Component. 1 byte. 2: Time-out time in ms. 2 bytes.	- Check that all nodes are functional. - Check tat the CAN bus cables are correctly connected.
02, Checksum error	The node has detected a checksum error in the parameter memory.	1: The calculated checksum. 1 byte. 2: Stored inverted checksum. 1 byte. 3: Stored checksum. 1 byte.	- Download the correct parameter file. - Change board.
03, Unknown command	The node has detected a CAN command that is not implemented in the node.	1: The unknown command. 1 byte. 2: Sender part of the CAN identifier. 2 bytes.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
04, Logic power low	The node has detected that the logic power is low.	Not used.	- Check the 24 V logic voltage, measure at the logic power connector to the board.

7.1.3.4 Motor Nodes

Definitions

The following collision types is defined.

Table 7-5 Description of the different collision types

Collision type	Description	Corrective action
1	Control error larger than specified by the "max position error" parameter.	- Remove any blocking obstacle. - Check the mechanics. - Check that the correct parameter file is used.
2	Time out, did not reach final position in time.	- Remove any blocking obstacle. - Check the mechanics. - Check that the correct parameter file is used.
3	No power, the power to the DC-board was switched off during a movement.	- Check the 36V power voltage (measure at the power connector to the DC-board). - Check the DC-board fuse.
4	Drive unit externally inhibited.	- Check that the voltage between J3:2-J3:6 and J3:3-J3:6 (on the DC-boards) are zero volts.
5	Position transducer has not moved, in spite that the output voltage has had an output voltage for a time. The voltage is specified in the "moved voltage" parameter and the time is specified in the "moved time" parameter.	- Remove any blocking obstacle. - Check the mechanics. - Check that the correct parameter file is used. - Check the potentiometer.

Table 7-6 Component ID 03, Motor Node

Reason	Description and status of System	Extra	Corrective action
01, Transducer diff error	A motor node equipped with two position transducers, whose positions differs more than specified.	Not used.	- Check that the correct parameter file is used. - Check the position transducers.
02, Transducer not present	The position transducer is not connected to the node.	Not used.	- Check that the correct parameter file is used. - Check the position transducer.
03, Collision	A collision has occurred.	1: Collision type. 1 byte.	- See **Table 7-5**
04, Encoder overflow	An encoder overflow has been detected.	Not used.	- Check that the correct parameter file is used. - Check the encoder. - Contact dealer.
05 Uncontrolled movement	An uncontrolled movement has been detected.	Not used.	- Check if it was an actual movement or just a false position reading that caused the uncontrolled movement. - Check the potentiometer.

Table 7-7 Component ID 04, Driver Error

Reason	Description and status of System	Extra	Corrective action
01, Servo on error	Failed to perform a servo on	Not used.	- Check the 36V power voltage. - Check the DC-board fuse. - Check that the voltage between J3:2-J3:6 and J3:3-J3:6 (on the DC-boards) are zero volts.
02, Temperature error	Temperature of the driver is too high.	Not used.	- Let the DC-board cool off.

Reason	Description and status of System	Extra	Corrective action
03, Shoot through error	Shoot through currents detected in the H-bridge of the driver.	Not used.	- Check for shortcuts in motor cabling and motor. Both between cables and toward chassis. - Change board.
04, Output current error	Error with the output current from the driver.	Not used.	- Check the 36V power voltage. - Check the DC-board fuse.
05, Output over voltage error	Error with the output voltage on the driver.	Not used.	- Check that the correct parameter file is used. - Contact dealer.
06, Driver watchdog error	A watchdog error from the driver was detected.	Not used.	- Check that the correct parameter file is used. - Contact dealer.
07, Communication error	Failed to communicate with the driver.	Not used.	- Check that the correct parameter file is used. - Contact dealer.
08, Motor error	Error with the motor detected.	Not used.	- Check that the correct parameter file is used. - Contact dealer.

Table 7-8 Component ID 3, CAN Driver Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-9 Component ID 4, Timer Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-10 Component ID 10, Communication Interface Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-11 Component ID 11, ACAN Component

Reason	Description and status of System	Extra	Corrective action
01 Message not decoded	Internal software error.		- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Add node reason	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
03 Bus off	CAN-bus error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged. - Change boards.
04 Bus off not present	A previously reported CAN error has now been cleared.	N.a	
05 Error warning	CAN-bus error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged. - Change boards.
06 Error warning not present	A previously reported CAN error has now been cleared.	N.a	
07 RX buffer overflow	Internal software error.	N.a	- Contact dealer.
08 SJA1000 data overrun	Internal software error.	N.a	- Contact dealer.

09 Transmit error	CAN-bus error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged.
10 TX buffer overflow	Internal software error.	N.a	- Check that the CAN bus cables are correctly connected. - Check that the CAN bus cables aren't damaged. - Contact dealer.

Table 7-12 Component ID 12, ASAP Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-13 Component ID 13, Data Reader Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-14 Component ID 20, JMATH Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-15 Component ID 21, Linked List Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-16 Component ID 30, Event Server Component

Reason	Description and status of System	Extra	Corrective action
01 Add event reason	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-17 Component ID 31, Event Source Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-18 Component ID 32, Client Manager Component

Reason	Description and status of System	Extra	Corrective action
01 Client id invalid	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Add client reason	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-19 Component ID 33, Call Back Receiver Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-20 Component ID 34, System Message Manager

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-21 Component ID 35, Time Out Server Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-22 Component ID 36, Memory Manager Component

Reason	Description and status of System	Extra	Corrective action
01 Memory exhausted	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-23 Component ID 40, System Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-24 Component ID 41, Master Component

Reason	Description and status of System	Extra	Corrective action
01 Enable nodes timeout	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Enable managers timeout	Internal software error.	1: Line number in the code. 4 bytes.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
03 Unexpected disable node	Internal software error.	1: Line number in the code. 4 bytes.	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
04 Emergency stop	An emergency stop button was activated.	Not used.	- Release emergency button.

Reason	Description and status of System	Extra	Corrective action
06 Event queue overflow	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
08 Unknown node	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-25 Component ID 42, Configuration Component

Reason	Description and status of System	Extra	Corrective action
01 Parameter checksum	An checksum error has been detected.	1: The calculated checksum. 1 byte. 2: Stored inverted checksum. 1 byte. 3: Stored checksum. 1 byte.	- Download the correct parameter file. - Change board.

Table 7-26 Component ID 50, Movement Manager Component

Reason	Description and status of System	Extra	Corrective action
01 Add movement	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Unknown movement	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-27 Component ID 51, Movement Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-28 Component ID 54, Single Movement Component

Reason	Description and status of System	Extra	Corrective action
01 Start not allowed	A start of a movement was denied.	1: Start allowed result. 1 byte. 2: Movement direction. 1 byte. 3: Source id. 2 bytes, see tables at page 8-18.	- Check that the table top is levelled, this is checked by: Difference between Z1 and Z2 height (read in service software) should be less than 4 mm. - Use the service software to check the angle given from the tilt sensor. If appropriate calibrate the tilt sensor.

Table 7-29 Component ID 55, Auto-position Component

Reason	Description and status of System	Extra	Corrective action
01 Movement fail	A start of an auto position movement failed	1: Start allowed result. 1 byte. 2: Line number in the code. 3 bytes.	- Check that the table top is levelled, this is checked by: Difference between Z1 and Z2 height (read in service software) should be less than 4 mm. - Use the service software to check the angle given from the tilt sensor. If appropriate calibrate the tilt sensor.
02 All paused	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-30 Component ID 56, Brake Movement Component

Reason	Description and status of System	Extra	Corrective action
01 Incorrect configuration	The brake movement was told to start a directional movement.	1: source id.4 byte.	- Check that a valid System software release is used. - Check the configuration.
02 Unlock brakes not allowed	It was not possible to unlock the brakes.	1: Start allowed result. 1 byte. 2: source id.3 bytes, see tables.	- Check that the table top is levelled. - Check the angle given from the tilt sensor.

Table 7-31 Component ID 57, Double Movement Component

Reason	Description and status of System	Extra	Corrective action
01 Start not allowed	A start of a movement was denied.	1: Start allowed result. 1 byte. 2: Movement direction. 1 byte. 3: Source id. 2 bytes (see tables).	- Check that the table top is levelled, this is checked by: Difference between Z1 and Z2 height (read in service software) should be less than 4 mm. - Use the service software to check the angle given from the tilt sensor. If appropriate calibrate the tilt sensor.
02 End set point timeout	Internal software error.	Not used.	- Contact dealer.

Table 7-32 Component ID70, Supervisor Component

Reason	Description and status of System	Extra	Corrective action
01 Table top alignment error	The table top is not level.	1: Height difference between Z1 and Z2, in 0.1 mm. 4 bytes	- Press foot pedal until table top is levelled, this may require that the pedal is pressed more than once.
02 Tilt sensor full movement	The tilt sensor does not prevent any movement.	1: Table top angle (0.01°), given from the tilt sensor. 4 bytes.	

Reason	Description and status of System	Extra	Corrective action
03 Tilt sensor restricted angle	The tilt sensor does prevent movement.	1: Table top angle (0.01°), given from the tilt sensor. 4 bytes.	- Press foot pedal until table top is levelled, this may require that the pedal is pressed more than once. - If table top is levelled (measure with water level) calibrate the tilt sensor.
04 Guard crash detected	The guard board has detected a crash.	1: Crash direction, 1 for a positive crash and 2 for a negative crash. 1 byte.	- Remove obstacle.

Table 7-33 Component ID 80, Node Component

Reason	Description and status of System	Extra	Corrective action
01 Message decode	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
02 Communication not established	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-34 Component ID 81, Slave Node Component

Reason	**Description and status of System**	**Extra**	**Corrective action**
01 watchdog timeout	A watchdog timeout occurred.	1: Source id. 1 byte. 2: Line number in the code. 2 bytes.	- Check the state of the node (shown I service software). - Check the LED's on the board (for error indication).
02 Unexpected node state	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
03 Set state failed	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
04 Acknowledge status	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
05 Init timeout	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.
06 Node ready	Internal software error.	N.a	- Check that the correct parameter file is used. - Check that a valid System software release is used. - Contact dealer.

Table 7-35 Component ID 82, Motor Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-36 Component ID 83, Guard Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-37 Component ID 90, Foot Pedal Component

Reason	Description and status of System	Extra	Corrective action
01 Switch active at start up	A pedal was active at start up.	1: Current foot pedal input status. 4 bytes. The following masks are used: Z up 0x0000 0001 Z down 0x0000 0002 X brake 0x0000 0004 Y brake 0x0000 0008 XY brake 0x0000 0200 DMG 0x0000 0100	- Check foot pedal.
01 Switch active at start up	The time between activation/ deactivation of the Z up/down and the dmg switch was too large.	Not used.	- Check foot pedal.
03 Switch function deactivated	The activated switch functionality was deactivated.	Not used.	- Some earlier error caused that this function has been deactivated.

Table 7-38 Component ID 91, Tilt Sensor Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

Table 7-39 Component ID 93, Emergency Switch Component

Reason	Description and status of System	Extra	Corrective action
01 Switch active at start up	An emergency switch was active at start up.	1: Current emergency switch input status. 4 bytes. The following masks are used: Internal 0x00000400 External 0x00000800	- Check the emergency switches.
02 Internal emergency switch is activated	The internal emergency switch was activated.	Not used.	
03 External emergency switch is activated	The external emergency switch was activated.	Not used.	
04 Emergency switch released	The last emergency switch was deactivated.	Not used.	

Table 7-40 Component ID 94, ASAP Client Component

Reason	Description and status of System	Extra	Corrective action
N.a.			

7.1.3.5 Master Node

Definitions

The information in the tables below refer to the notes in the column “Extra” in the tables above.

Table 7-41 IDs used to identify the movements.

Movement ID	Number	Description
Z1 movement	0	Z1 column
Z2 movement	1	Z2 column
Table top x movement	2	Table top X-direction
Table top x movement	3	Table top Y-direction
Table top movement	16	Table top Z-direction
Auto-position movement	32	Auto-positioning table top Z-direction

Table 7-42 IDs used to identify the different parts within the master.

Source ID	ID
None	0
Internal	1
Supervisor	2
System	3
Master	4
Movement manager	10
Movement Z1	11
Movement Z2	12
Movement table top X	13
Movement table top Y	14
Movement table top	15
Movement auto-position	16
System message manager	30
Motor Z1	40
Motor Z2	41
Guard	42
Foot pedal	50
Emergency switch	51

Tilt sensor	52
CLI handler	60
ACAN client	61

Table 7-43 IDs used to identify the different start allowed results.

Movement	Number	Description
OK	0	Ok to start.
Supervisor not enabled	1	
Auto-position already started	2	
Tilted	3	Table top not level.
Crash	4	Guard crash active.
Error	5	An error has occurred.

Table 7-44 IDs used to identify the different movement directions.

Movement	Number	Description
No direction	0	Ok to start.
Positive direction	1	
Negative direction	2	
Unknown direction	3	Table top not level.

7.1.4 CB800-board

7.1.4.1 Fault Handling

There are three types of NOTIFICATIONS - Shows the present occurrence. For example; collision. They are listed below in ranking order.

1. ERROR

   Information on the overhead tube crane display (red). Sound: two beeps.
2. WARNING

   Information on the overhead tube crane display (grey). Sound: one beep.
3. INFO - Not shown to the user. Only registered in the setting menu.

Notifications

Error

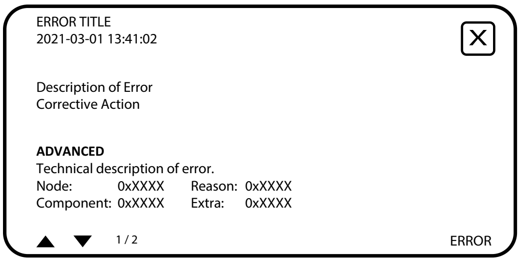


Fig. 7-3 Error pop-up window

When an error occurs, an Error pop-up window appears on the OTC display.

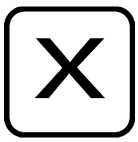


Fig. 7-4 Close button

The Error pop-up window disappears when the user pushes the close button.

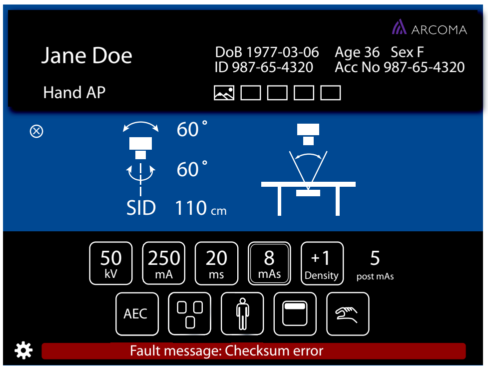


Fig. 7-5 Error information bar, table

When closing the Error pop-up window, shown in **Fig. 7-3**, an information bar appears, see **Fig. 7-5**.

When the user pushes the information bar, the Error pop-up window appears again.

The Error information bar (lower part of the window) is present until the error is fixed or the System is restarted.

Warning and Information

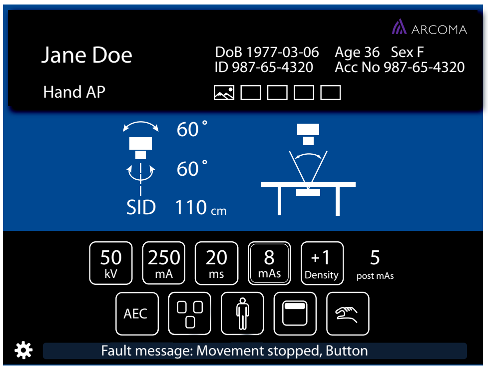


Fig. 7-6 Warning information bar

A warning message appears in an information bar (lower part of the display), when the handling of the System justifies that.

The information bar is cleared if/when a new message is displayed, or after time.

The latest sent message is shown.

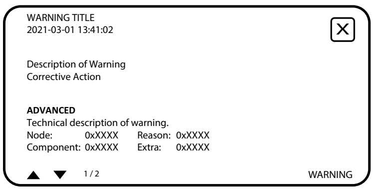


Fig. 7-7 Pop-up window — Warning information bar

When pushing the information bar, shown in **Fig. 7-6**), a pop-up window appears see **Fig. 7-7**.

Fig. 7-8 Close button

The *Warning pop-up window* disappears when the user pushes the close button.

Log

The *Log file* is part of the *Setting menu* and reached by pressing the gear or the *Error/ Warning messenger* bars.

CB800-board

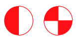
General Description

The symbols in the table below are throughout this document used to show the different LED states.

LED symbol		**Description**
Slow (1Hz)	Fast (5Hz)	
		Off
		Constant green
		Constant red
		Blinking green
		Blinking red
		Alternating green/red

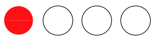
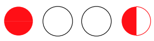
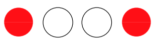
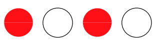
The top (first) LED is used to show the overall status of the board, the usage of the other three depends on the first.

Top LED	**Description**	**Limitations**
	Everything is OK, both software and hardware, the application is running. The usage of the other LEDs may be different for every board in the system. The System Manual shall for every board describe the usage of these LEDs.	None of the other LEDs may show constant or blinking red.
	Reserved for Boot applications.	None of the other LEDs may show constant or blinking red.
	The application (or bootloader) has encountered an error. The reason may be a hardware error but the error cause cannot be exactly pinpointed as a hardware error. The usage of the other LEDs may be different for every board in the System. The System Manual shall for every board describe the usage of these LEDs.	None

Top LED	Description	Limitations
	A hardware error has been detected. The usage of the other LEDs shall be identical for all boards in all Systems.	None
	May be used to show that the application (or bootloader) has encountered an error. Constant red or alternating green/ red should be used instead.	

Hardware Error

The table below shows the LED indications for various hardware errors.

LED	Description	Limitations
	No bootloader image found.	This is shown by the bootstrap application.
	RAM error. The memory test found an error in the SDRAM.	
	NAND-flash error. A boot application image was found, but the image had a CRC error. This may also be an undetected SDRAM error.	
	Processor internal error.	

Second LED

State	Description
Off	No connection with generator.
Solid green	Communication with generator established.

Third LED

State	Description
Off	No connection with ceiling system.
Flashing green	Communication with ceiling system established, ceiling system is not in *“Enable”* state.
Solid green	Communication with ceiling system established, ceiling system is in *“Enable”* state.

Bottom LED

State	Description
Off	No connection with IS.
Flashing green	Connected to IS but *“StartCommunication”* not yet received.
Solid green	Communicating with IS.

8 Function And Safety Checks

8.1 Monthly Checks

8.1.1 General

If any malfunction is detected, the entire equipment must be taken out of use until the problem is eliminated by a service technician from the supplier or by the local technical staff trained by the supplier.

Note!

Before performing any maintenance please read the Safety chapter.

Daily and monthly checks are normally performed by the user/operator.

Annual checks shall be performed either by local technical staff trained by the supplier or authorized service representatives.

Use the safety checklist to verify the check.

Checks for all units.

overhead tube crane, table and wallstand:

- [ ] 1. Check the cable hose for damage.
- [ ] 2. Check all outer cabling for damage.
- [ ] 3. Clean all outer surfaces, except for the lubricated column segments.
- [ ] 4. Make sure that the Instruction for use is available and up to date.
- [ ] 5. Check the emergency stop. By activating the emergency stop all motorized movements are inhibited. See *Safety Chapter* for information on how the Emergency stop should react on command.

8.1.2 Overhead Tube Crane

- [ ] 6. Power up the overhead tube crane and check all functions.
- [ ] 7. Move the overhead tube crane around and observe any irregularities.

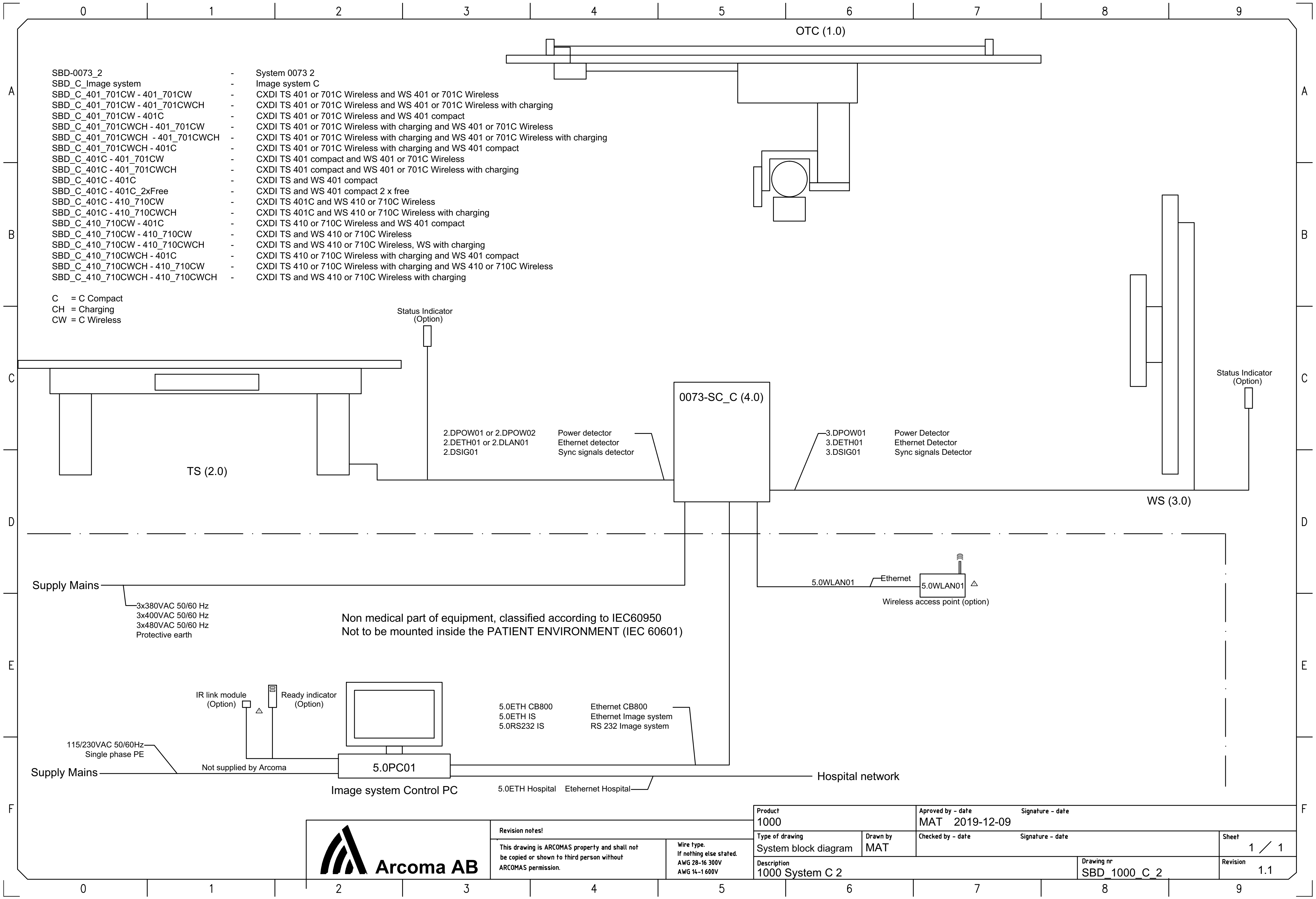
8.1.3 Table

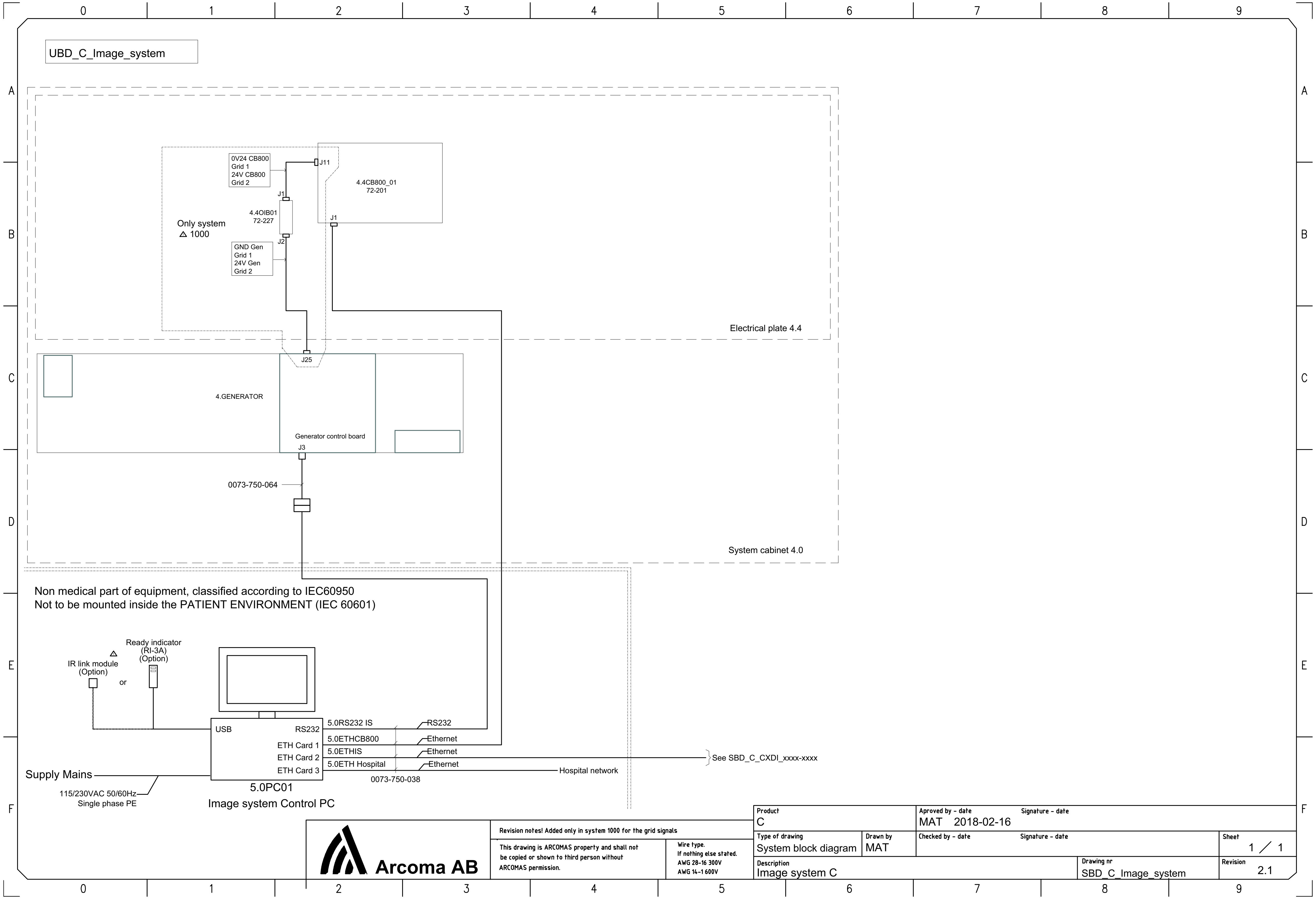
- [ ] 8. Move the Table in X, Y and Z direction to make sure it runs smoothly and sounds OK.
- [ ] 9. Move the table top longitudinal and check that the mechanical end stops are not loose.

8.1.4 Wallstand

- [ ] 10. Move the wallstand up and down in Z direction and make sure it runs smoothly and sounds OK.

9 Electrical Drawings


OTC (1.0)
SBD-0073_2 - System 0073 2
SBD_C_Image system - Image system C
SBD_C_401_701CW - 401_701CW - CXDI TS 401 or 701C Wireless and WS 401 or 701C Wireless
SBD_C_401_701CW - 401_701CWCH - CXDI TS 401 or 701C Wireless and WS 401 or 701C Wireless with charging
SBD_C_401_701CW - 401C - CXDI TS 401 or 701C Wireless and WS 401 compact
SBD_C_401_701CWCH - 401_701CW - CXDI TS 401 or 701C Wireless with charging and WS 401 or 701C Wireless
SBD_C_401_701CWCH - 401_701CWCH - CXDI TS 401 or 701C Wireless with charging and WS 401 or 701C Wireless with charging
SBD_C_401_701CWCH - 401C - CXDI TS 401 or 701C Wireless with charging and WS 401 compact
SBD_C_401C - 401_701CW - CXDI TS 401 compact and WS 401 or 701C Wireless
SBD_C_401C - 401_701CWCH - CXDI TS 401 compact and WS 401 or 701C Wireless with charging
SBD_C_401C - 401C - CXDI TS and WS 401 compact
SBD_C_401C - 401C_2xFree - CXDI TS and WS 401 compact 2 x free
SBD_C_401C - 410_710CW - CXDI TS 401C and WS 410 or 710C Wireless
SBD_C_401C - 410_710CWCH - CXDI TS 401C and WS 410 or 710C Wireless with charging
SBD_C_410_710CW - 401C - CXDI TS 410 or 710C Wireless and WS 401 compact
SBD_C_410_710CW - 410_710CW - CXDI TS and WS 410 or 710C Wireless
SBD_C_410_710CW - 410_710CWCH - CXDI TS and WS 410 or 710C Wireless, WS with charging
SBD_C_410_710CWCH - 401C - CXDI TS 410 or 710C Wireless with charging and WS 401 compact
SBD_C_410_710CWCH - 410_710CW - CXDI TS 410 or 710C Wireless with charging and WS 410 or 710C Wireless
SBD_C_410_710CWCH - 410_710CWCH - CXDI TS and WS 410 or 710C Wireless with charging
C = C Compact
CH = Charging
CW = C Wireless
Status Indicator (Option)
TS (2.0)
2.DPOW01 or 2.DPOW02 Power detector
2.DETH01 or 2.DLAN01 Ethernet detector
2.DSIG01 Sync signals detector
0073-SC_C (4.0)
3.DPOW01 Power Detector
3.DETH01 Ethernet Detector
3.DSIG01 Sync signals Detector
Status Indicator (Option)
WS (3.0)
Supply Mains
3x380VAC 50/60 Hz
3x400VAC 50/60 Hz
3x480VAC 50/60 Hz
Protective earth
5.0WLAN01
Ethernet
5.0WLAN01
Wireless access point (option)
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
IR link module (Option)
Ready indicator (Option)
5.0ETH CB800 Ethernet CB800
5.0ETH IS Ethernet Image system
5.0RS232 IS RS 232 Image system
115/230VAC 50/60Hz
Single phase PE
Supply Mains
Not supplied by Arcoma
5.0PC01
Image system Control PC
Hospital network
5.0ETH Hospital Etehernet Hospital
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
1000
Aproved by - date
MAT 2019-12-09
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
1000 System C 2
Drawing nr
SBD_1000_C_2
Revision
1.1



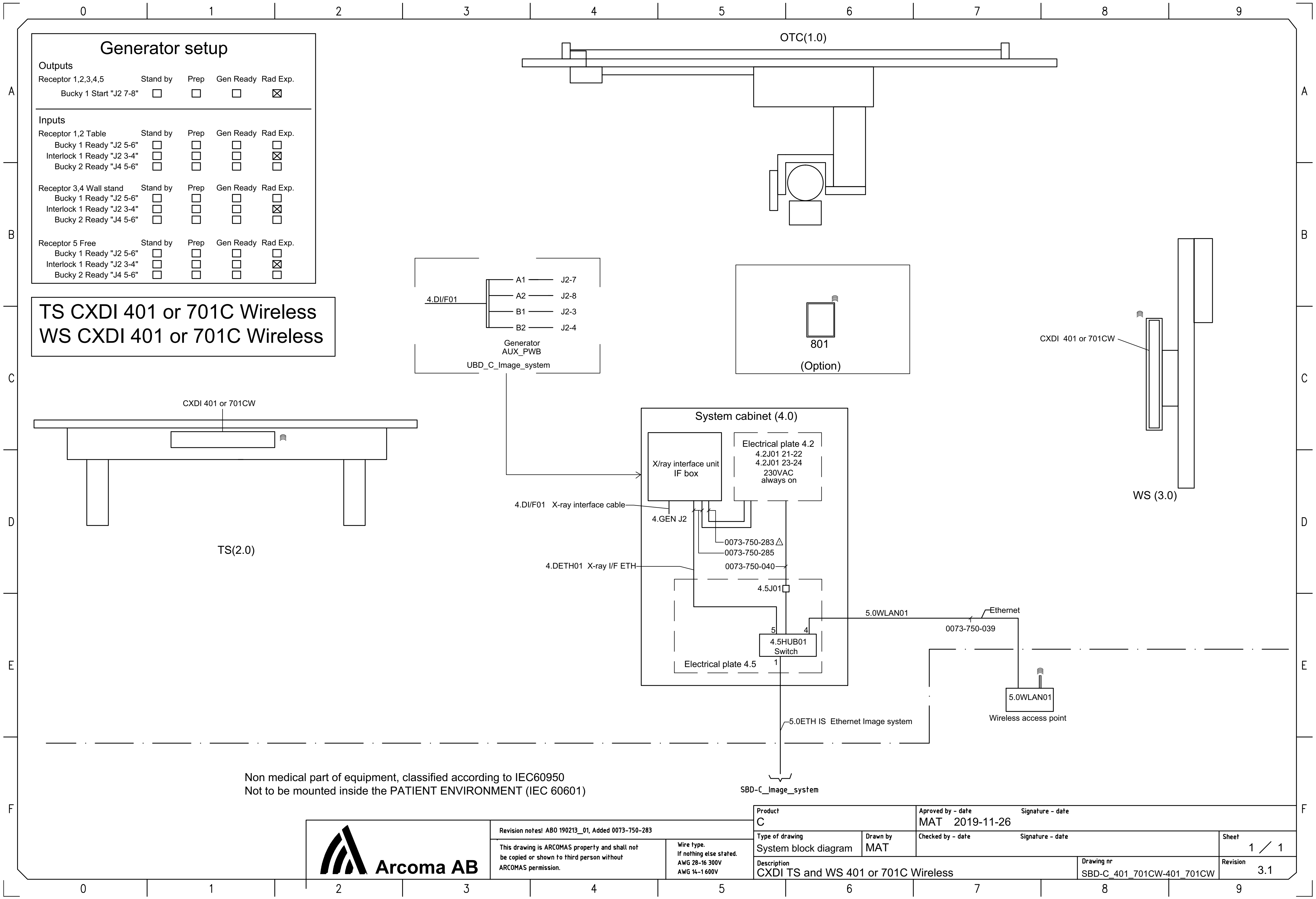
Product: C	Aproved by - date: MAT 2018-02-16	Signature - date	
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Sheet: 1 / 1
Description: Image system C		Drawing nr: SBD_C_Image_system	Revision: 2.1

Arcoma AB

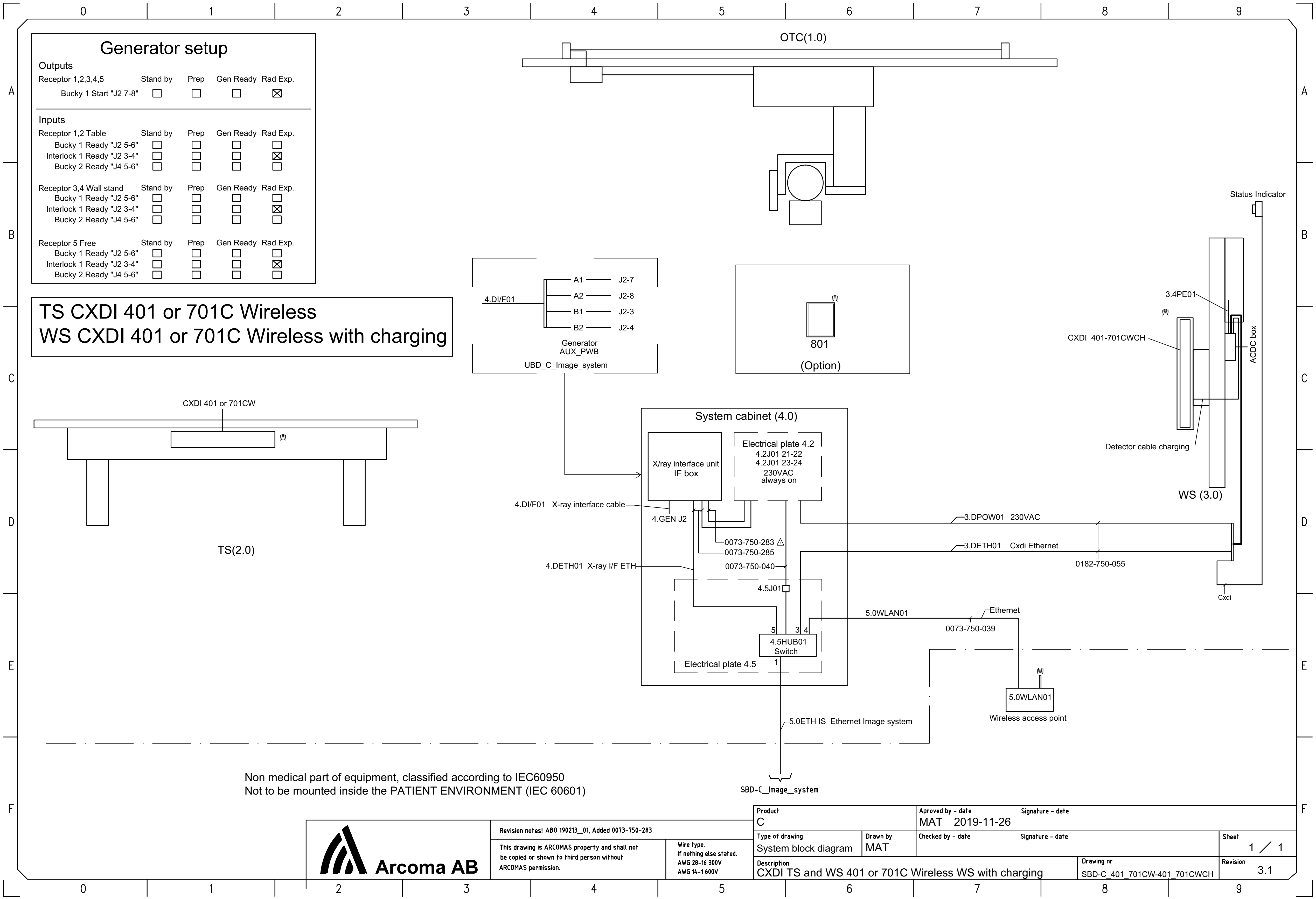
Revision notes! Added only in system 1000 for the grid signals

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

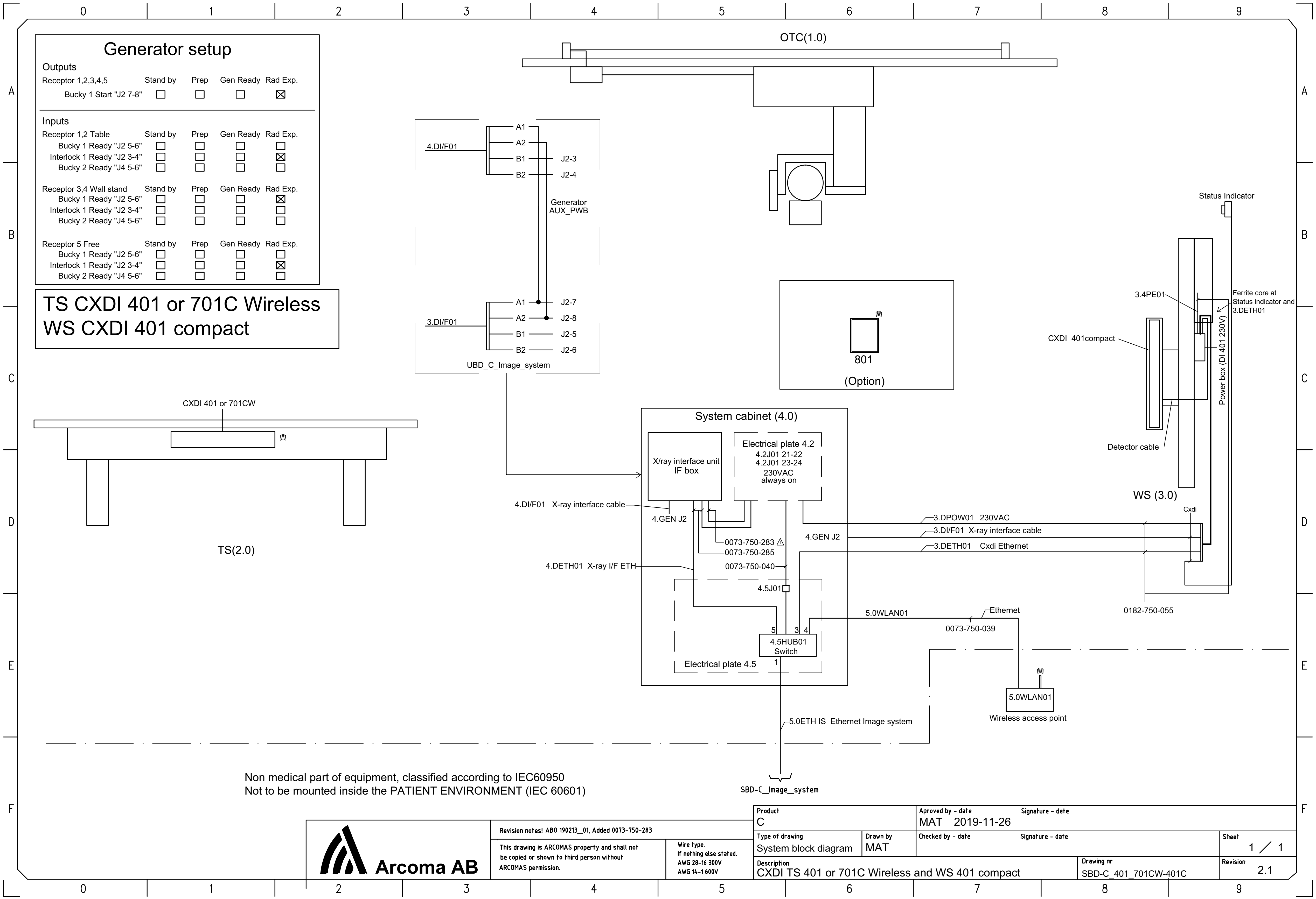
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

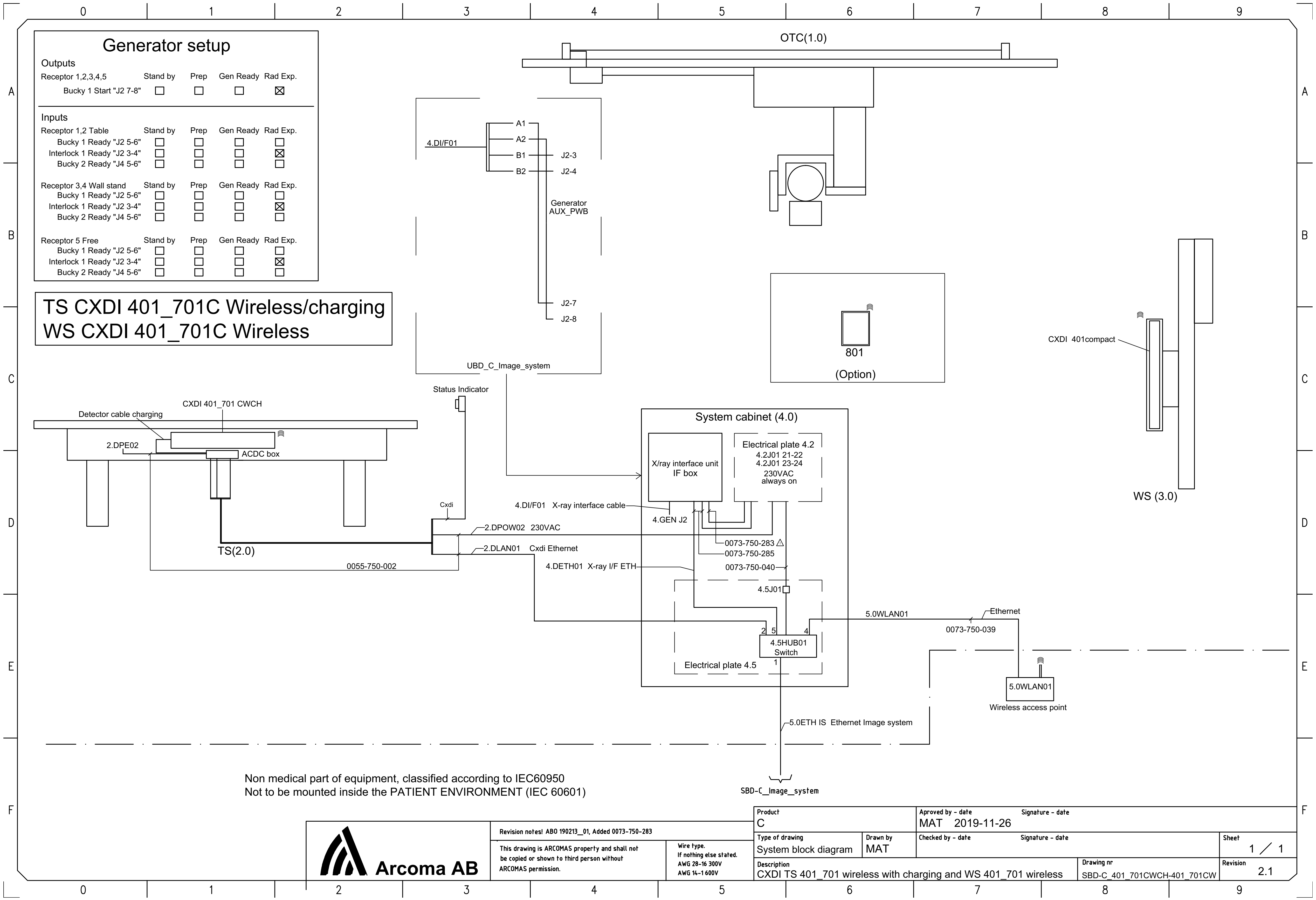


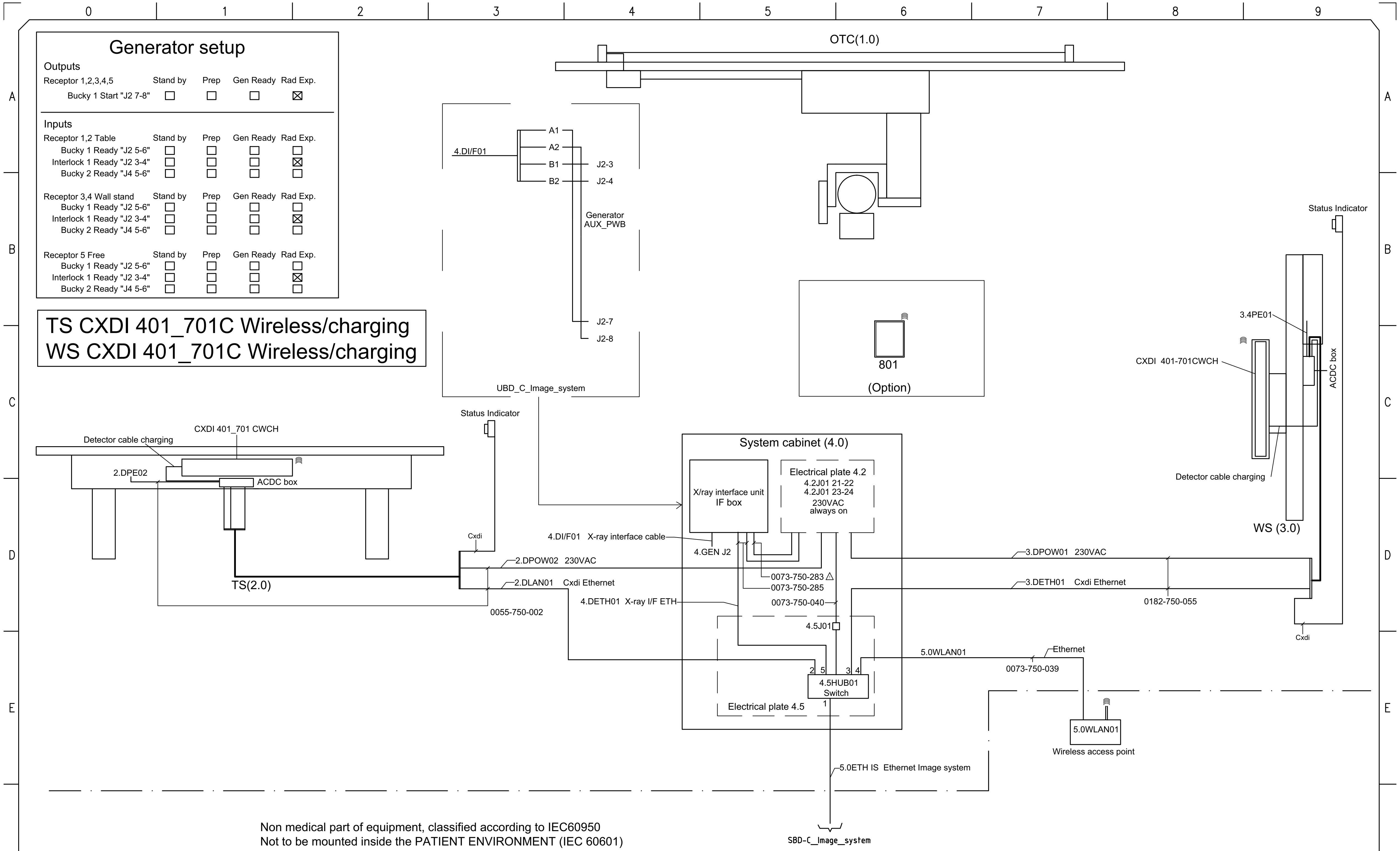
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 or 701C Wireless
WS CXDI 401 or 701C Wireless
OTC(1.0)
4.DI/F01
A1 J2-7
A2 J2-8
B1 J2-3
B2 J2-4
Generator
AUX_PWB
UBD_C_Image_system
801
(Option)
CXDI 401 or 701CW
CXDI 401 or 701CW
WS (3.0)
TS(2.0)
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-283
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01
Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS and WS 401 or 701C Wireless
Drawing nr SBD-C_401_701CW-401_701CW
Revision 3.1



Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 or 701C Wireless
WS CXDI 401 or 701C Wireless with charging
OTC(1.0)
4.DI/F01
A1 J2-7
A2 J2-8
B1 J2-3
B2 J2-4
Generator
AUX_PWB
UBD_C_Image_system
801
(Option)
Status Indicator
3.4PE01
CXDI 401-701CWCH
ACDC box
Detector cable charging
WS (3.0)
CXDI 401 or 701CW
TS(2.0)
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-283
0073-750-285
4.DETH01 X-ray I/F ETH
0073-750-040
4.5J01
5 3 4
4.5HUB01
Switch
1
Electrical plate 4.5
3.DPOW01 230VAC
3.DETH01 Cxdi Ethernet
0182-750-055
Cxdi
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
C
Aproved by - date
MAT 2019-11-26
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CXDI TS and WS 401 or 701C Wireless WS with charging
Drawing nr
SBD-C_401_701CW-401_701CWCH
Revision
3.1

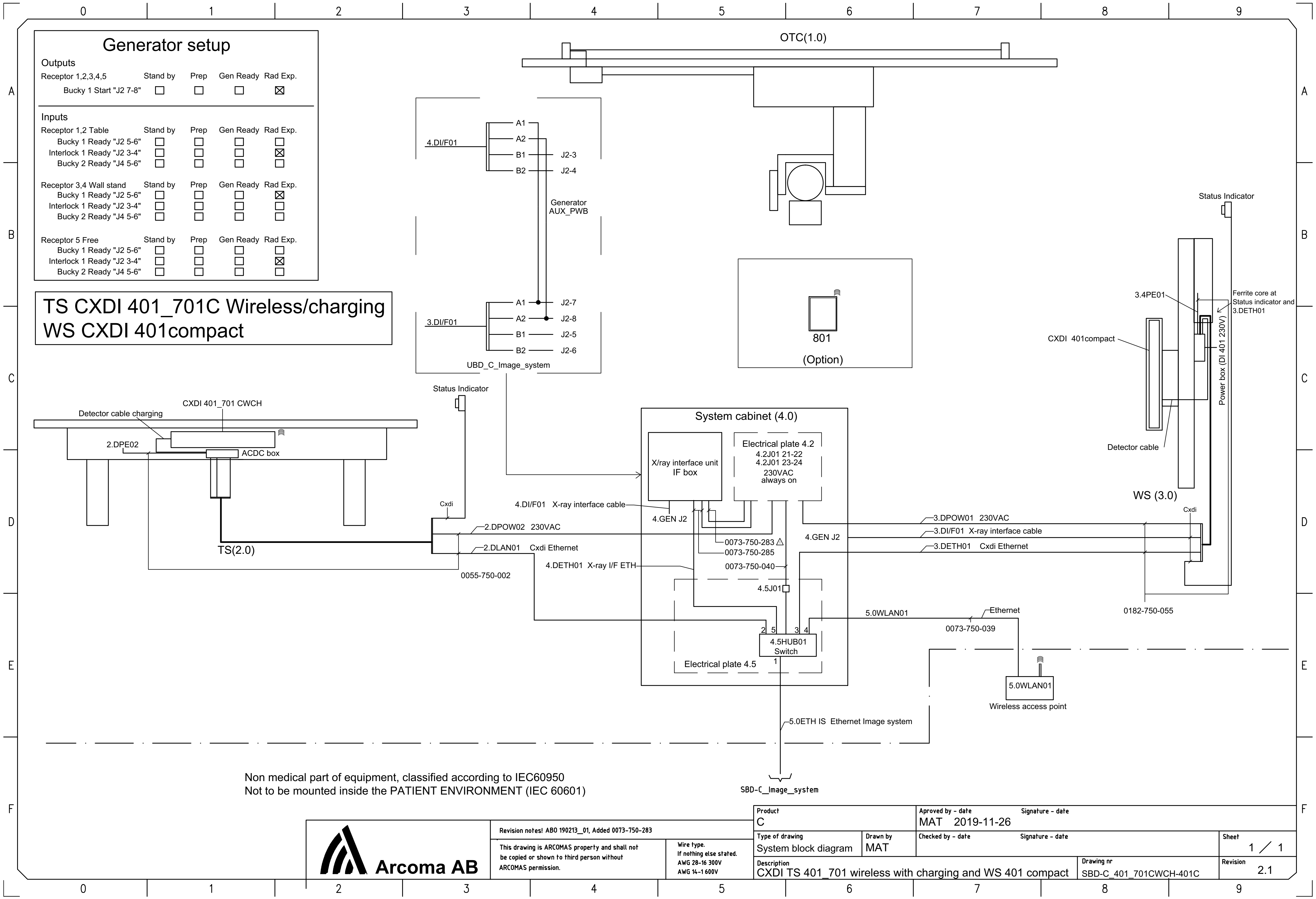

Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 or 701C Wireless
WS CXDI 401 compact
4.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator
AUX_PWB
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
OTC(1.0)
801
(Option)
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
CXDI 401 or 701CW
TS(2.0)
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-283
0073-750-285
4.GEN J2
4.DETH01 X-ray I/F ETH
0073-750-040
4.5J01
4.5HUB01
Switch
Electrical plate 4.5
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 401 or 701C Wireless and WS 401 compact
Drawing nr SBD-C_401_701CW-401C
Revision 2.1


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401_701C Wireless/charging
WS CXDI 401_701C Wireless
4.DI/F01
A1
A2
B1
B2
J2-3
J2-4
Generator
AUX_PWB
J2-7
J2-8
UBD_C_Image_system
OTC(1.0)
801
(Option)
CXDI 401compact
WS (3.0)
Status Indicator
CXDI 401_701 CWCH
Detector cable charging
2.DPE02
ACDC box
Cxdi
TS(2.0)
0055-750-002
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.DI/F01 X-ray interface cable
4.GEN J2
2.DPOW02 230VAC
2.DLAN01 Cxdi Ethernet
4.DETH01 X-ray I/F ETH
0073-750-283
0073-750-285
0073-750-040
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01
Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
C
Aproved by - date
MAT 2019-11-26
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CXDI TS 401_701 wireless with charging and WS 401_701 wireless
Drawing nr
SBD-C_401_701CWCH-401_701CW
Revision
2.1

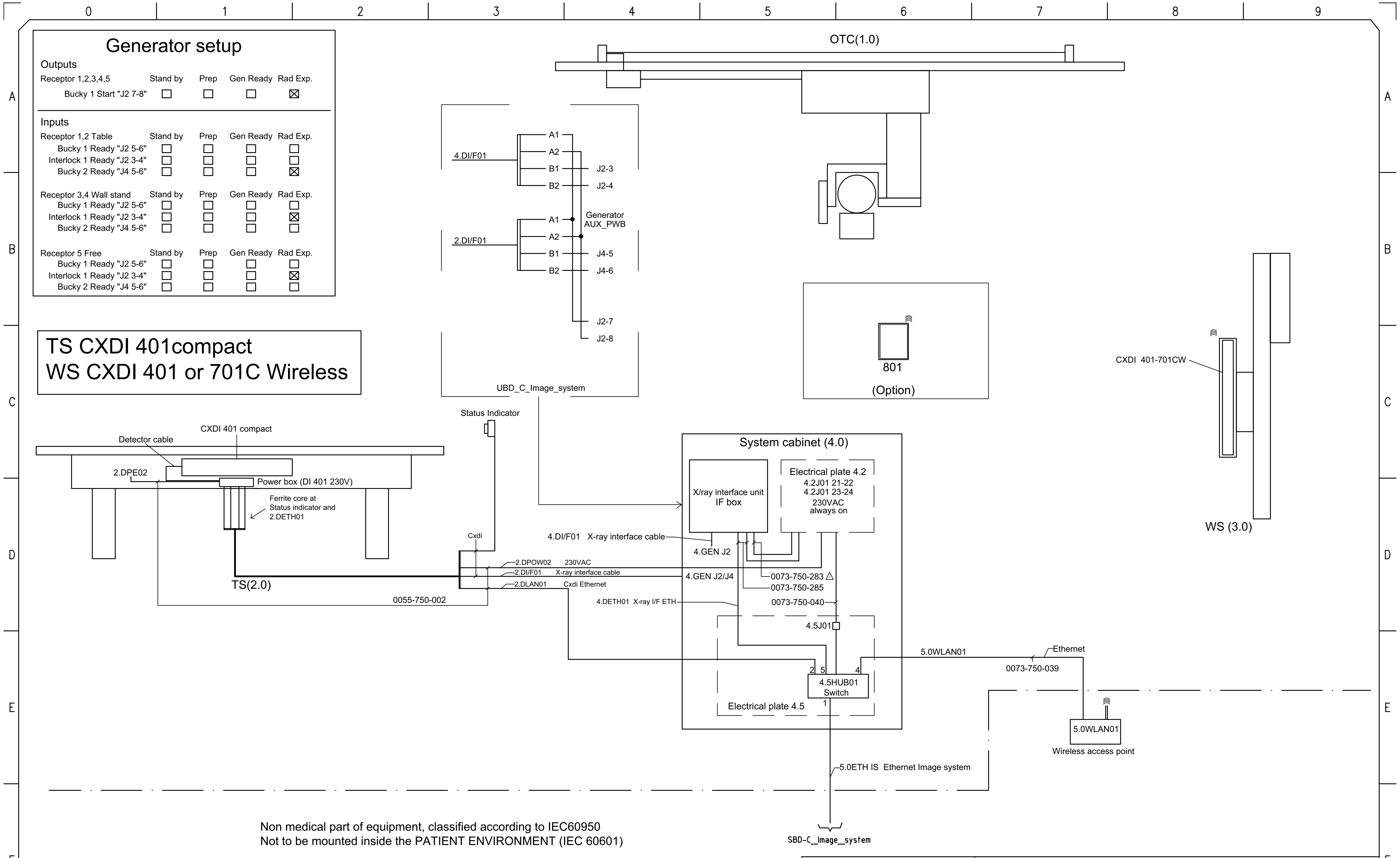


Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)

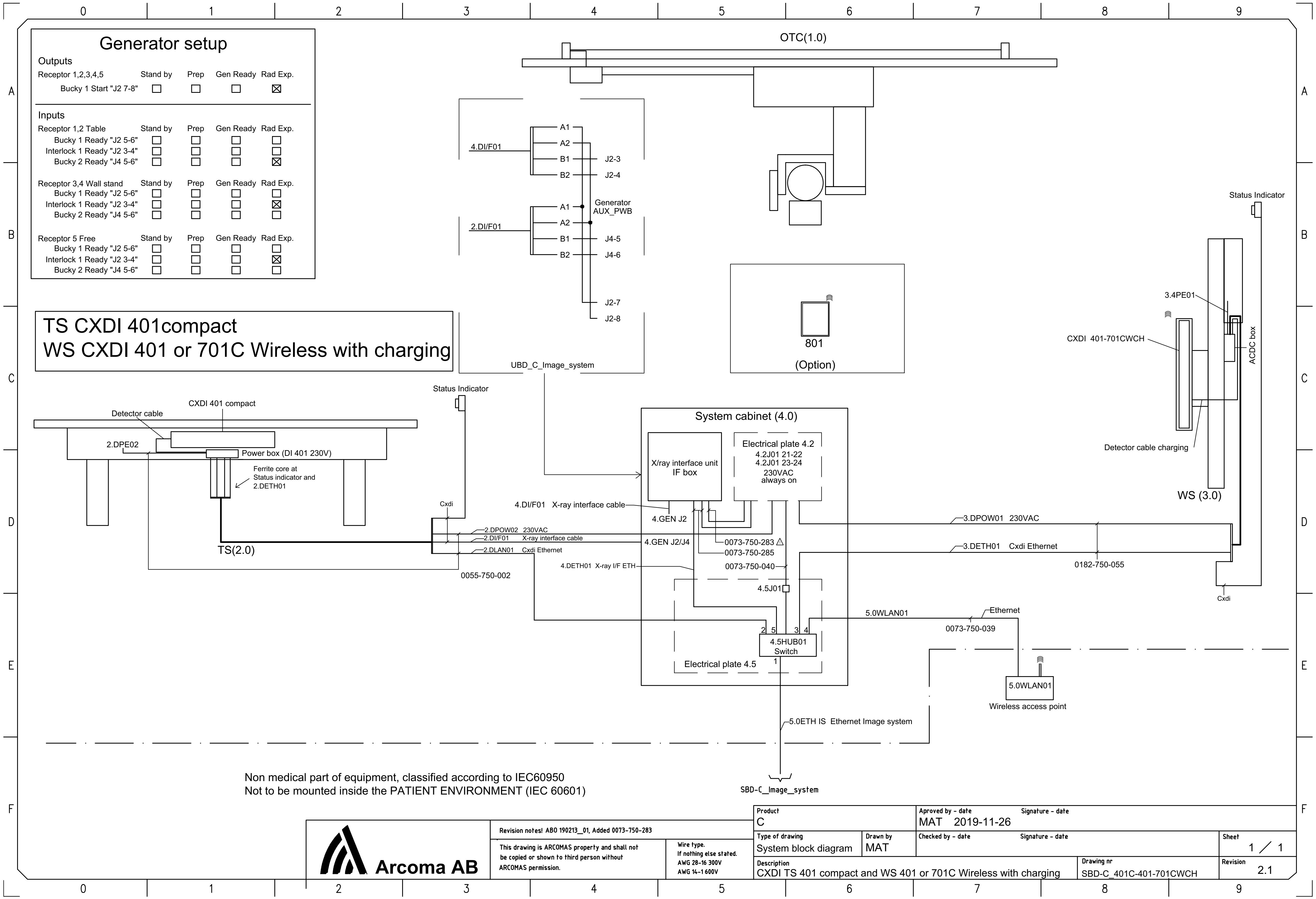
Arcoma AB	Revision notes! ABO 190213_01, Added 0073-750-283	Product: C	Aproved by - date: MAT 2019-11-26 / Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission. / Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Type of drawing: System block diagram / Drawn by: MAT	Checked by - date / Signature - date / Sheet: 1 / 1
		Description: CXDI TS and WS 401_701 wireless with charging	Drawing nr: SBD-C_401_701CWCH-401_701CWCH / Revision: 2.1



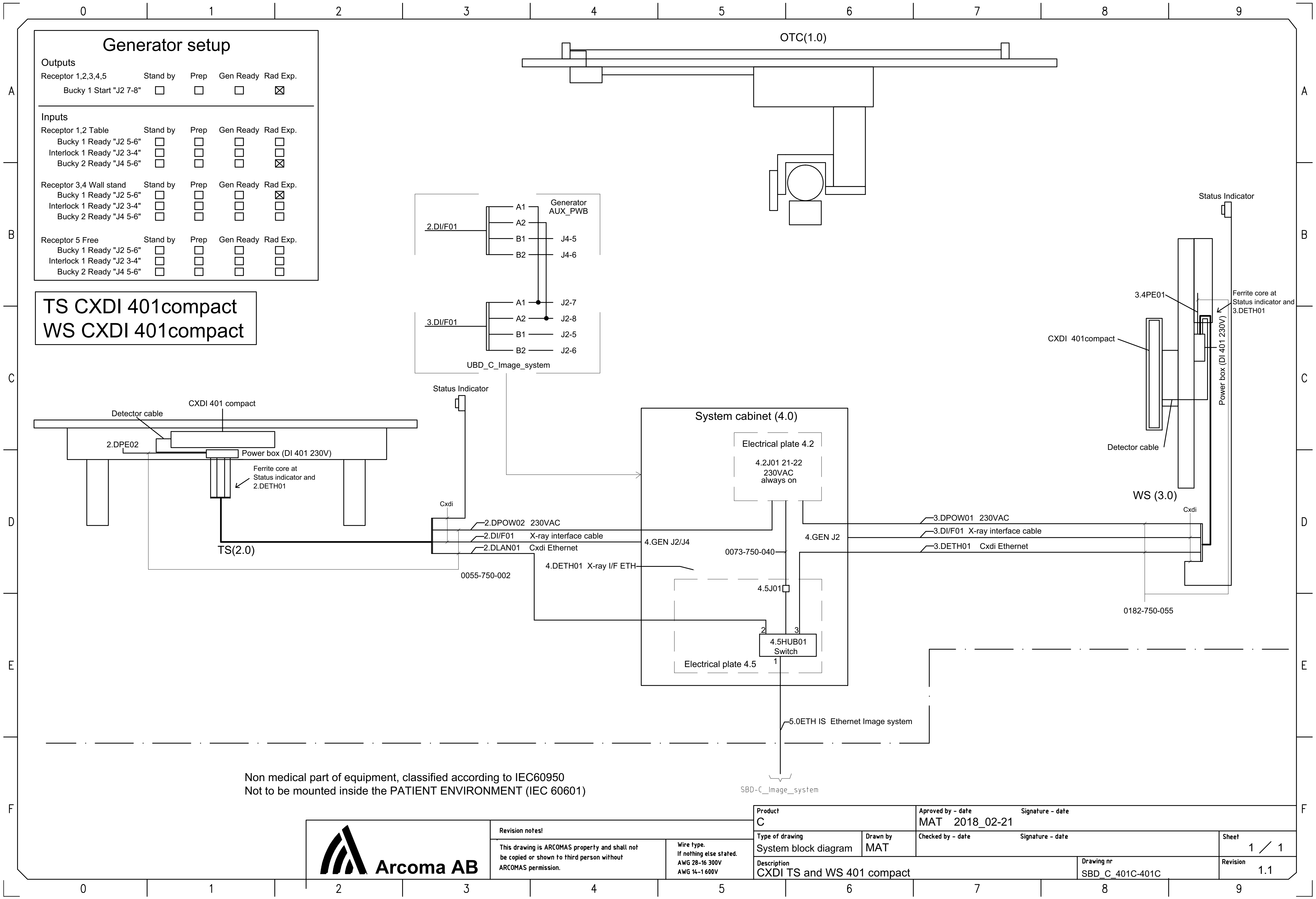
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401_701C Wireless/charging
WS CXDI 401compact
OTC(1.0)
4.DI/F01
A1
A2
B1 J2-3
B2 J2-4
Generator
AUX_PWB
3.DI/F01
A1 J2-7
A2 J2-8
B1 J2-5
B2 J2-6
UBD_C_Image_system
801
(Option)
Status Indicator
Ferrite core at Status indicator and 3.DETH01
3.4PE01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
CXDI 401_701 CWCH
Detector cable charging
2.DPE02
ACDC box
Status Indicator
Cxdi
TS(2.0)
2.DPOW02 230VAC
2.DLAN01 Cxdi Ethernet
0055-750-002
4.DI/F01 X-ray interface cable
4.DETH01 X-ray I/F ETH
System cabinet (4.0)
X/ray interface unit
IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.GEN J2
4.GEN J2
0073-750-283
0073-750-285
0073-750-040
4.5J01
2 5 3 4
4.5HUB01
Switch
1
Electrical plate 4.5
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
C
Aproved by - date
MAT 2019-11-26
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
CXDI TS 401_701 wireless with charging and WS 401 compact
Drawing nr
SBD-C_401_701CWCH-401C
Revision
2.1



Arcoma AB	Revision notes! ABO 190213_01, Added 0073-750-283	Product: C	Aproved by - date: MAT 2019-11-26; Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Type of drawing: System block diagram; Drawn by: MAT	Checked by - date; Signature - date; Sheet: 1 / 1
	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Description: CXDI TS 401 compact and WS 401 or 701C Wireless	Drawing nr: SBD-C_401C-401-701CW; Revision: 2.1



Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401 or 701C Wireless with charging
OTC(1.0)
4.DI/F01
2.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
J4-5 J4-6
J2-7 J2-8
UBD_C_Image_system
801
(Option)
Status Indicator
3.4PE01
CXDI 401-701CWCH
ACDC box
Detector cable charging
WS (3.0)
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
4.DI/F01 X-ray interface cable
System cabinet (4.0)
X/ray interface unit IF box
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.GEN J2
4.GEN J2/J4
0073-750-283
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
3.DPOW01 230VAC
3.DETH01 Cxdi Ethernet
0182-750-055
Cxdi
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! ABO 190213_01, Added 0073-750-283
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2019-11-26
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 401 compact and WS 401 or 701C Wireless with charging
Drawing nr SBD-C_401C-401-701CWCH
Revision 2.1



Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401compact
OTC(1.0)
Generator AUX_PWB
2.DI/F01
A1 A2 B1 B2
J4-5 J4-6
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
4.GEN J2/J4
4.GEN J2
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
5.0ETH IS Ethernet Image system
SBD-C_Image_system
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
WS (3.0)
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes!
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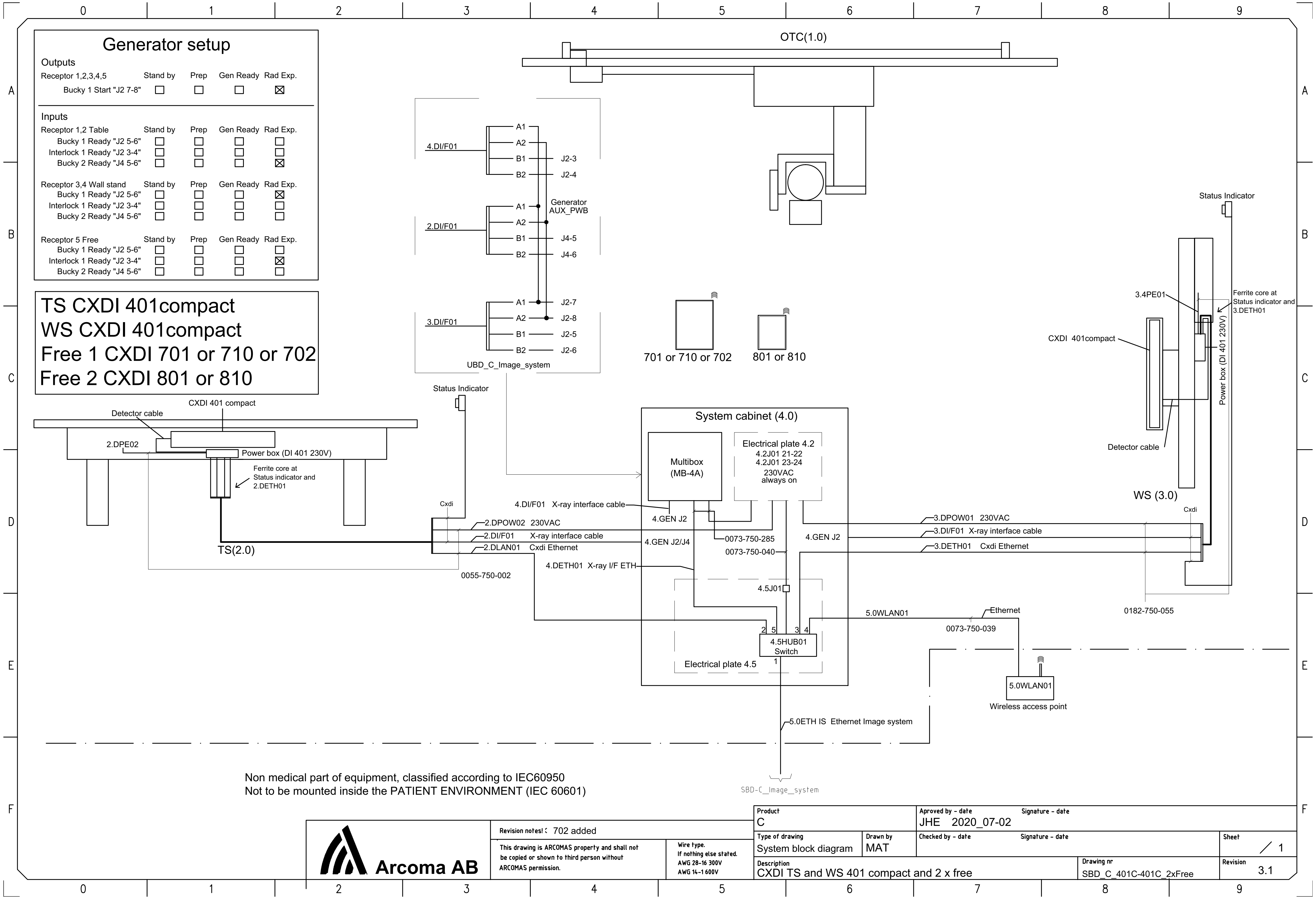
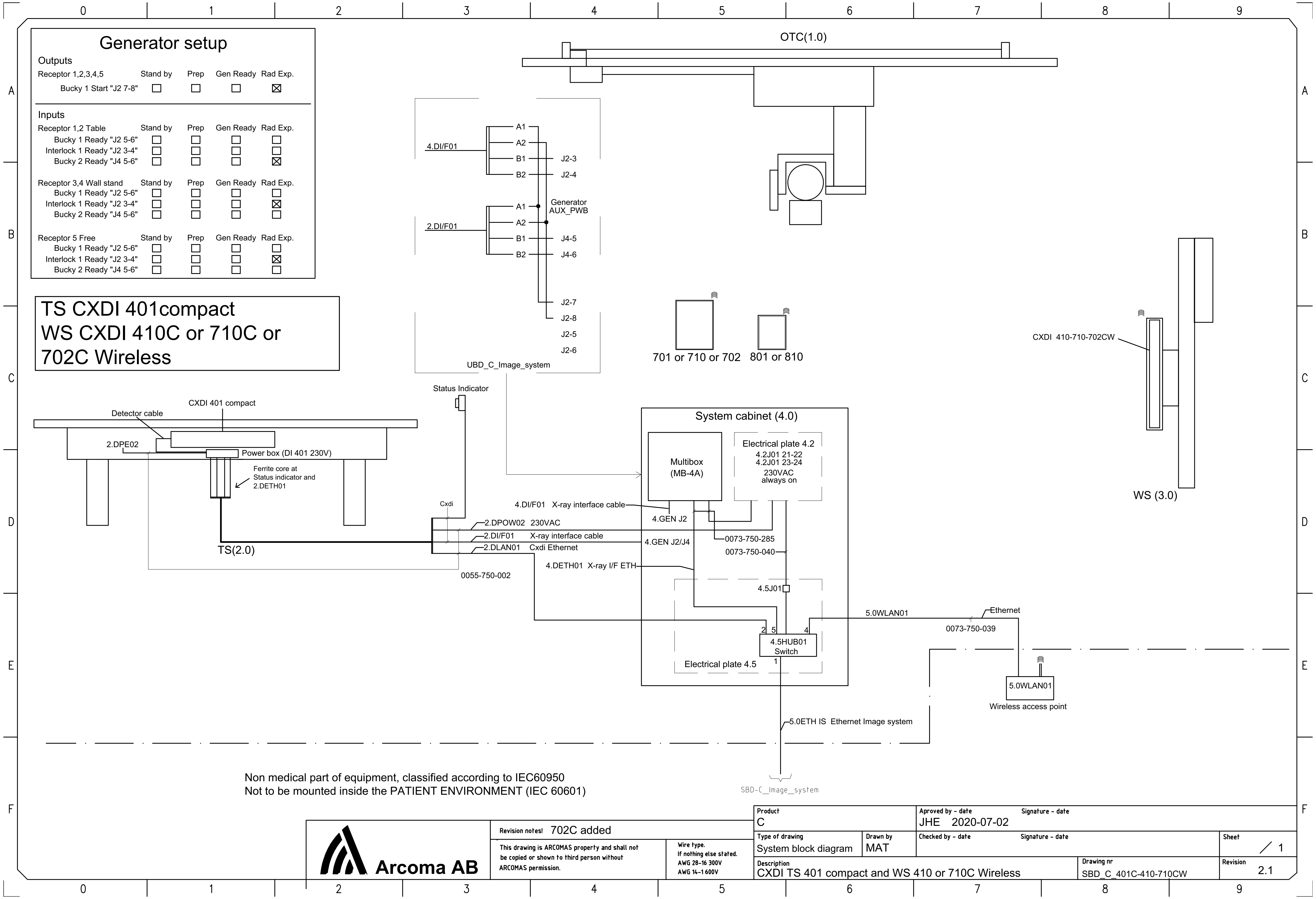
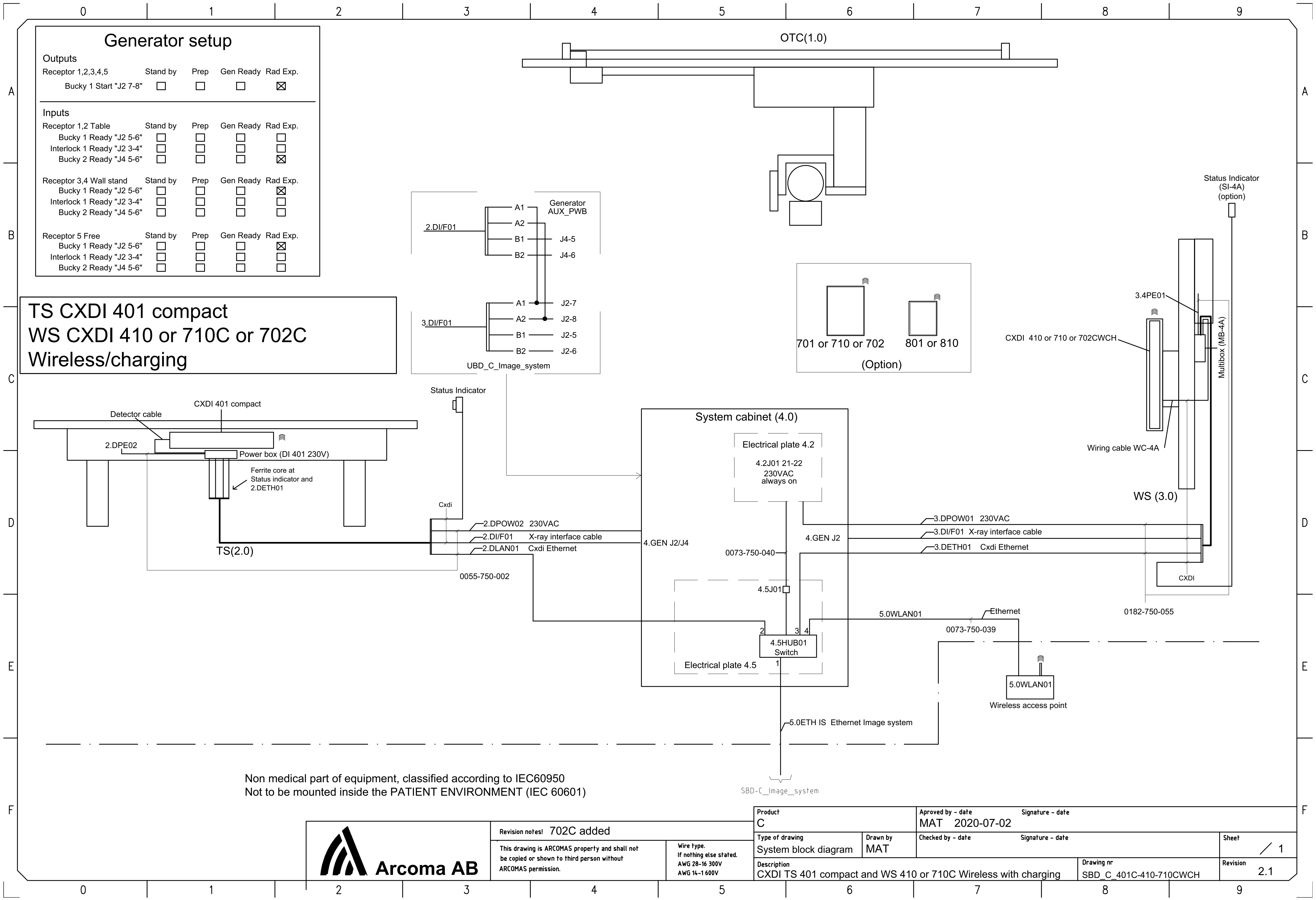
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2018_02-21
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS and WS 401 compact
Drawing nr SBD_C_401C-401C
Revision 1.1

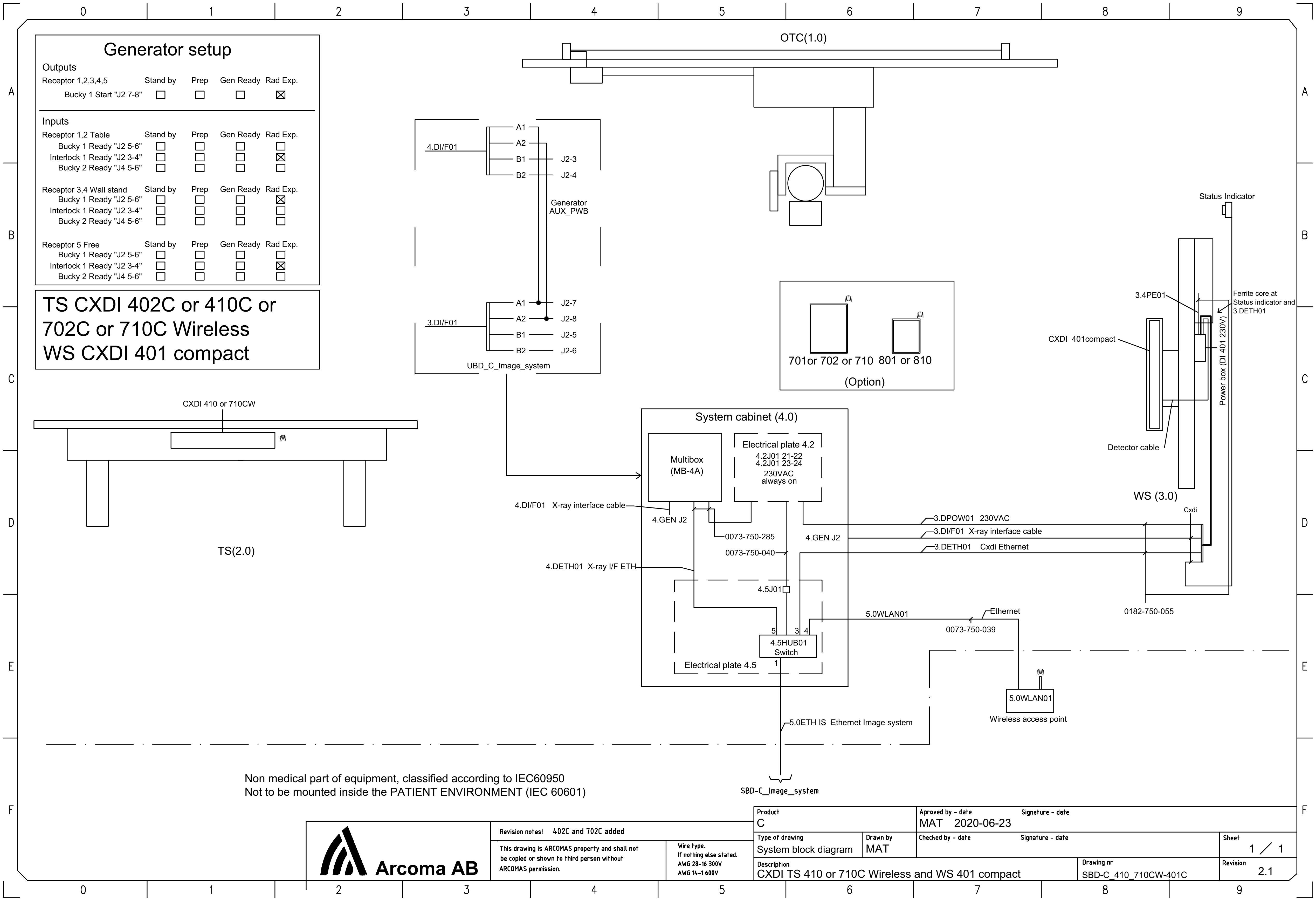


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 401compact
Free 1 CXDI 701 or 710 or 702
Free 2 CXDI 801 or 810
OTC(1.0)
4.DI/F01
2.DI/F01
3.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
J4-5 J4-6
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701 or 710 or 702
801 or 810
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
TS(2.0)
Cxdi
4.DI/F01 X-ray interface cable
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
4.DETH01 X-ray I/F ETH
System cabinet (4.0)
Multibox (MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.GEN J2
4.GEN J2/J4
0073-750-285
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
WS (3.0)
3.4PE01
CXDI 401compact
Ferrite core at Status indicator and 3.DETH01
Power box (DI 401 230V)
Detector cable
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes!: 702 added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date JHE 2020_07-02
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet / 1
Description CXDI TS and WS 401 compact and 2 x free
Drawing nr SBD_C_401C-401C_2xFree
Revision 3.1


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401compact
WS CXDI 410C or 710C or
702C Wireless
OTC(1.0)
4.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator
AUX_PWB
2.DI/F01
A1 A2 B1 B2
J4-5 J4-6
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701 or 710 or 702
801 or 810
CXDI 410-710-702CW
WS (3.0)
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at
Status indicator and
2.DETH01
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
4.DI/F01 X-ray interface cable
4.DETH01 X-ray I/F ETH
System cabinet (4.0)
Multibox
(MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC
always on
4.GEN J2
4.GEN J2/J4
0073-750-285
0073-750-040
4.5J01
2 5 4
4.5HUB01
Switch
1
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
C
Aproved by - date
JHE 2020-07-02
Signature - date
Type of drawing
System block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
/ 1
Description
CXDI TS 401 compact and WS 410 or 710C Wireless
Drawing nr
SBD_C_401C-410-710CW
Revision
2.1



Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 401 compact
WS CXDI 410 or 710C or 702C
Wireless/charging
OTC(1.0)
Generator AUX_PWB
2.DI/F01
3.DI/F01
A1 A2 B1 B2 J4-5 J4-6
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701 or 710 or 702
801 or 810
(Option)
Status Indicator (SI-4A) (option)
3.4PE01
CXDI 410 or 710 or 702CWCH
Multibox (MB-4A)
Wiring cable WC-4A
WS (3.0)
Status Indicator
CXDI 401 compact
Detector cable
2.DPE02
Power box (DI 401 230V)
Ferrite core at Status indicator and 2.DETH01
Cxdi
TS(2.0)
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
4.GEN J2/J4
4.GEN J2
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
CXDI
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-07-02
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1
Description CXDI TS 401 compact and WS 410 or 710C Wireless with charging
Drawing nr SBD_C_401C-410-710CWCH
Revision 2.1



Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless WS CXDI 401 compact
4.DI/F01
A1 A2 B1 B2
J2-3 J2-4
Generator AUX_PWB
3.DI/F01
J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
OTC(1.0)
701or 702 or 710 801 or 810
(Option)
CXDI 410 or 710CW
TS(2.0)
System cabinet (4.0)
Multibox (MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-285
0073-750-040
4.GEN J2
4.DETH01 X-ray I/F ETH
4.5J01
5 3 4
4.5HUB01 Switch
1
Electrical plate 4.5
5.0WLAN01
0073-750-039
Ethernet
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0182-750-055
Status Indicator
3.4PE01
Ferrite core at Status indicator and 3.DETH01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
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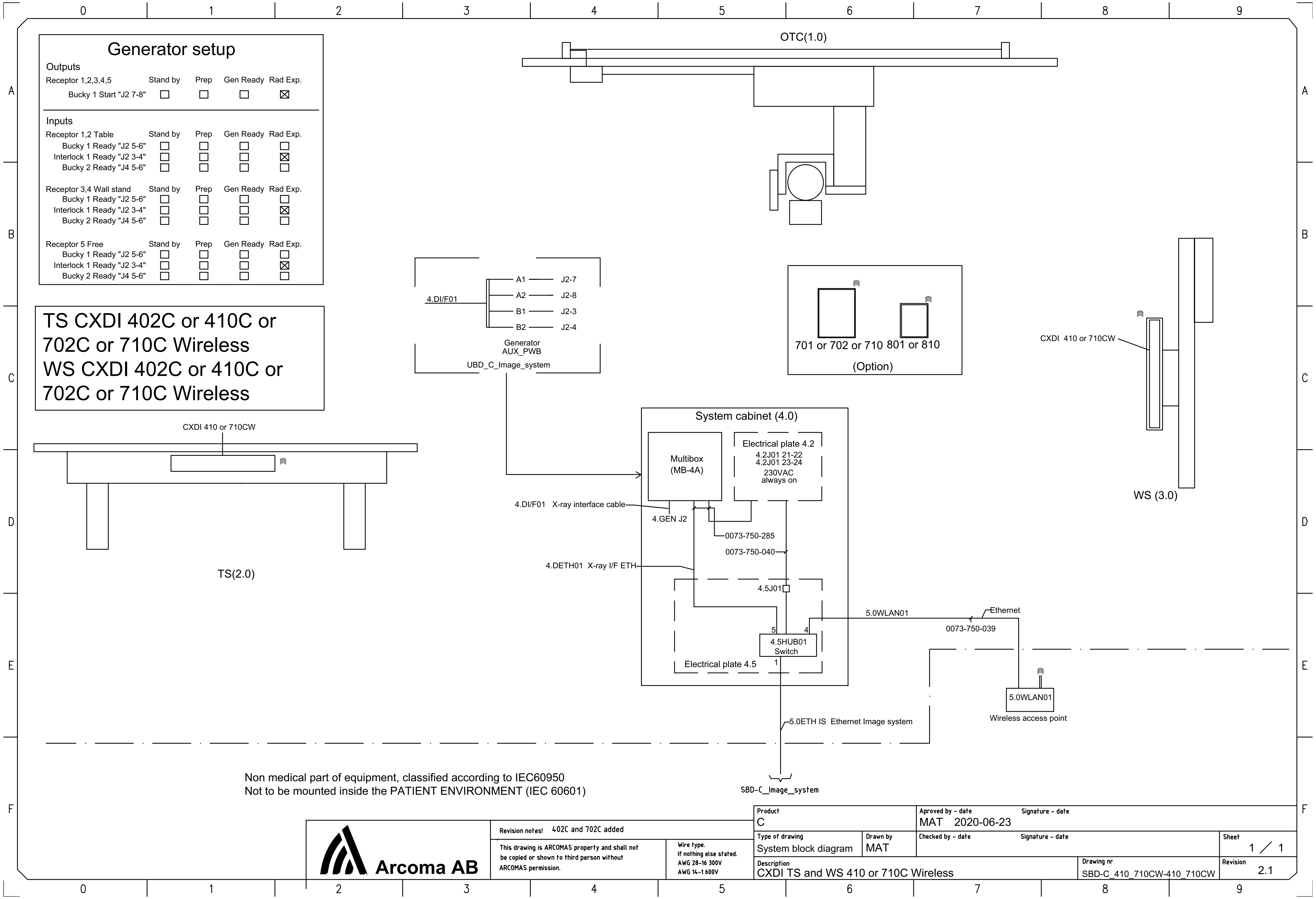
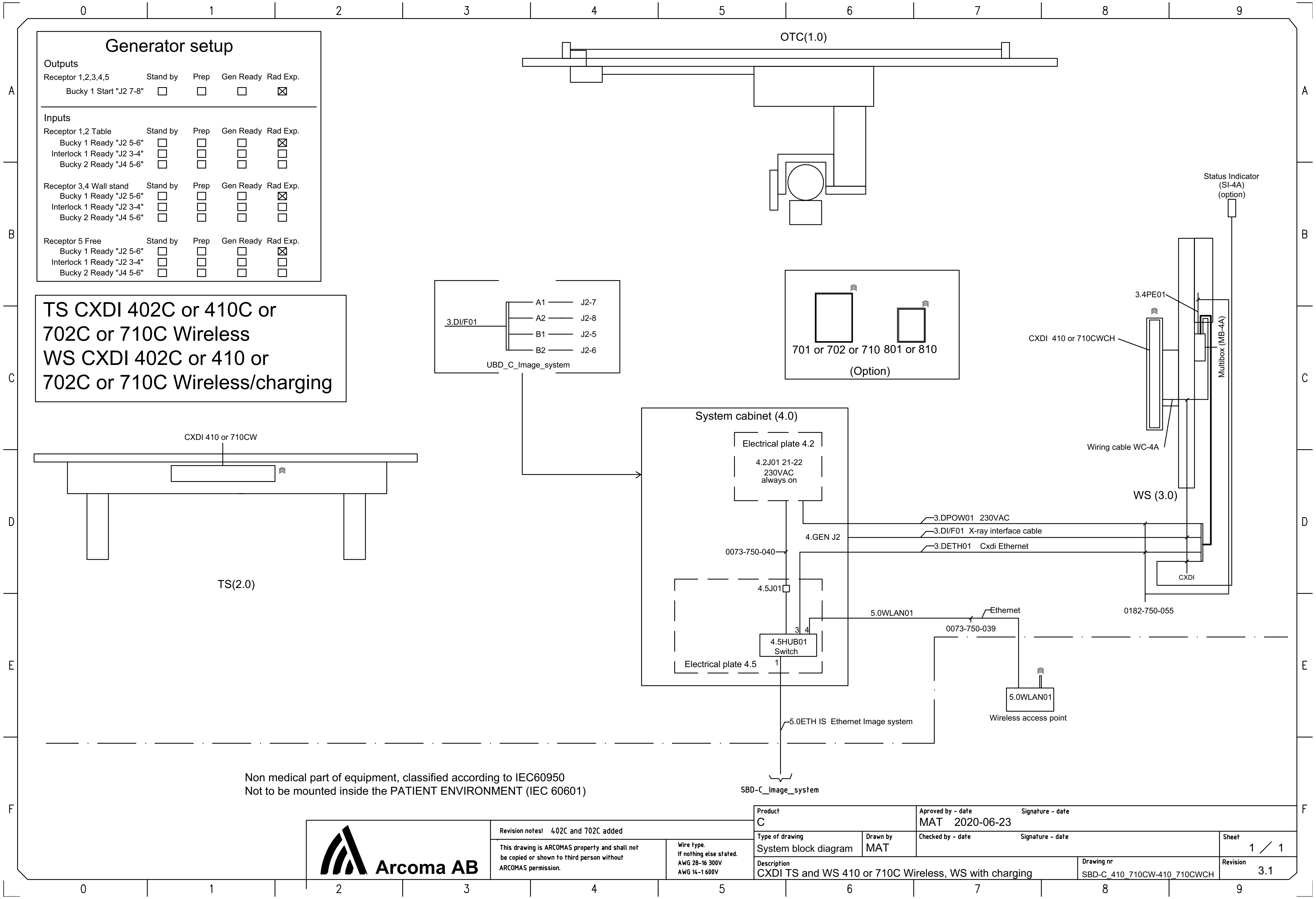
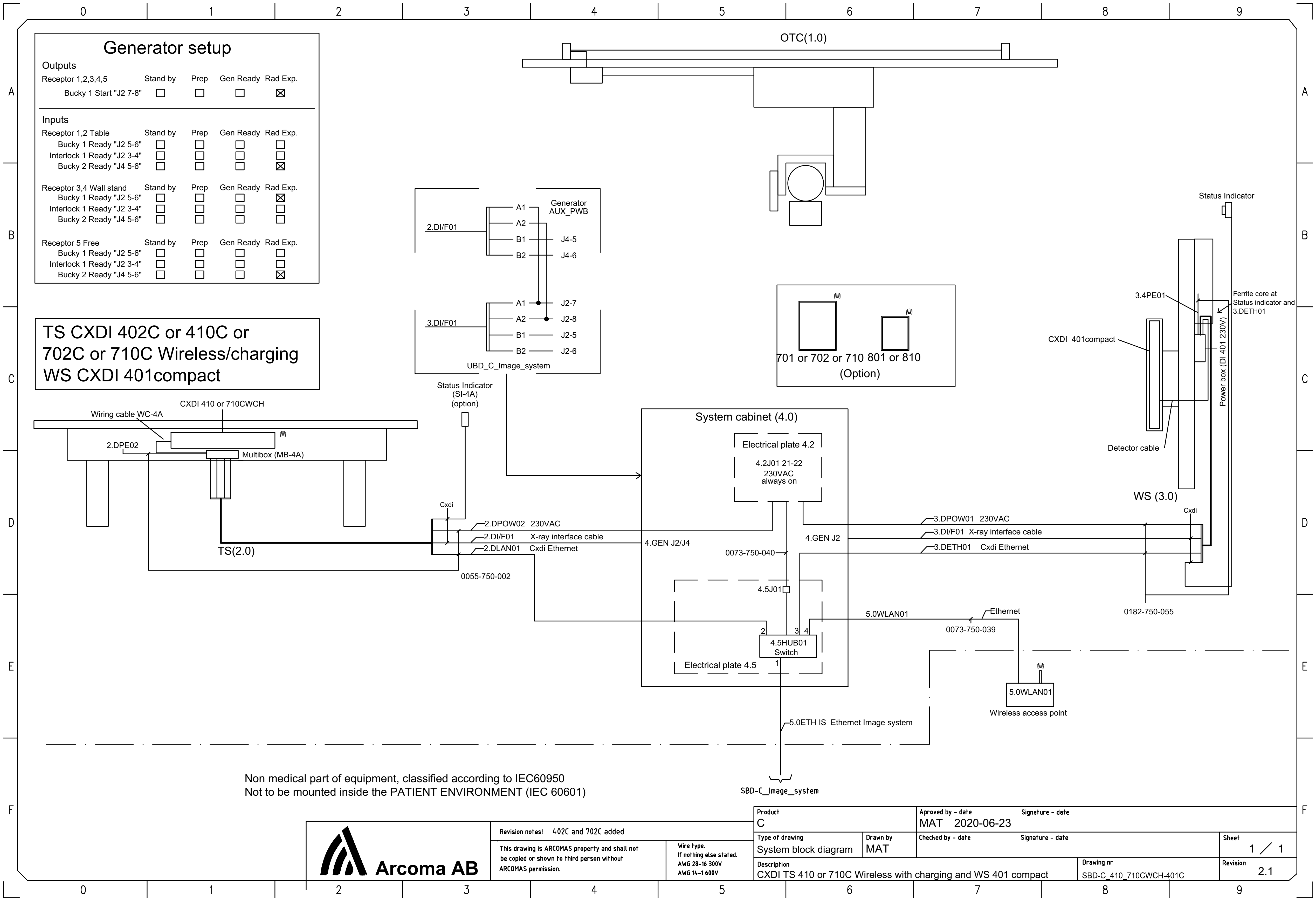
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description CXDI TS 410 or 710C Wireless and WS 401 compact
Drawing nr SBD-C_410_710CW-401C
Revision 2.1

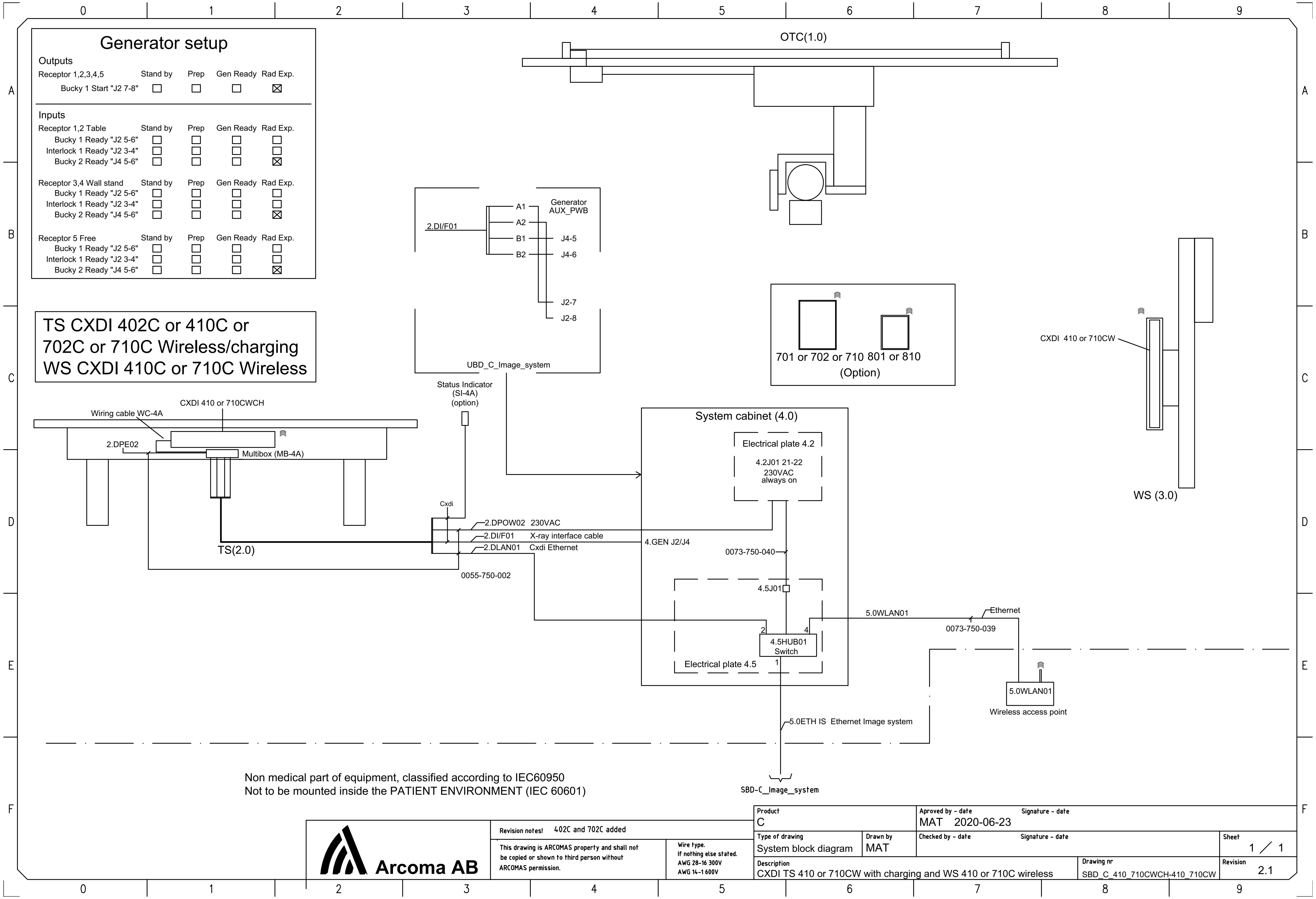

Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless
WS CXDI 402C or 410C or 702C or 710C Wireless
CXDI 410 or 710CW
TS(2.0)
OTC(1.0)
4.DI/F01
A1 J2-7
A2 J2-8
B1 J2-3
B2 J2-4
Generator AUX_PWB
UBD_C_Image_system
701 or 702 or 710
801 or 810
(Option)
CXDI 410 or 710CW
WS (3.0)
System cabinet (4.0)
Multibox (MB-4A)
Electrical plate 4.2
4.2J01 21-22
4.2J01 23-24
230VAC always on
4.DI/F01 X-ray interface cable
4.GEN J2
0073-750-285
0073-750-040
4.DETH01 X-ray I/F ETH
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS and WS 410 or 710C Wireless
Drawing nr SBD-C_410_710CW-410_710CW
Revision 2.1



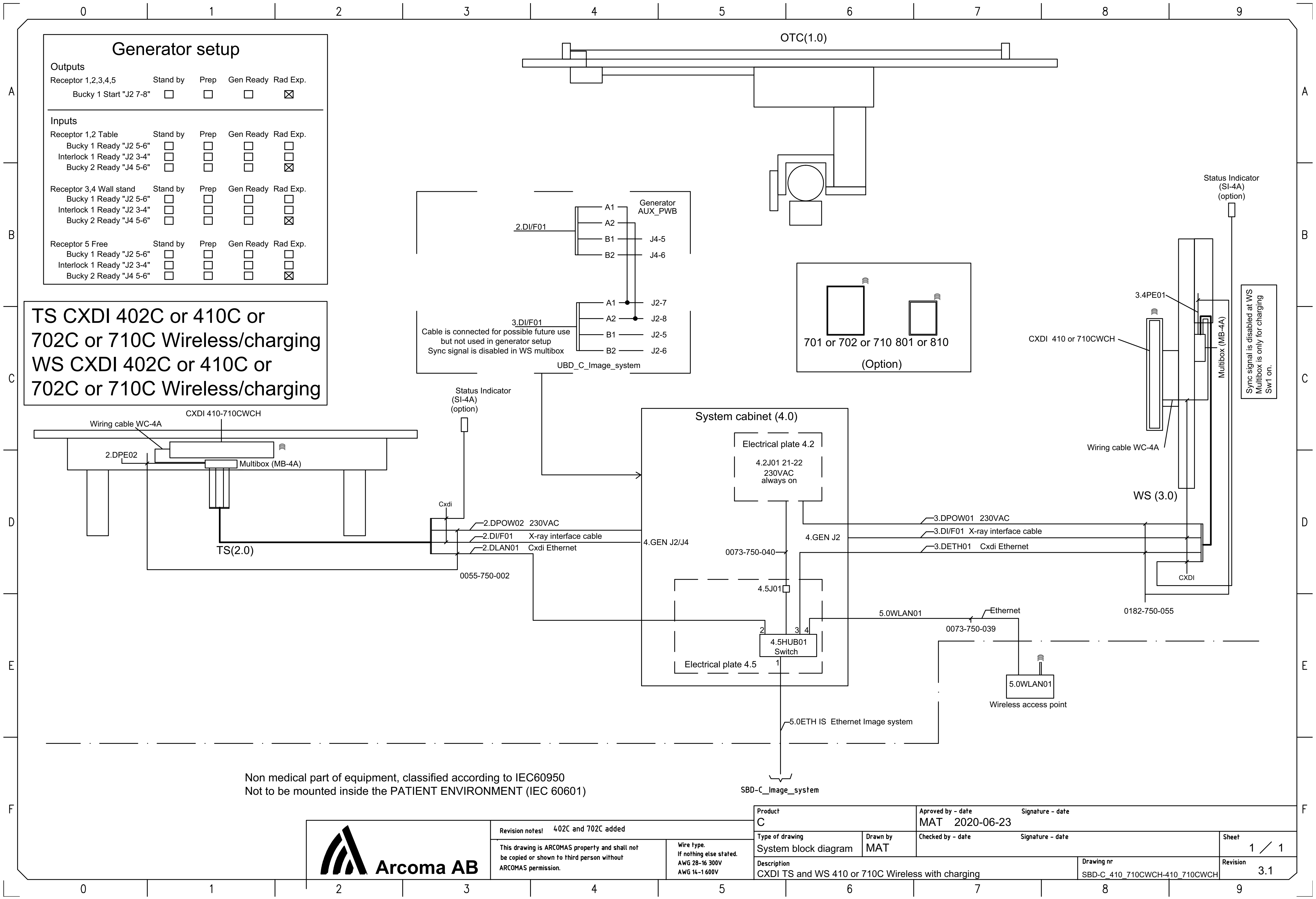
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless
WS CXDI 402C or 410 or 702C or 710C Wireless/charging
OTC(1.0)
3.DI/F01
A1 J2-7
A2 J2-8
B1 J2-5
B2 J2-6
UBD_C_Image_system
701 or 702 or 710
801 or 810
(Option)
Status Indicator (SI-4A) (option)
3.4PE01
CXDI 410 or 710CWCH
Multibox (MB-4A)
Wiring cable WC-4A
WS (3.0)
CXDI 410 or 710CW
TS(2.0)
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
4.GEN J2
0073-750-040
CXDI
0182-750-055
4.5J01
5.0WLAN01
Ethernet
0073-750-039
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS and WS 410 or 710C Wireless, WS with charging
Drawing nr SBD-C_410_710CW-410_710CWCH
Revision 3.1

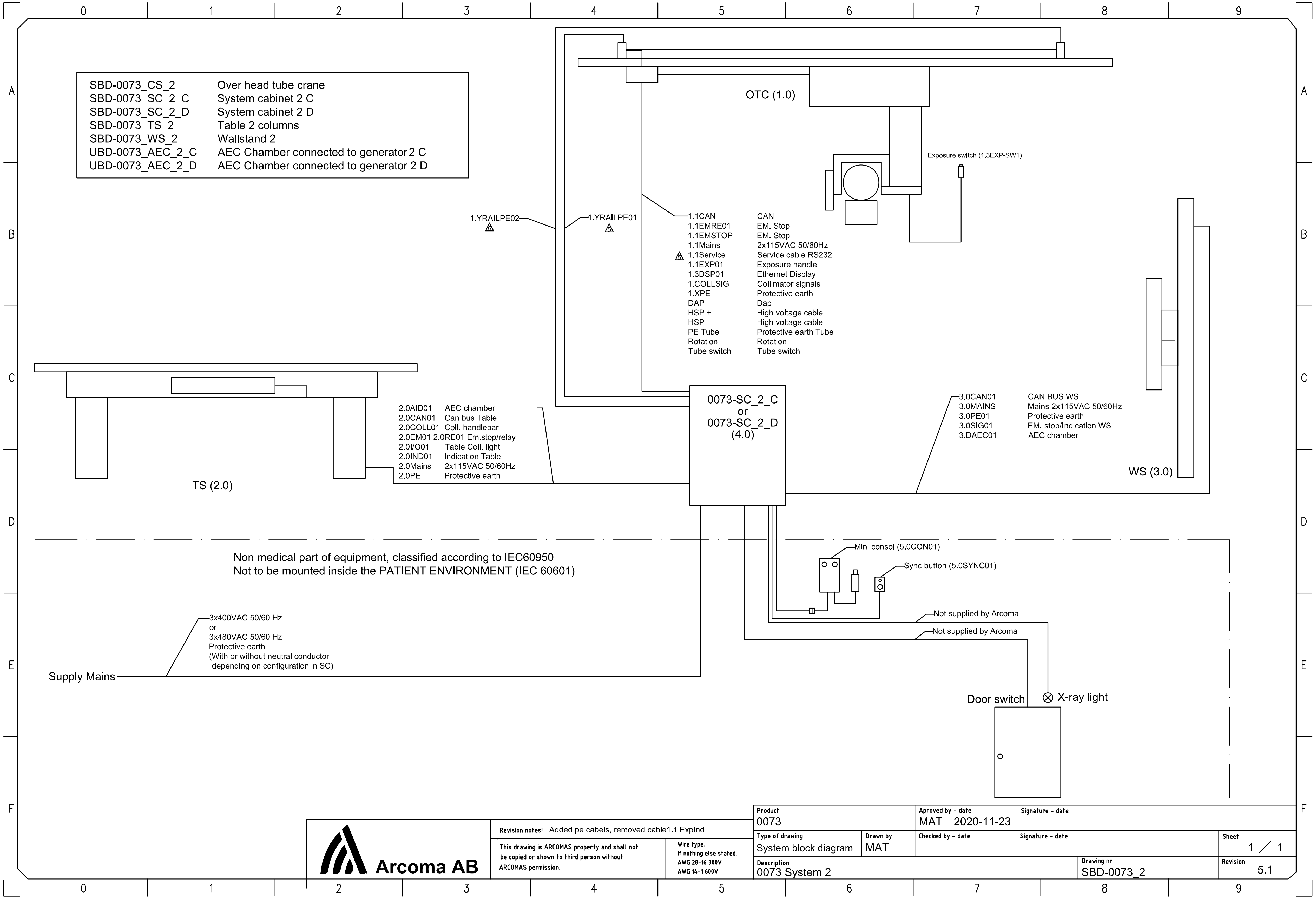


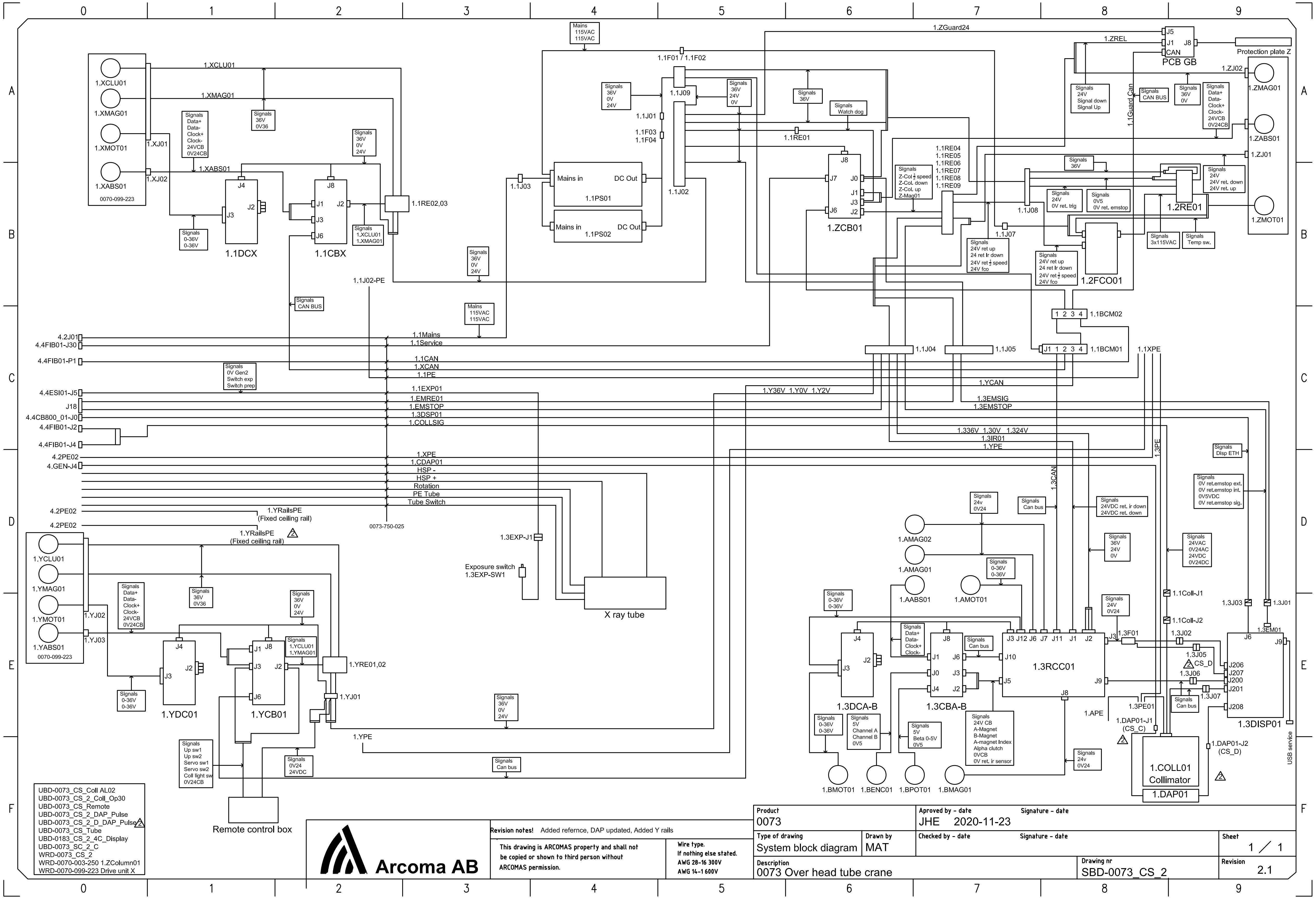
Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or
702C or 710C Wireless/charging
WS CXDI 401compact
OTC(1.0)
Generator AUX_PWB
2.DI/F01
A1 A2 B1 B2 J4-5 J4-6
3.DI/F01
A1 A2 B1 B2 J2-7 J2-8 J2-5 J2-6
UBD_C_Image_system
701 or 702 or 710 801 or 810
(Option)
Status Indicator
Ferrite core at Status indicator and 3.DETH01
3.4PE01
CXDI 401compact
Power box (DI 401 230V)
Detector cable
WS (3.0)
Cxdi
CXDI 410 or 710CWCH
Wiring cable WC-4A
2.DPE02
Multibox (MB-4A)
Status Indicator (SI-4A) (option)
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
TS(2.0)
4.GEN J2/J4
4.GEN J2
0073-750-040
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
0055-750-002
4.5J01
5.0WLAN01
Ethernet
0073-750-039
0182-750-055
4.5HUB01 Switch
Electrical plate 4.5
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
SBD-C_Image_system
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 410 or 710C Wireless with charging and WS 401 compact
Drawing nr SBD-C_410_710CWCH-401C
Revision 2.1

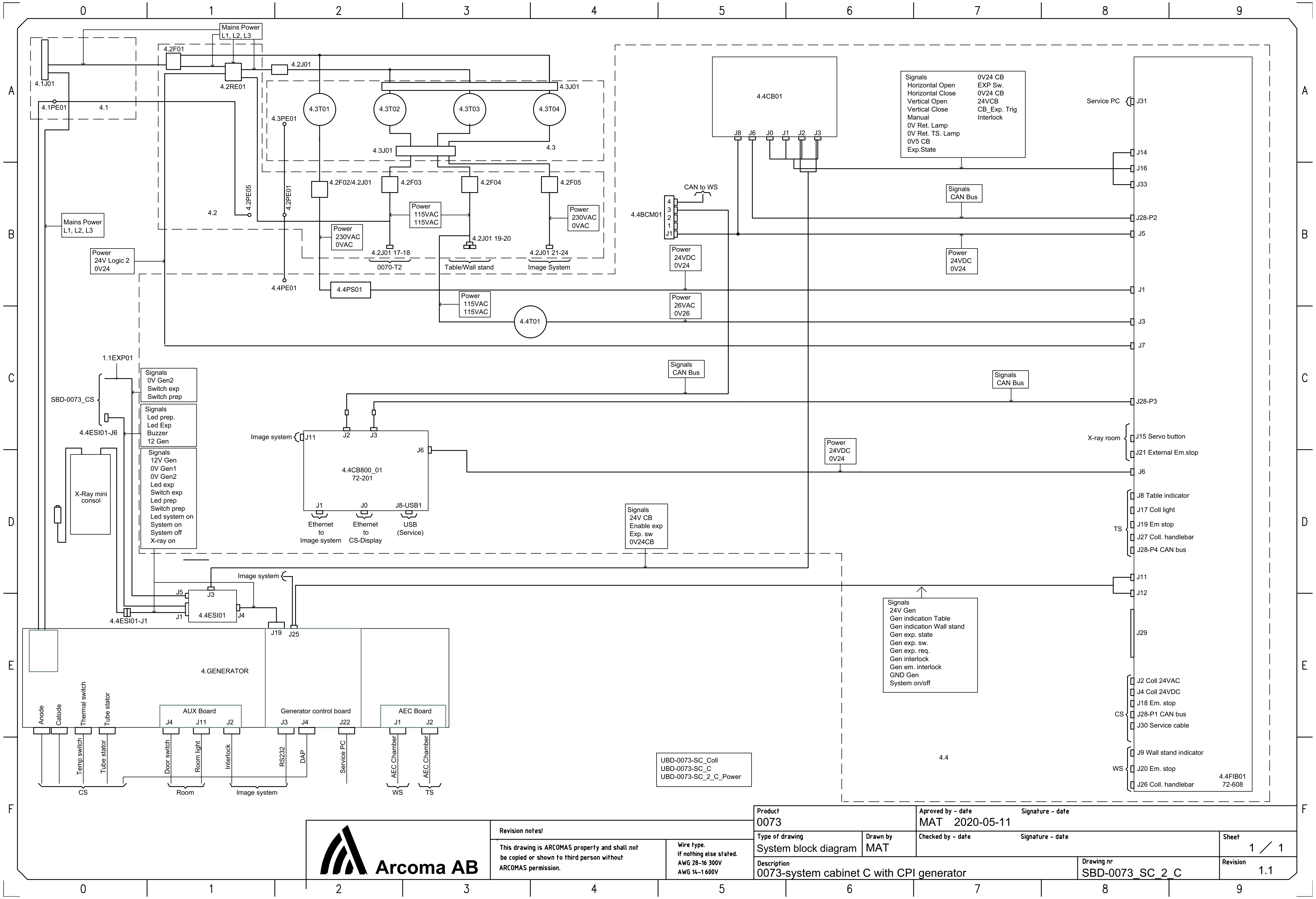


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or
702C or 710C Wireless/charging
WS CXDI 410C or 710C Wireless
OTC(1.0)
2.DI/F01
A1
A2
B1
B2
Generator
AUX_PWB
J4-5
J4-6
J2-7
J2-8
UBD_C_Image_system
701 or 702 or 710
801 or 810
(Option)
CXDI 410 or 710CW
WS (3.0)
Status Indicator
(SI-4A)
(option)
CXDI 410 or 710CWCH
Wiring cable WC-4A
2.DPE02
Multibox (MB-4A)
TS(2.0)
Cxdi
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC
always on
4.GEN J2/J4
0073-750-040
4.5J01
4.5HUB01
Switch
Electrical plate 4.5
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS 410 or 710CW with charging and WS 410 or 710C wireless
Drawing nr SBD_C_410_710CWCH-410_710CW
Revision 2.1


Generator setup
Outputs
Receptor 1,2,3,4,5 Stand by Prep Gen Ready Rad Exp.
Bucky 1 Start "J2 7-8"
Inputs
Receptor 1,2 Table Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 3,4 Wall stand Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
Receptor 5 Free Stand by Prep Gen Ready Rad Exp.
Bucky 1 Ready "J2 5-6"
Interlock 1 Ready "J2 3-4"
Bucky 2 Ready "J4 5-6"
TS CXDI 402C or 410C or 702C or 710C Wireless/charging
WS CXDI 402C or 410C or 702C or 710C Wireless/charging
OTC(1.0)
Generator AUX_PWB
2.DI/F01
3.DI/F01
A1 A2 B1 B2 J4-5 J4-6
A1 A2 B1 B2 J2-7 J2-8 J2-5 J2-6
Cable is connected for possible future use but not used in generator setup
Sync signal is disabled in WS multibox
UBD_C_Image_system
701 or 702 or 710 801 or 810
(Option)
Status Indicator (SI-4A) (option)
3.4PE01
CXDI 410 or 710CWCH
Multibox (MB-4A)
Sync signal is disabled at WS Multibox is only for charging Sw1 on.
Wiring cable WC-4A
WS (3.0)
CXDI 410-710CWCH
Wiring cable WC-4A
2.DPE02
Multibox (MB-4A)
Cxdi
TS(2.0)
2.DPOW02 230VAC
2.DI/F01 X-ray interface cable
2.DLAN01 Cxdi Ethernet
0055-750-002
System cabinet (4.0)
Electrical plate 4.2
4.2J01 21-22
230VAC always on
4.GEN J2/J4
4.GEN J2
0073-750-040
4.5J01
4.5HUB01 Switch
Electrical plate 4.5
3.DPOW01 230VAC
3.DI/F01 X-ray interface cable
3.DETH01 Cxdi Ethernet
CXDI
0182-750-055
5.0WLAN01
Ethernet
0073-750-039
5.0WLAN01
Wireless access point
5.0ETH IS Ethernet Image system
SBD-C_Image_system
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Arcoma AB
Revision notes! 402C and 702C added
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product C
Aproved by - date MAT 2020-06-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description CXDI TS and WS 410 or 710C Wireless with charging
Drawing nr SBD-C_410_710CWCH-410_710CWCH
Revision 3.1


SBD-0073_CS_2 Over head tube crane
SBD-0073_SC_2_C System cabinet 2 C
SBD-0073_SC_2_D System cabinet 2 D
SBD-0073_TS_2 Table 2 columns
SBD-0073_WS_2 Wallstand 2
UBD-0073_AEC_2_C AEC Chamber connected to generator 2 C
UBD-0073_AEC_2_D AEC Chamber connected to generator 2 D
OTC (1.0)
Exposure switch (1.3EXP-SW1)
1.YRAILPE02
1.YRAILPE01
1.1CAN CAN
1.1EMRE01 EM. Stop
1.1EMSTOP EM. Stop
1.1Mains 2x115VAC 50/60Hz
1.1Service Service cable RS232
1.1EXP01 Exposure handle
1.3DSP01 Ethernet Display
1.COLLSIG Collimator signals
1.XPE Protective earth
DAP Dap
HSP + High voltage cable
HSP- High voltage cable
PE Tube Protective earth Tube
Rotation Rotation
Tube switch Tube switch
0073-SC_2_C or 0073-SC_2_D (4.0)
2.0AID01 AEC chamber
2.0CAN01 Can bus Table
2.0COLL01 Coll. handlebar
2.0EM01 2.0RE01 Em.stop/relay
2.0I/O01 Table Coll. light
2.0IND01 Indication Table
2.0Mains 2x115VAC 50/60Hz
2.0PE Protective earth
TS (2.0)
3.0CAN01 CAN BUS WS
3.0MAINS Mains 2x115VAC 50/60Hz
3.0PE01 Protective earth
3.0SIG01 EM. stop/Indication WS
3.DAEC01 AEC chamber
WS (3.0)
Non medical part of equipment, classified according to IEC60950
Not to be mounted inside the PATIENT ENVIRONMENT (IEC 60601)
Mini consol (5.0CON01)
Sync button (5.0SYNC01)
Not supplied by Arcoma
Not supplied by Arcoma
3x400VAC 50/60 Hz
or
3x480VAC 50/60 Hz
Protective earth
(With or without neutral conductor
depending on configuration in SC)
Supply Mains
Door switch
X-ray light
Arcoma AB
Revision notes! Added pe cabels, removed cable1.1 Explnd
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0073
Aproved by - date MAT 2020-11-23
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Signature - date
Sheet 1 / 1
Description 0073 System 2
Drawing nr SBD-0073_2
Revision 5.1



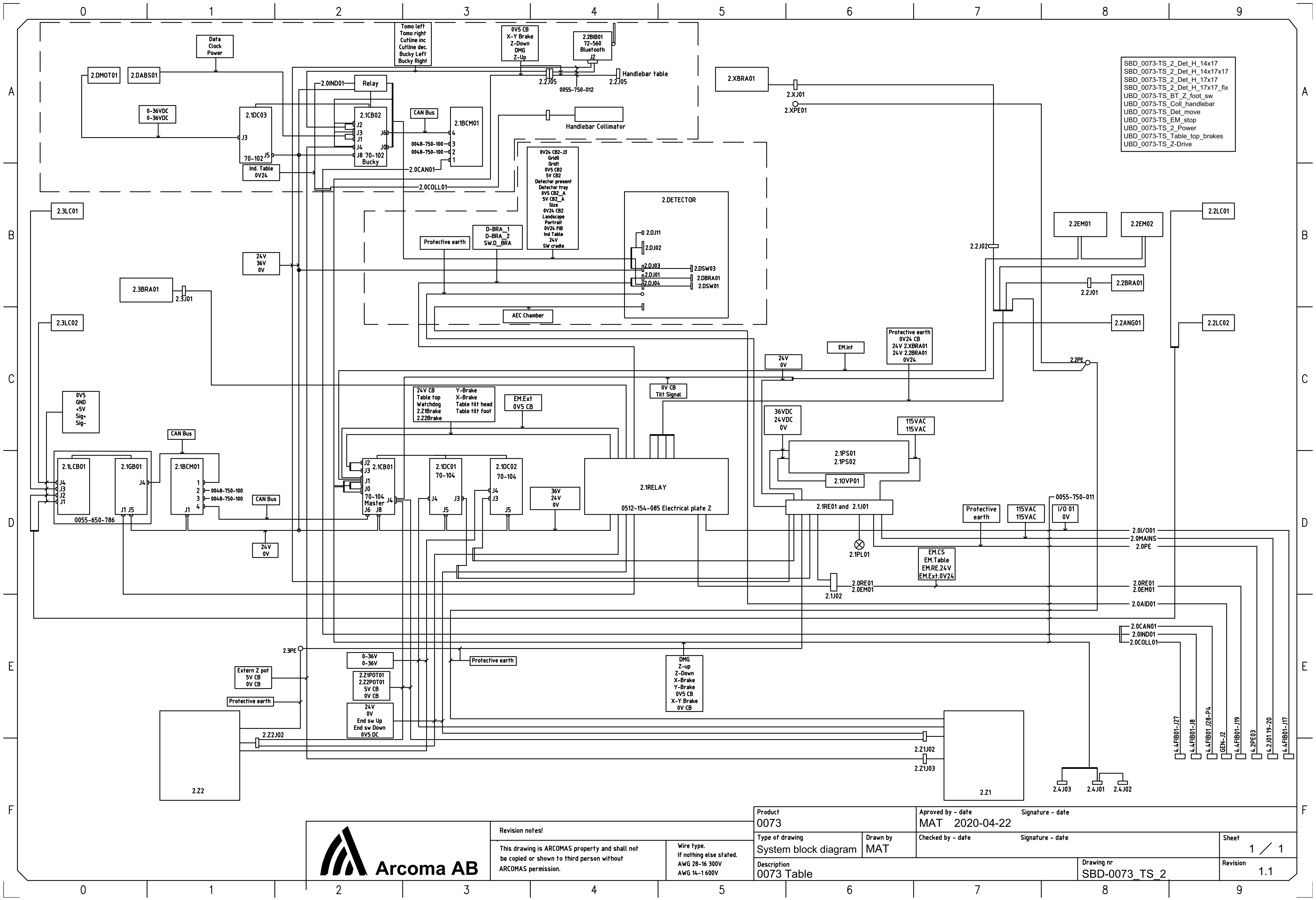


Arcoma AB

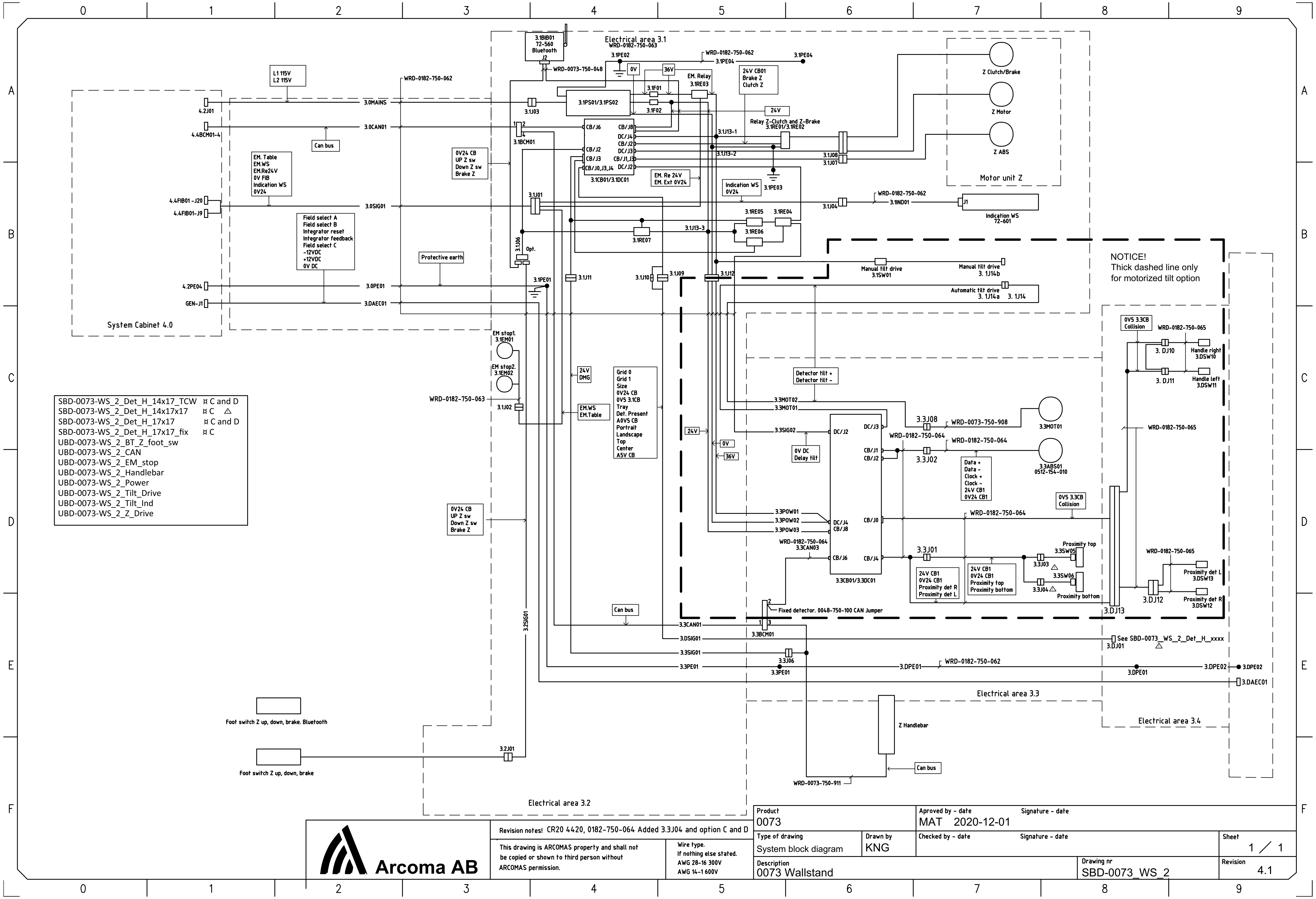
Revision notes!

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product: 0073		Aproved by - date: MAT 2020-05-11	Signature - date
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 1
Description: 0073-system cabinet C with CPI generator		Drawing nr: SBD-0073_SC_2_C	Revision: 1.1

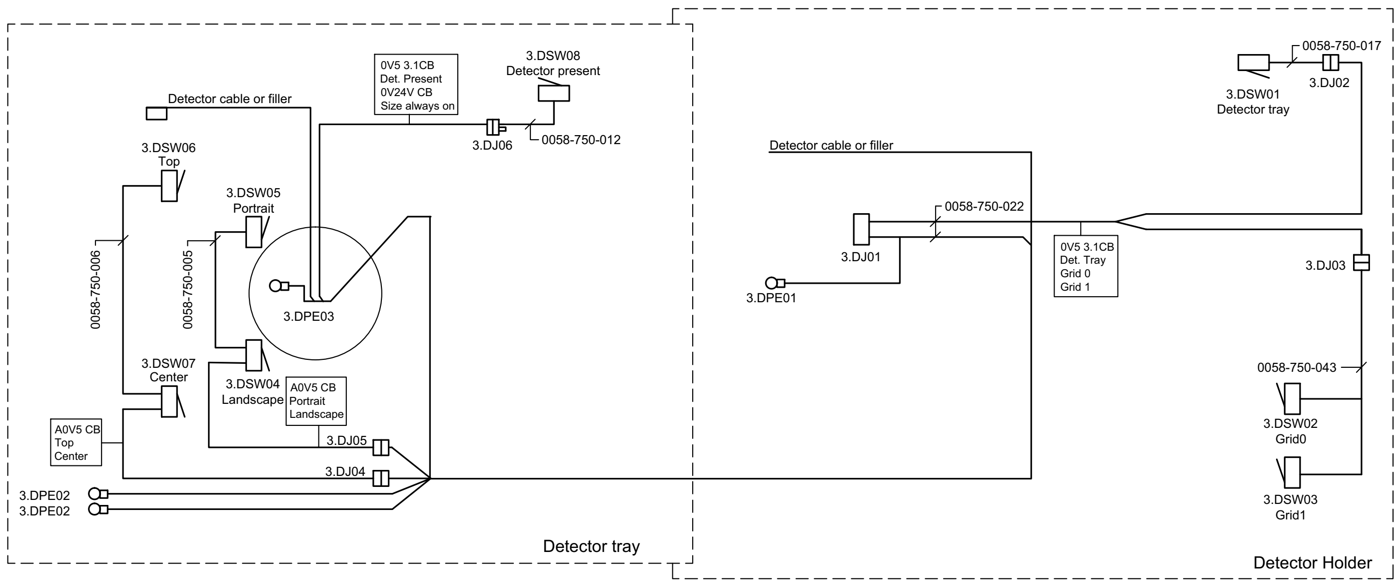


SBD_0073-TS_2_Det_H_14x17
SBD_0073-TS_2_Det_H_14x17x17
SBD_0073-TS_2_Det_H_17x17
SBD_0073-TS_2_Det_H_17x17_fix
UBD_0073-TS_BT_Z_foot_sw
UBD_0073-TS_Coll_handlebar
UBD_0073-TS_Det_move
UBD_0073-TS_EM_stop
UBD_0073-TS_2_Power
UBD_0073-TS_Table_top_brakes
UBD_0073-TS_Z-Drive
2.1RELAY
0512-154-085 Electrical plate Z
2.DETECTOR
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0073
Aproved by - date MAT 2020-04-22
Signature - date
Type of drawing System block diagram
Drawn by MAT
Checked by - date
Sheet 1 / 1
Description 0073 Table
Drawing nr SBD-0073_TS_2
Revision 1.1



Electrical area 3.1
Electrical area 3.2
Electrical area 3.3
Electrical area 3.4
System Cabinet 4.0
Motor unit Z
Z Clutch/Brake
Z Motor
Z ABS
NOTICE!
Thick dashed line only
for motorized tilt option
SBD-0073-WS_2_Det_H_14x17_TCW ¤ C and D
SBD-0073-WS_2_Det_H_14x17x17 ¤ C
SBD-0073-WS_2_Det_H_17x17 ¤ C and D
SBD-0073-WS_2_Det_H_17x17_fix ¤ C
UBD-0073-WS_2_BT_Z_foot_sw
UBD-0073-WS_2_CAN
UBD-0073-WS_2_EM_stop
UBD-0073-WS_2_Handlebar
UBD-0073-WS_2_Power
UBD-0073-WS_2_Tilt_Drive
UBD-0073-WS_2_Tilt_Ind
UBD-0073-WS_2_Z_Drive
Foot switch Z up, down, brake. Bluetooth
Foot switch Z up, down, brake
Z Handlebar
Arcoma AB
Revision notes! CR20 4420, 0182-750-064 Added 3.3J04 and option C and D
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0073
Aproved by - date MAT 2020-12-01
Signature - date
Type of drawing System block diagram
Drawn by KNG
Checked by - date
Sheet 1 / 1
Description 0073 Wallstand
Drawing nr SBD-0073_WS_2
Revision 4.1

UBD-0073_WS_2_Det_H_14x17_TCW



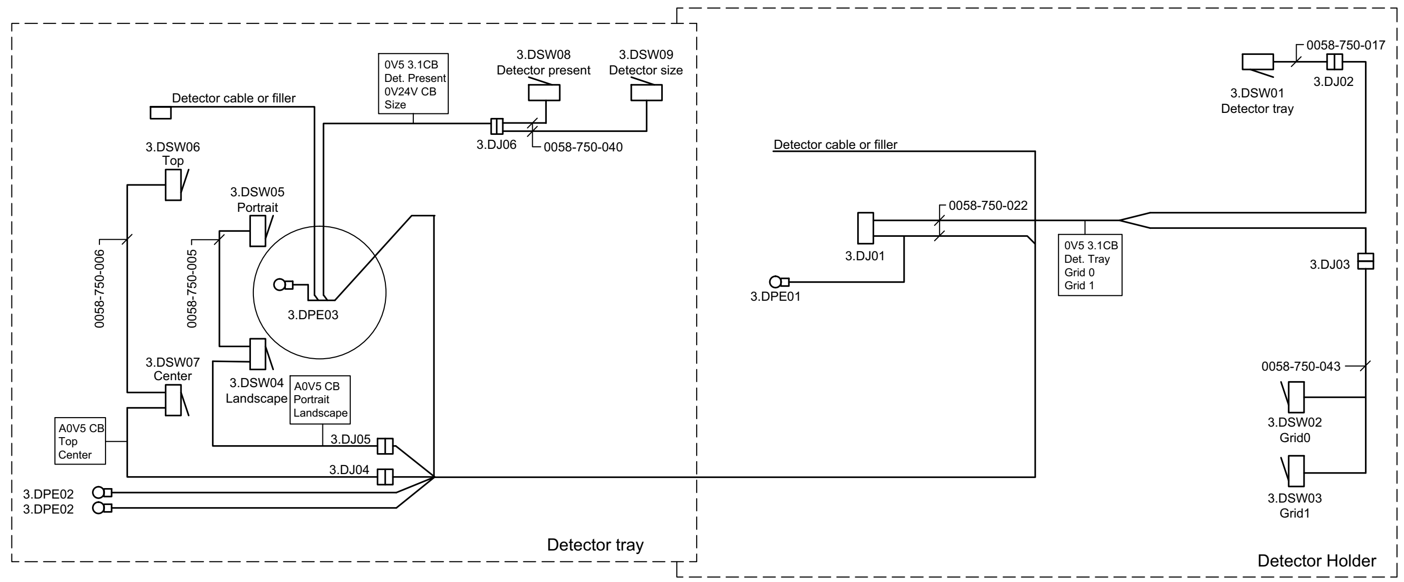
Product: 0073		Aproved by - date: MAT 2020-04-01	Signature - date
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Signature - date
Description: Detector holder 14x17, 17x17, top, center Wall stand		Drawing nr: SBD-0073_WS_2_Det_H_14x17_TCW	Sheet: 1 / 1 — Revision: 2.1

Arcoma AB

Revision notes!

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

UBD-0073_WS_2_Det_H_14x17x17



Arcoma AB

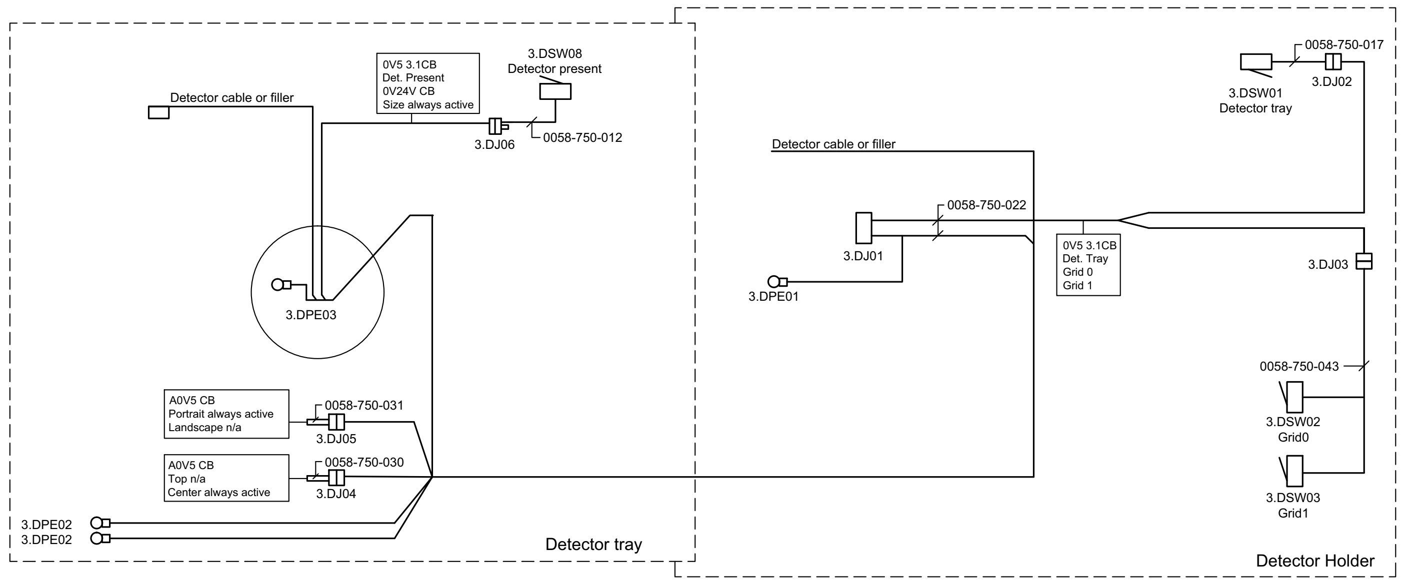
Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

Product: 0073	Aproved by - date: MAT 2020-04-01	Signature - date	
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: Detector holder 14x17 or 17x17		Drawing nr: SBD-0073_WS_2_Det_H_14x17x17	Revision: 2.1

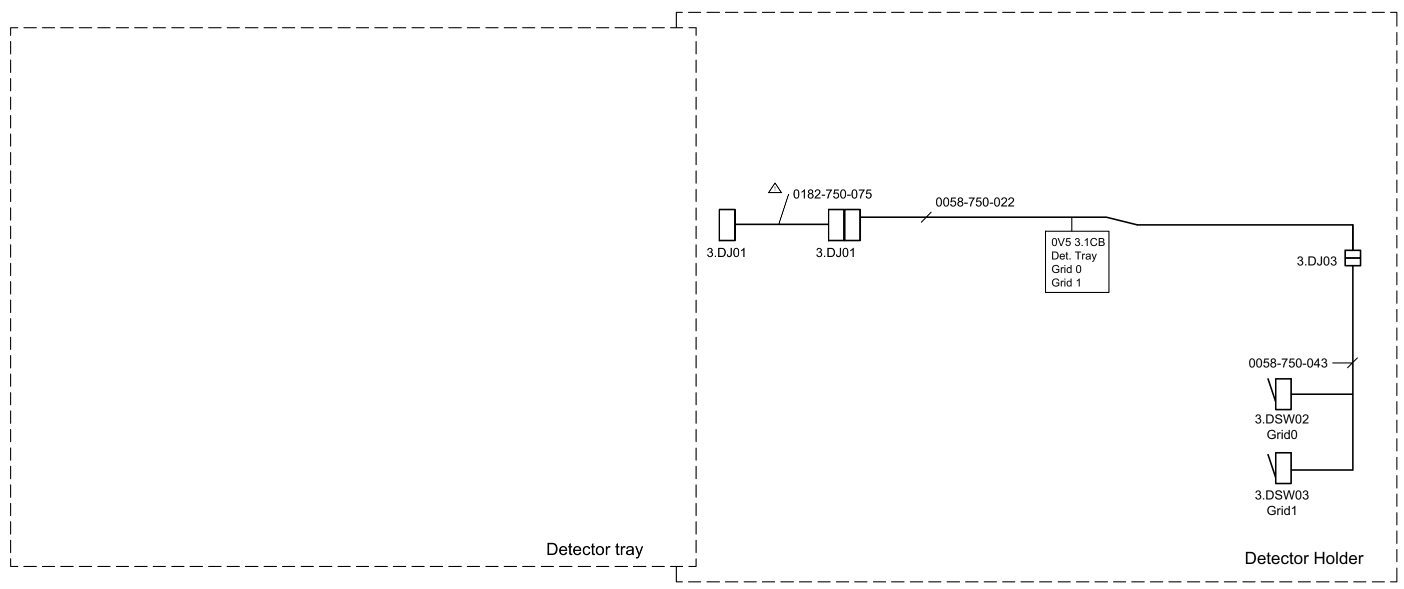
UBD-0073_WS_2_Det_H_17x17



Arcoma AB	Revision notes!	
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product	Aproved by - date	Signature - date		
0073	MAT 2020-04-01			
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 1
Description: Detector holder 17x17 Wallstand			Drawing nr: SBD-0073_WS_2_Det_H_17x17	Revision: 2.1

UBD-0073_WS_2_Det_H_17x17_fix



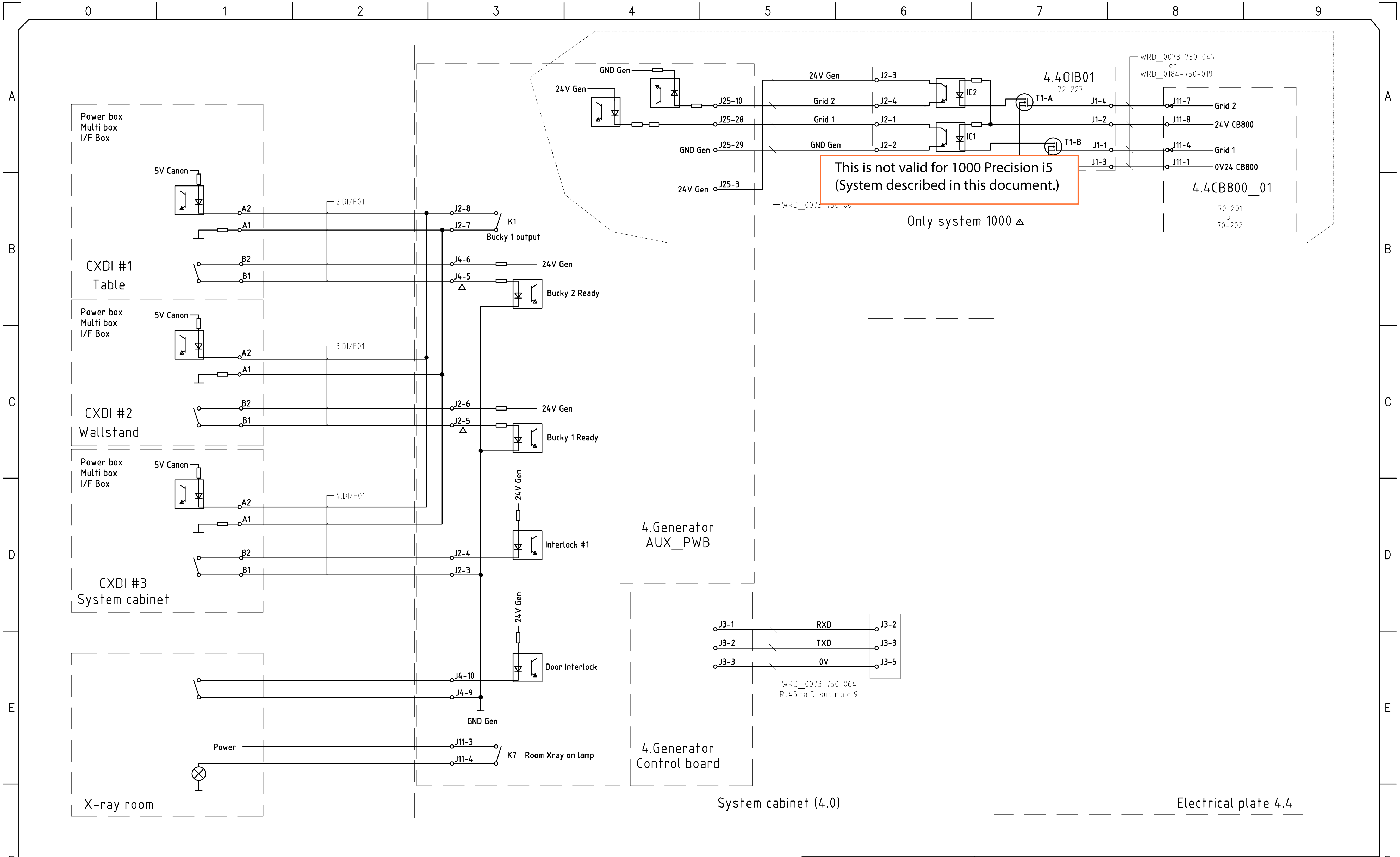
Arcoma AB

Revision notes! CR20 4420 added 0182-750-075

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

Product	Aproved by - date	Signature - date		
0073	MAT 2020-11-25			
Type of drawing: System block diagram	Drawn by: MAT	Checked by - date	Signature - date	Sheet: 1 / 1
Description: Detector holder 17x17_fix Wallstand			Drawing nr: SBD-0073_WS_2_Det_H_17x17_fix	Revision: 3.1



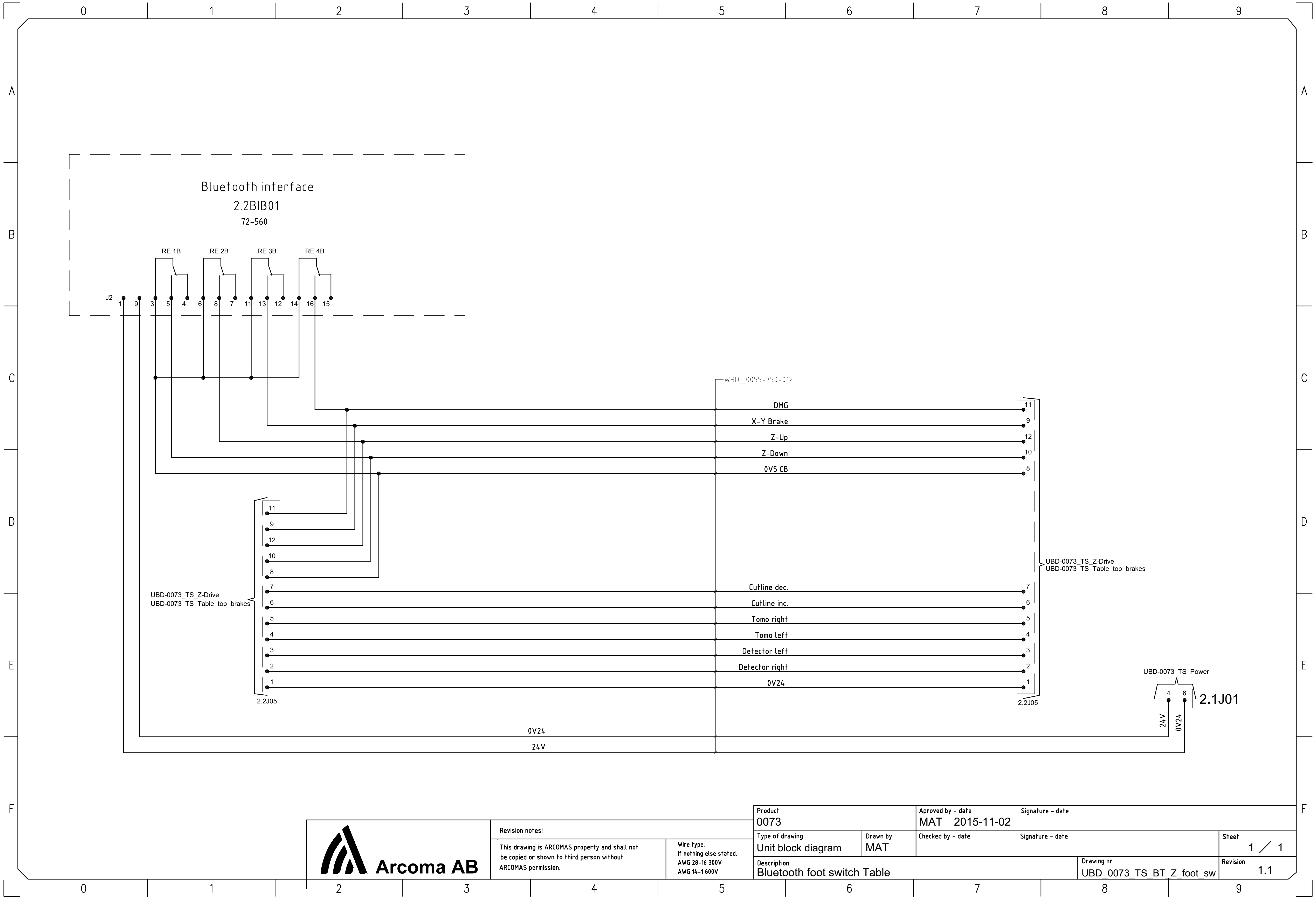
Product	Aproved by - date	Signature - date	
C	MAT 2018-02-19		
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: Image system C		Drawing nr: UBD_C_Image_system	Revision: 2.1

Arcoma AB

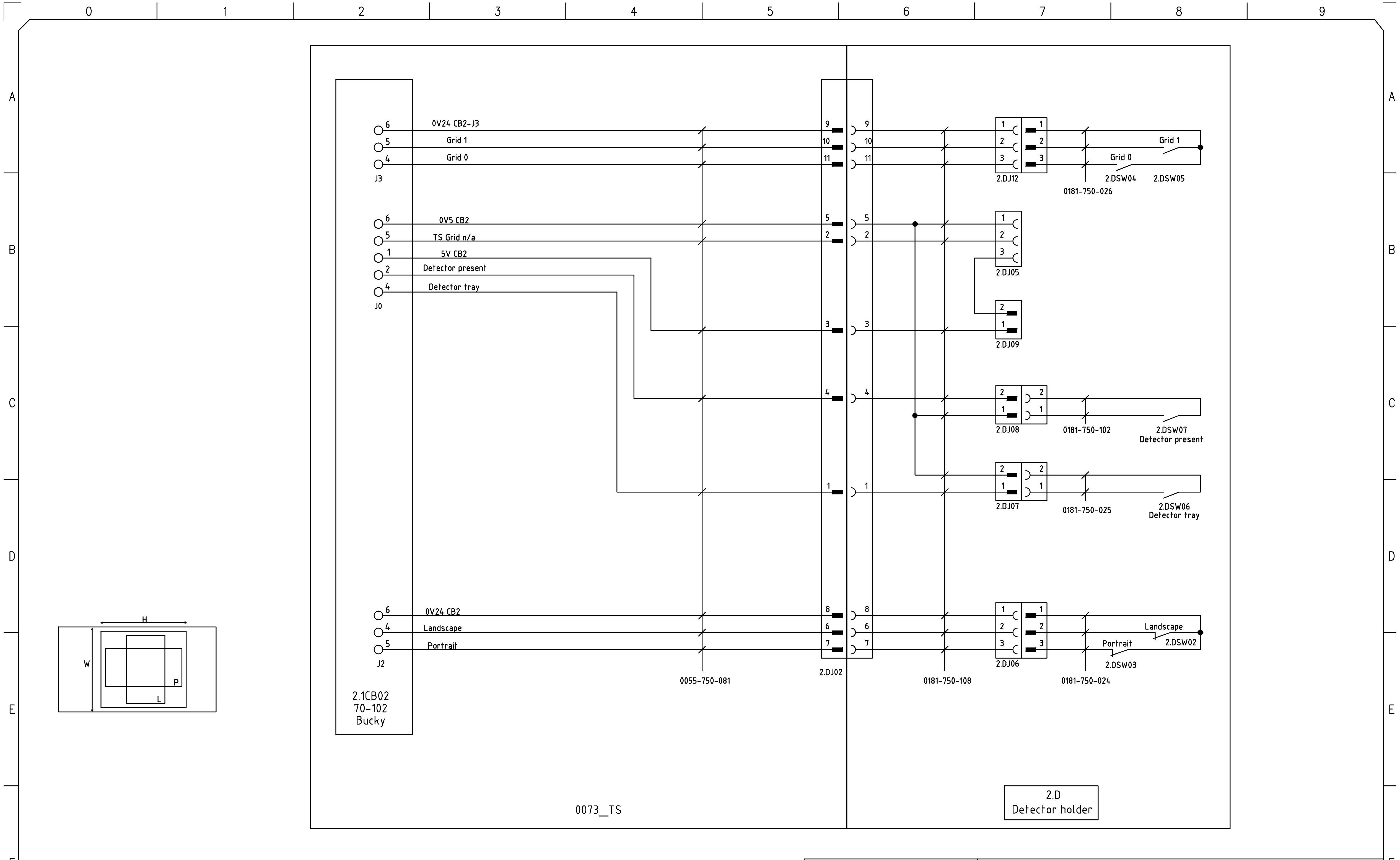
Revision notes! Swapped J2 5-6 and J4 5-6. Added only system 1000

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V



Bluetooth interface
2.2BIB01
72-560
RE 1B
RE 2B
RE 3B
RE 4B
J2
WRD_0055-750-012
DMG
X-Y Brake
Z-Up
Z-Down
0V5 CB
UBD-0073_TS_Z-Drive
UBD-0073_TS_Table_top_brakes
Cutline dec.
Cutline inc.
Tomo right
Tomo left
Detector left
Detector right
0V24
2.2J05
UBD-0073_TS_Power
2.1J01
24V
0V24
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2015-11-02
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Bluetooth foot switch Table
Drawing nr
UBD_0073_TS_BT_Z_foot_sw
Revision
1.1

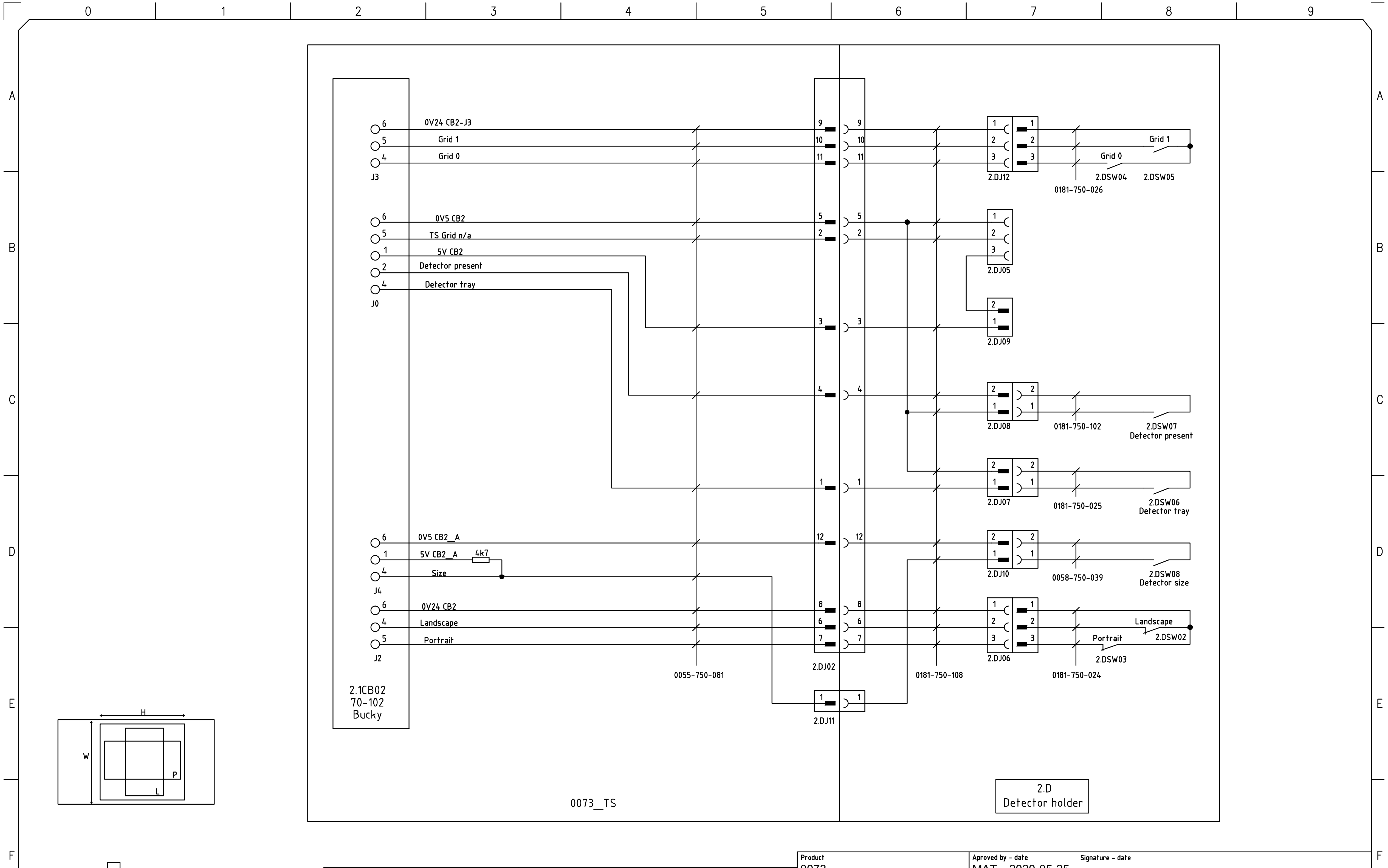


Product: 0073	Aproved by - date: MAT 2020-05-25	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: Detector holder 14x17, table.		Drawing nr: UBD-0073_TS_2_Det_H_14x17	Revision: 1.1

Arcoma AB

Revision notes!

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V



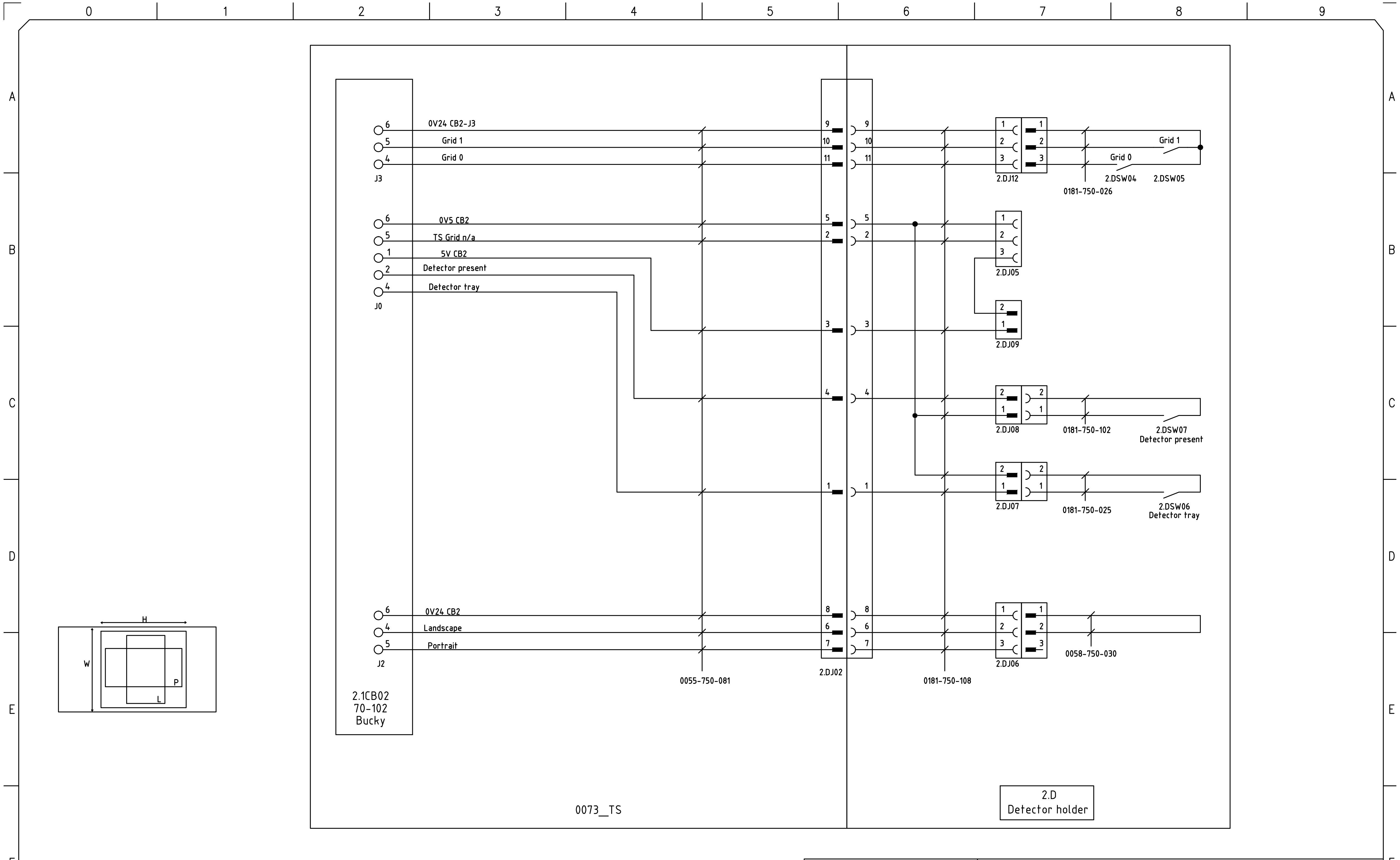
Arcoma AB

Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

Product	Aproved by - date	Signature - date	
0073	MAT 2020-05-25		
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Sheet: 1 / 1
Description: Detector holder 14x17 17x17, table.		Drawing nr: UBD-0073_TS_2_Det_H_14x17x17	Revision: 1.1



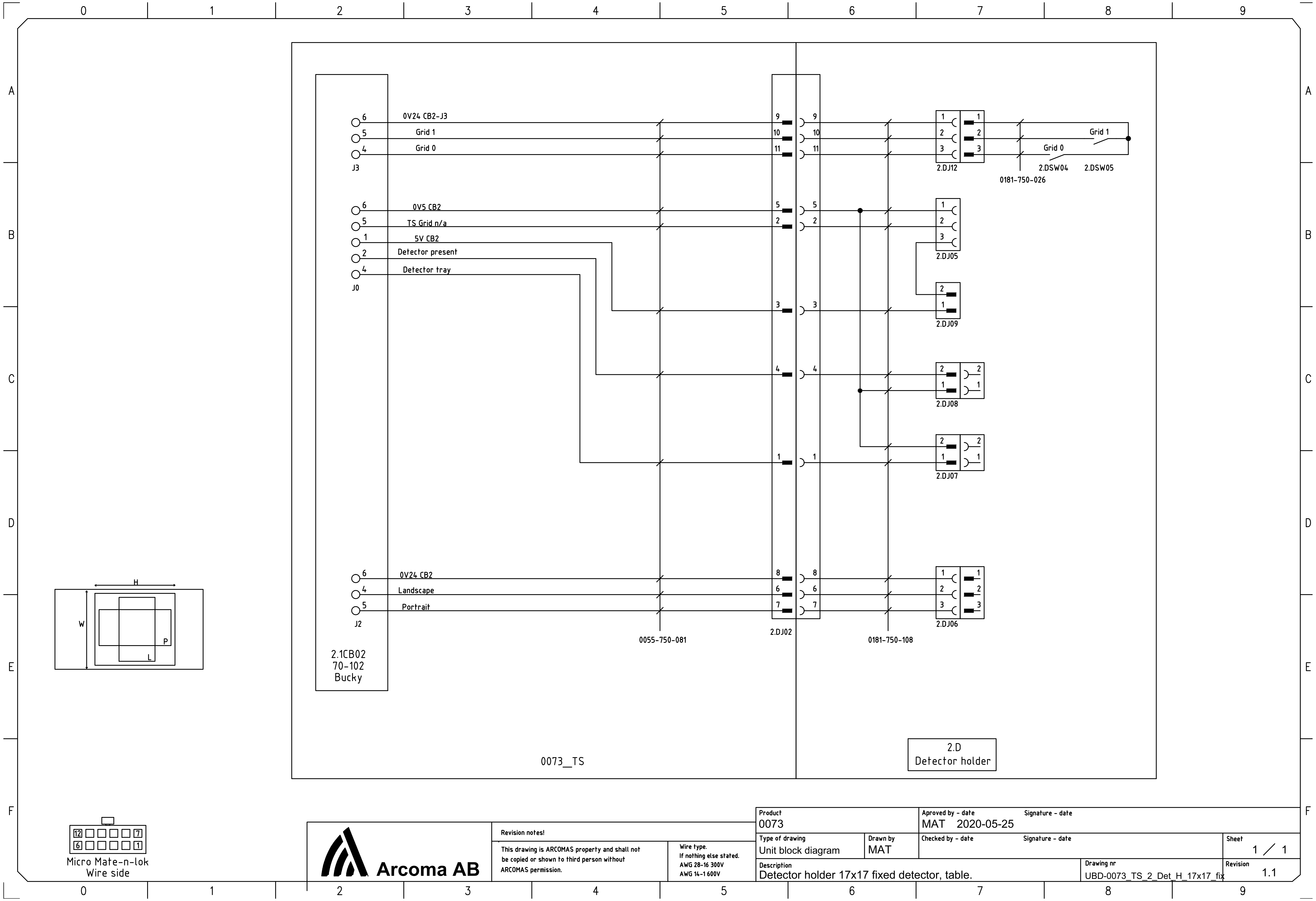
Arcoma AB

Revision notes!

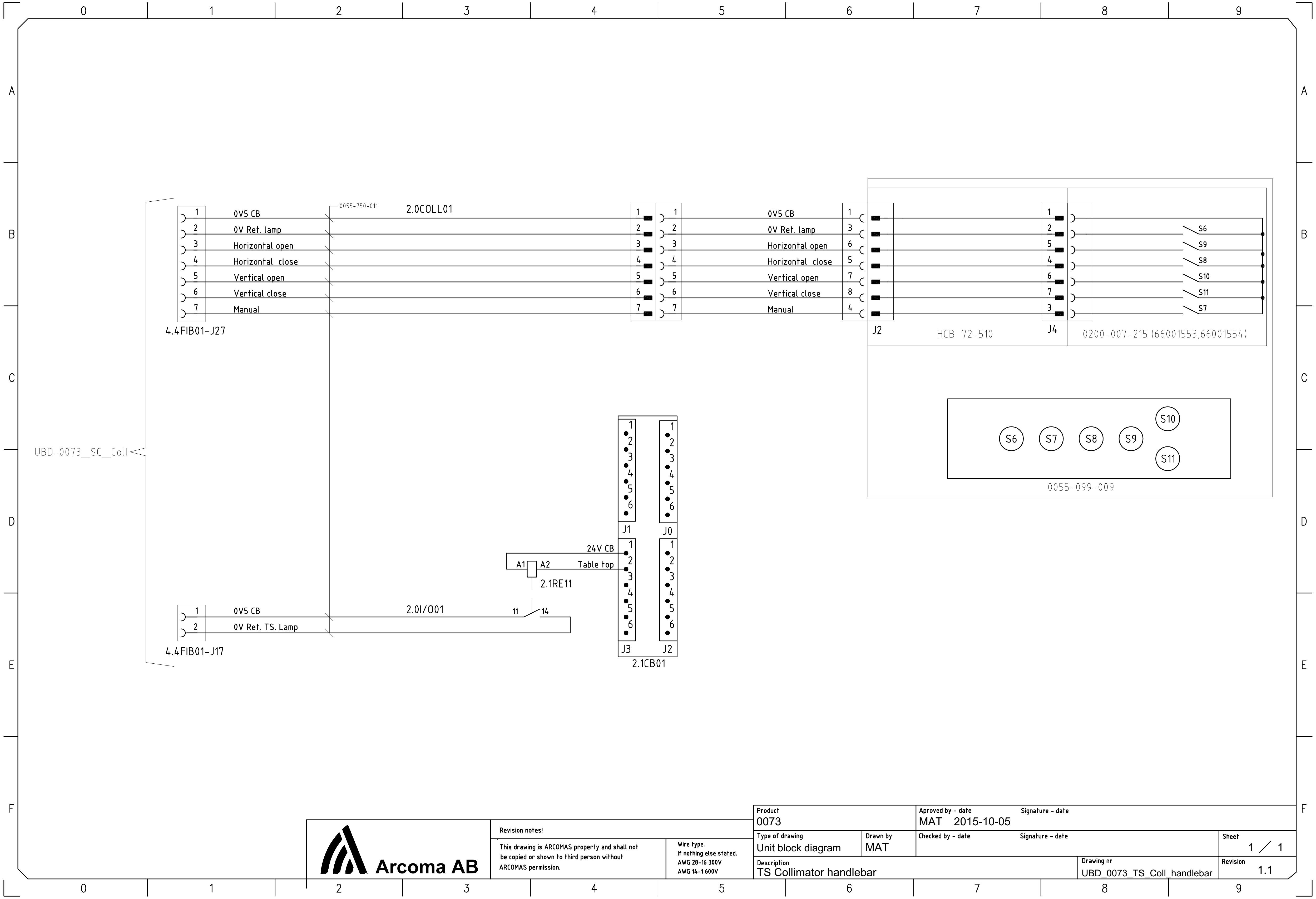
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

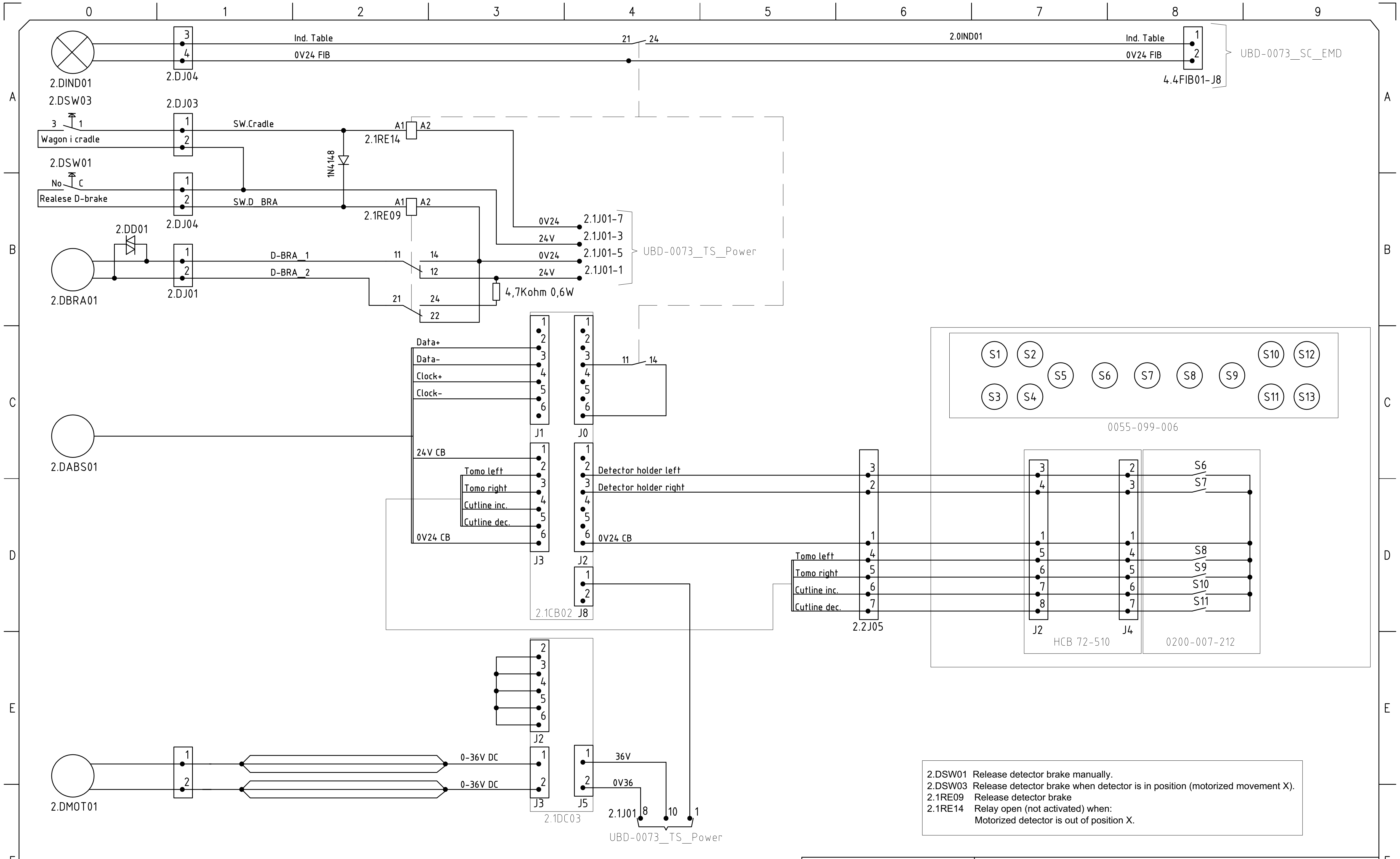
Product: 0073	Aproved by - date: MAT 2020-05-25	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: Detector holder 17x17, table.		Drawing nr: UBD-0073_TS_2_Det_H_17x17	Revision: 1.1



0V24 CB2-J3
Grid 1
Grid 0
J3
0V5 CB2
TS Grid n/a
5V CB2
Detector present
Detector tray
J0
0V24 CB2
Landscape
Portrait
J2
2.1CB02
70-102
Bucky
0055-750-081
2.DJ02
0181-750-108
2.DJ12
0181-750-026
2.DSW04
2.DSW05
Grid 1
Grid 0
2.DJ05
2.DJ09
2.DJ08
2.DJ07
2.DJ06
0073_TS
2.D
Detector holder
H
W
P
L
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-05-25
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Detector holder 17x17 fixed detector, table.
Drawing nr
UBD-0073_TS_2_Det_H_17x17_fix
Revision
1.1



UBD-0073__SC__Coll
4.4FIB01-J27
0V5 CB
0V Ret. lamp
Horizontal open
Horizontal close
Vertical open
Vertical close
Manual
0055-750-011
2.0COLL01
J2
HCB 72-510
J4
0200-007-215 (66001553,66001554)
S6
S9
S8
S10
S11
S7
0055-099-009
J1
J0
J3
J2
2.1CB01
24V CB
Table top
A1
A2
2.1RE11
11
14
2.0I/O01
0V Ret. TS. Lamp
4.4FIB01-J17
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2015-10-05
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
TS Collimator handlebar
Drawing nr
UBD_0073_TS_Coll_handlebar
Revision
1.1



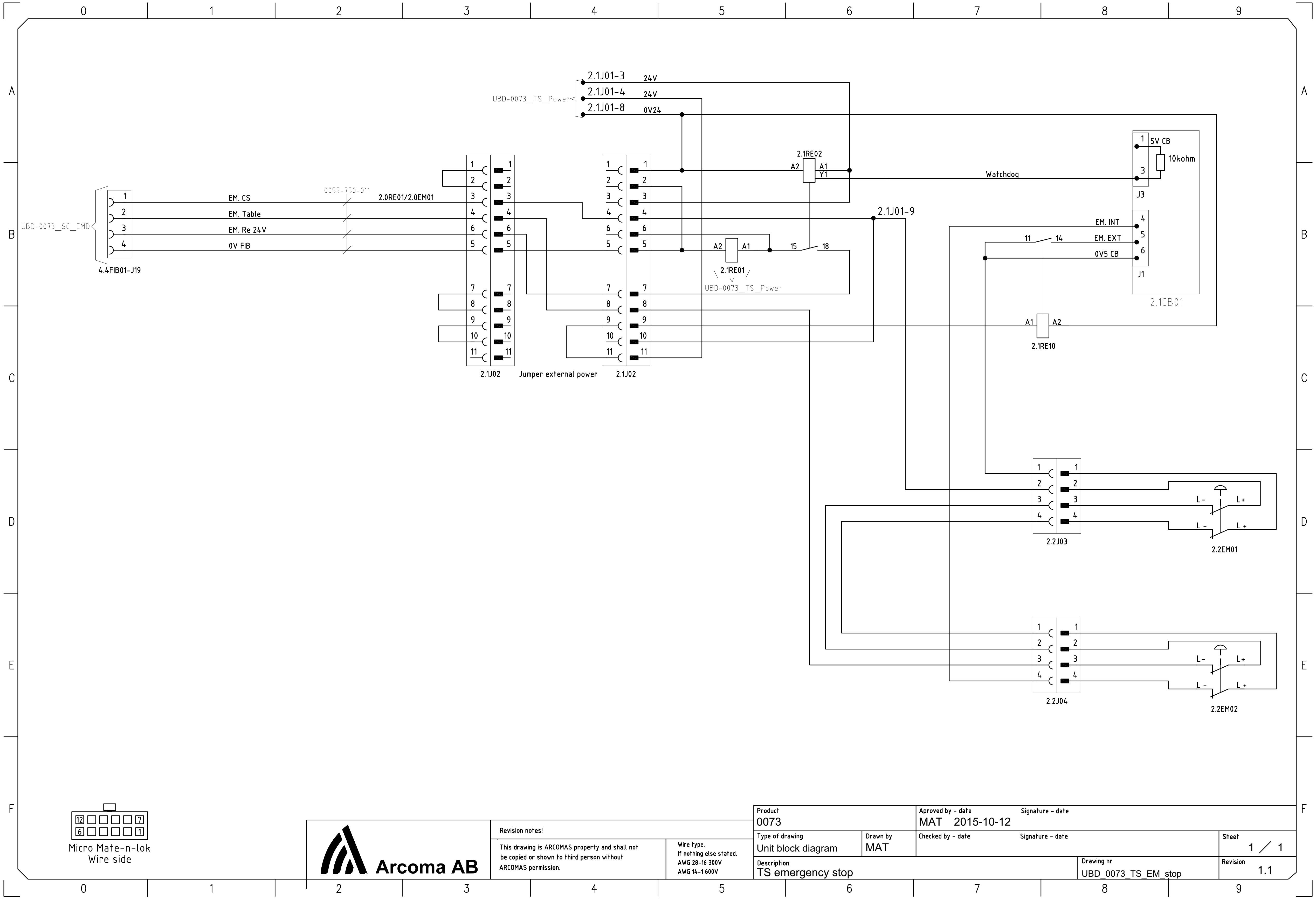
2.DSW01 Release detector brake manually.
2.DSW03 Release detector brake when detector is in position (motorized movement X).
2.1RE09 Release detector brake
2.1RE14 Relay open (not activated) when:
Motorized detector is out of position X.

Product: 0073	Aproved by - date: MAT 2015-09-29	Signature - date	
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Sheet: 1 / 1
Description: TS Detector movement		Drawing nr: UBD_0073_TS_Det_move	Revision: 1.1

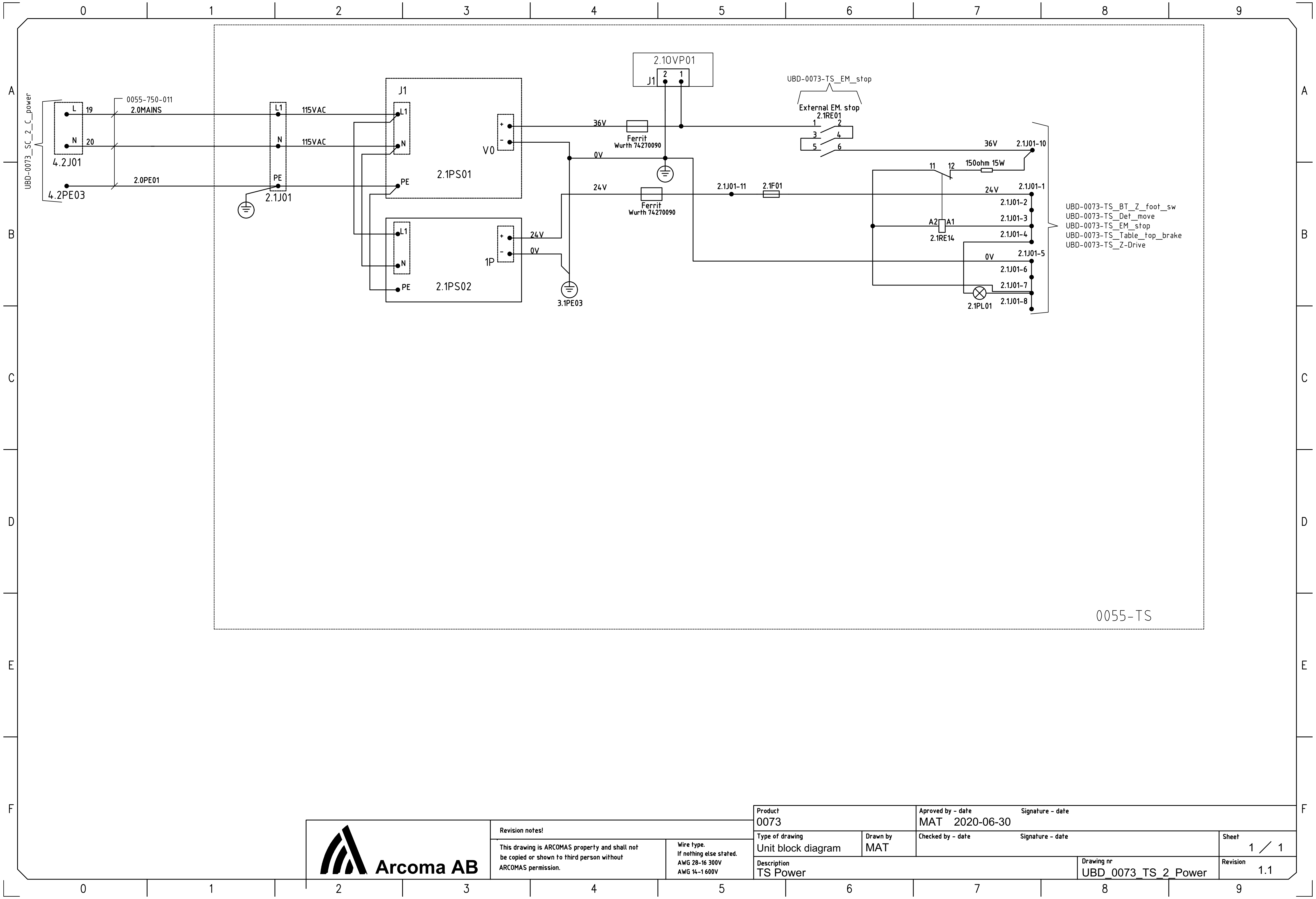
Arcoma AB

Revision notes!

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V



UBD-0073_TS_Power
2.1J01-3
2.1J01-4
2.1J01-8
24V
24V
0V24
UBD-0073_SC_EMD
4.4FIB01-J19
EM. CS
EM. Table
EM. Re 24V
0V FIB
0055-750-011
2.0RE01/2.0EM01
2.1J02
Jumper external power
2.1J02
2.1RE02
2.1RE01
UBD-0073_TS_Power
2.1J01-9
Watchdog
5V CB
10kohm
J3
EM. INT
EM. EXT
0V5 CB
J1
2.1CB01
2.1RE10
2.2J03
2.2EM01
2.2J04
2.2EM02
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2015-10-12
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
TS emergency stop
Drawing nr
UBD_0073_TS_EM_stop
Revision
1.1

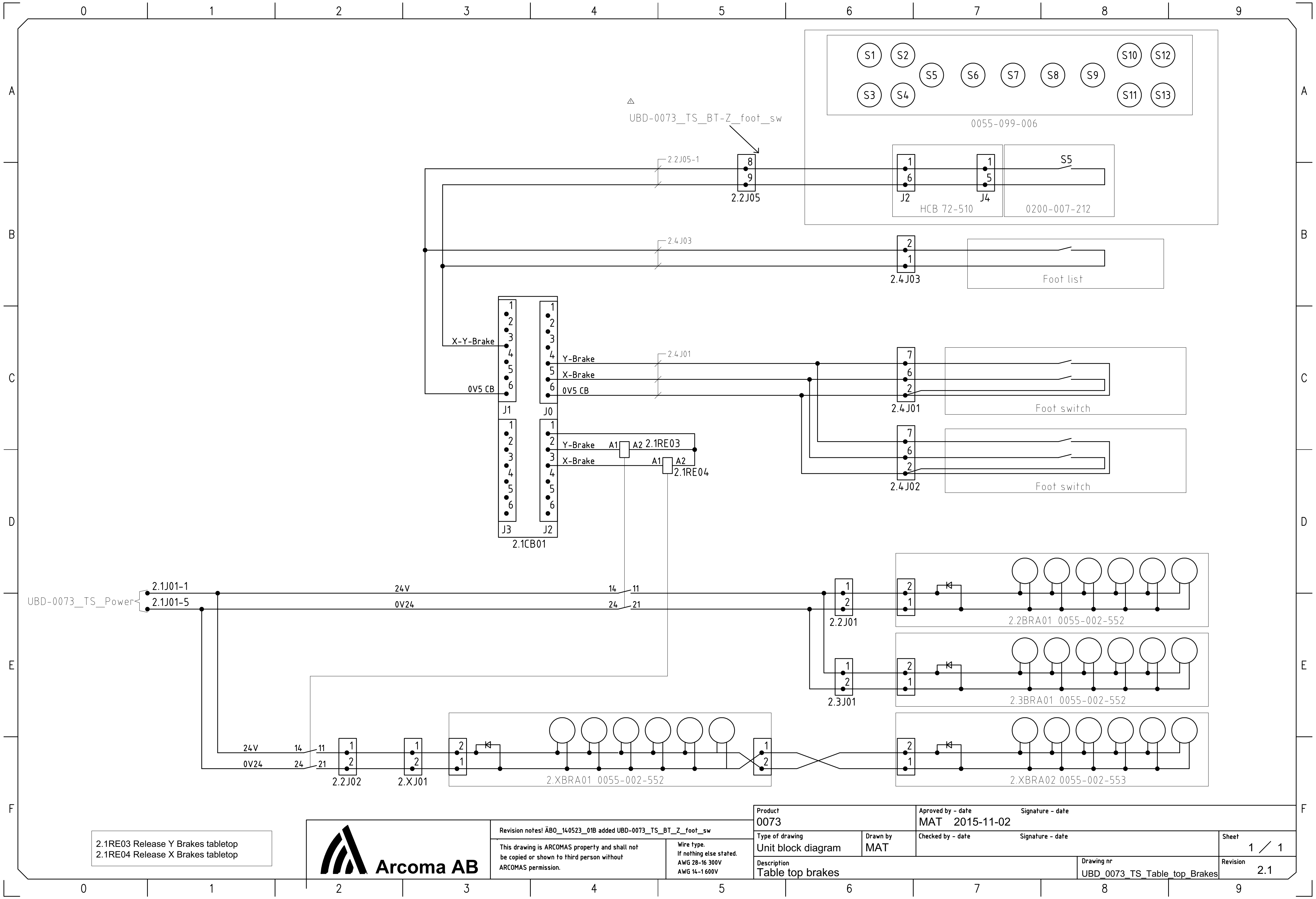


Product	Aproved by - date	Signature - date	
0073	MAT 2020-06-30		
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date / Signature - date	Sheet: 1 / 1
Description: TS Power		Drawing nr: UBD_0073_TS_2_Power	Revision: 1.1

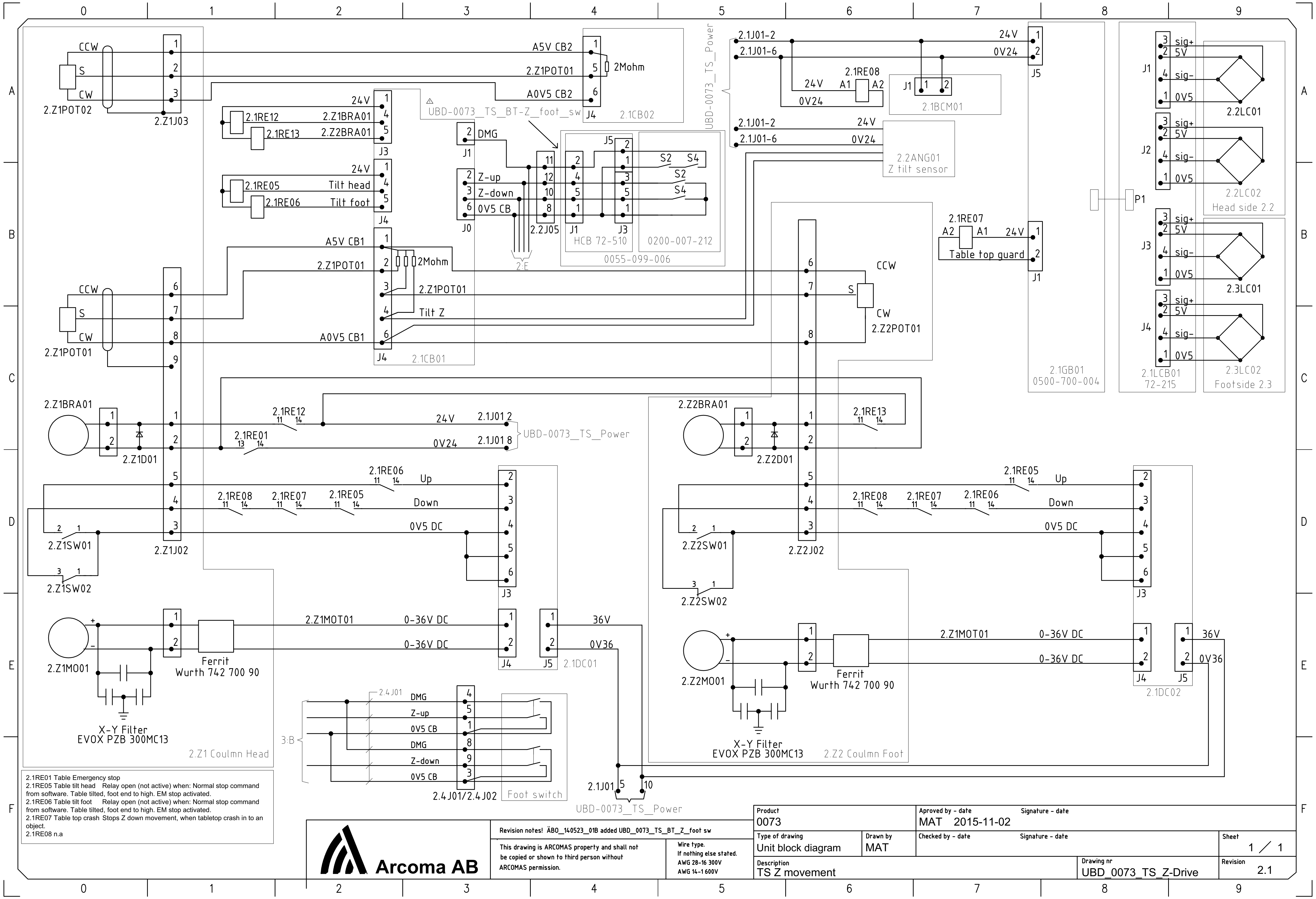
Arcoma AB

Revision notes!

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V



S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
0055-099-006
UBD-0073__TS__BT-Z__foot__sw
2.2J05-1
2.2J05
J2
J4
HCB 72-510
0200-007-212
2.4J03
Foot list
X-Y-Brake
0V5 CB
Y-Brake
X-Brake
J1
J0
2.4J01
Foot switch
2.4J02
2.1RE03
2.1RE04
J3
J2
2.1CB01
UBD-0073__TS__Power
2.1J01-1
2.1J01-5
24V
0V24
2.2J01
2.2BRA01 0055-002-552
2.3J01
2.3BRA01 0055-002-552
2.2J02
2.XJ01
2.XBRA01 0055-002-552
2.XBRA02 0055-002-553
2.1RE03 Release Y Brakes tabletop
2.1RE04 Release X Brakes tabletop
Arcoma AB
Revision notes! ÄBO__140523__01B added UBD-0073__TS__BT__Z__foot__sw
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2015-11-02
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Table top brakes
Drawing nr
UBD_0073_TS_Table_top_Brakes
Revision
2.1



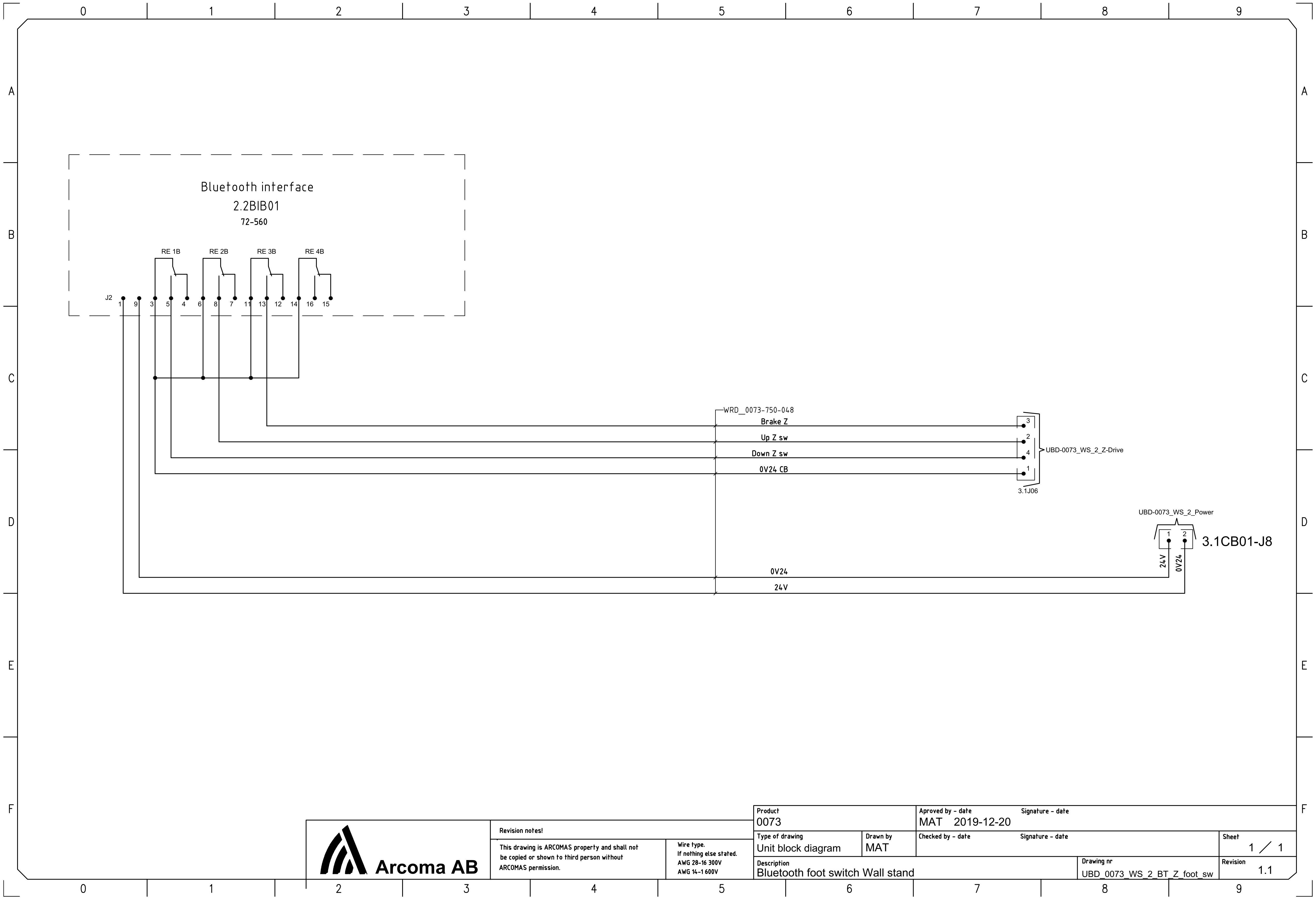
2.1RE01 Table Emergency stop
2.1RE05 Table tilt head Relay open (not active) when: Normal stop command from software. Table tilted, foot end to high. EM stop activated.
2.1RE06 Table tilt foot Relay open (not active) when: Normal stop command from software. Table tilted, foot end to high. EM stop activated.
2.1RE07 Table top crash Stops Z down movement, when tabletop crash in to an object.
2.1RE08 n.a

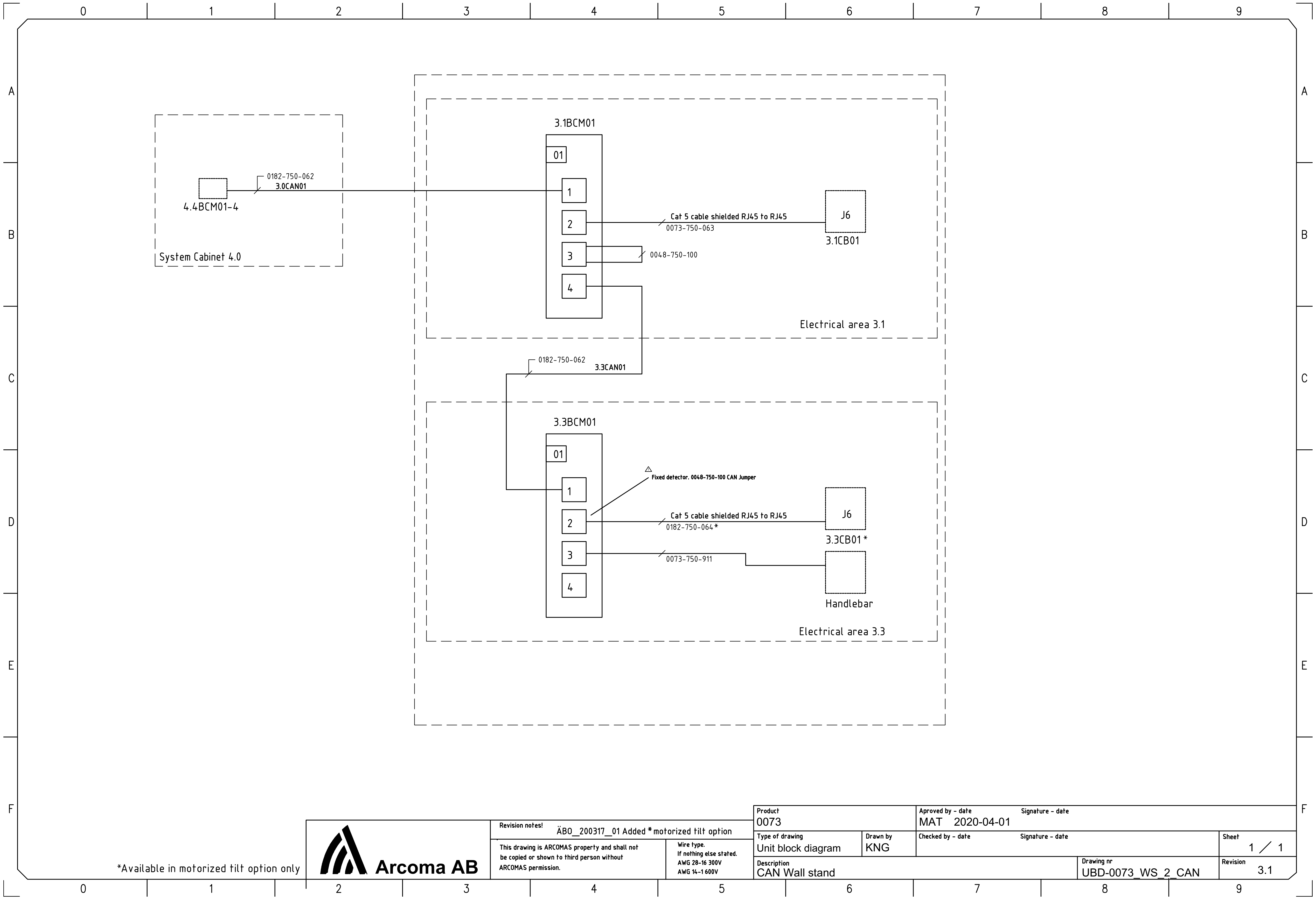
Arcoma AB

Revision notes! ÄBO__140523__01B added UBD__0073__TS__BT__Z__foot sw

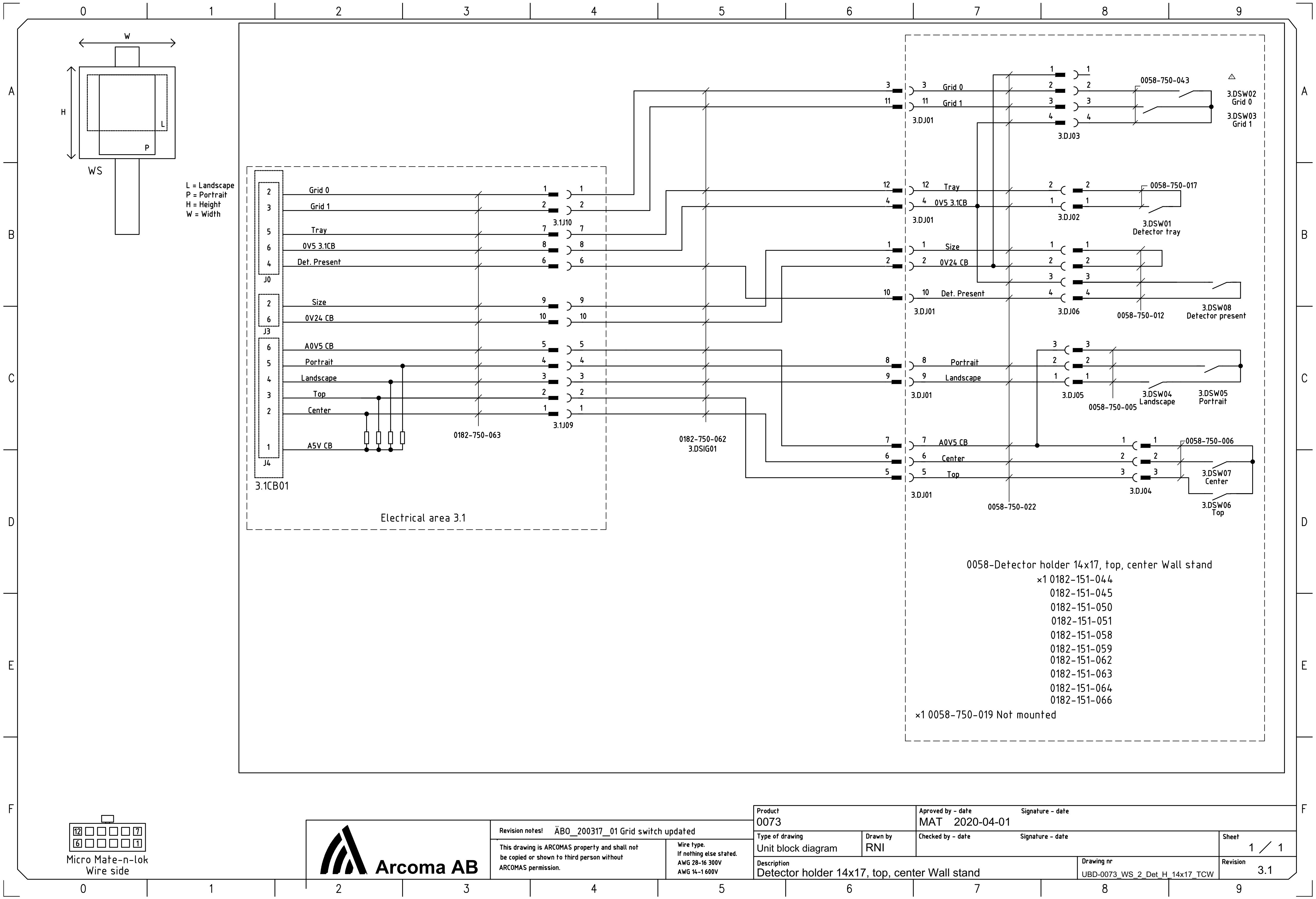
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

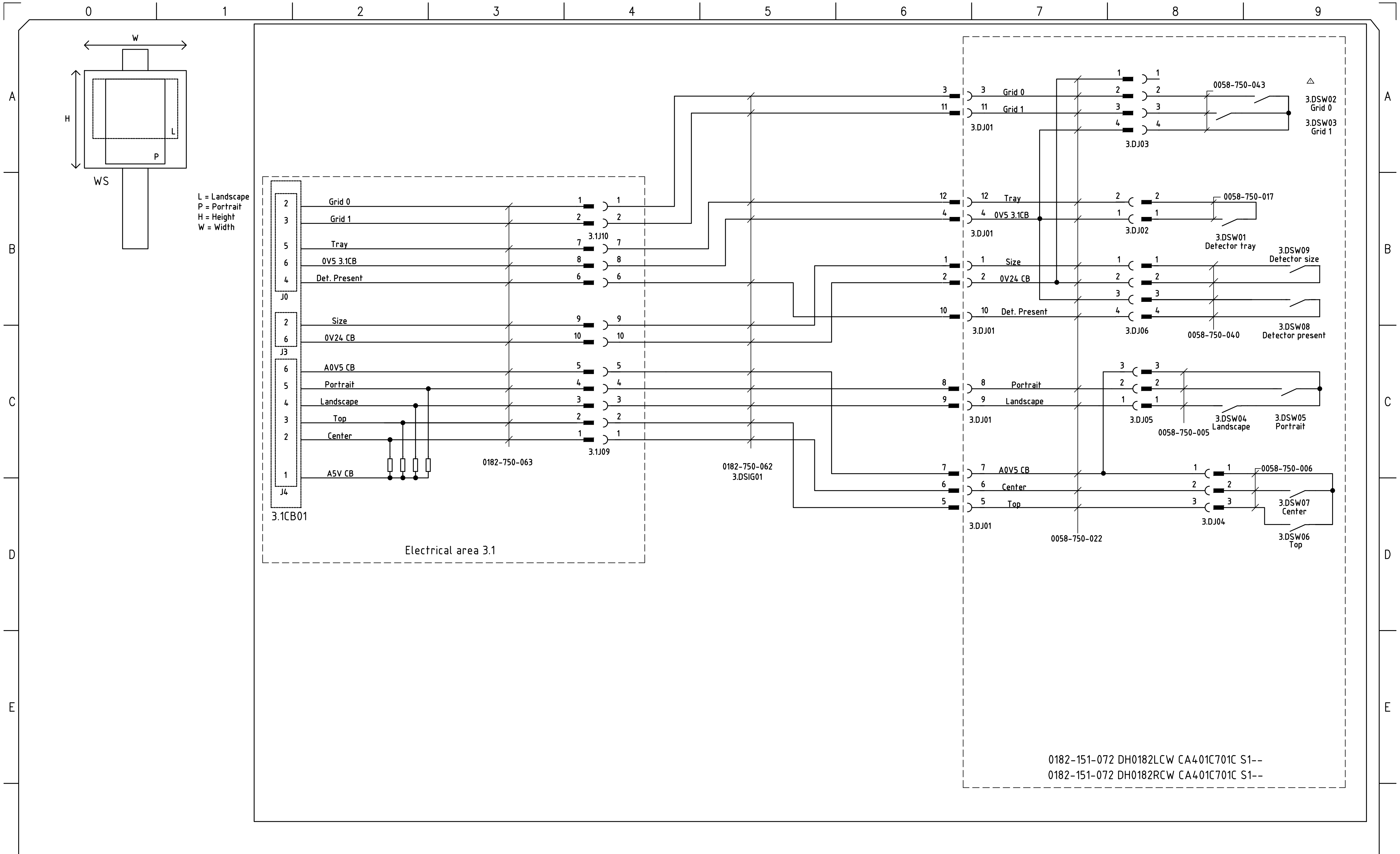
Product	Aproved by - date	Signature - date	
0073	MAT 2015-11-02		
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date	Sheet: 1 / 1
Description: TS Z movement		Drawing nr: UBD_0073_TS_Z-Drive	Revision: 2.1


Bluetooth interface
2.2BIB01
72-560
RE 1B
RE 2B
RE 3B
RE 4B
J2
1
9
3
5
4
6
8
7
11
13
12
14
16
15
WRD_0073-750-048
Brake Z
Up Z sw
Down Z sw
0V24 CB
3
2
4
1
UBD-0073_WS_2_Z-Drive
3.1J06
UBD-0073_WS_2_Power
3.1CB01-J8
24V
0V24
0V24
24V
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2019-12-20
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Bluetooth foot switch Wall stand
Drawing nr
UBD_0073_WS_2_BT_Z_foot_sw
Revision
1.1



System Cabinet 4.0
4.4BCM01-4
0182-750-062
3.0CAN01
3.1BCM01
01
1
2
3
4
Cat 5 cable shielded RJ45 to RJ45
0073-750-063
J6
3.1CB01
0048-750-100
Electrical area 3.1
0182-750-062
3.3CAN01
3.3BCM01
01
1
2
3
4
Fixed detector. 0048-750-100 CAN Jumper
Cat 5 cable shielded RJ45 to RJ45
0182-750-064*
J6
3.3CB01*
0073-750-911
Handlebar
Electrical area 3.3
*Available in motorized tilt option only
Arcoma AB
Revision notes!
ÄBO_200317_01 Added * motorized tilt option
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-04-01
Signature - date
Type of drawing
Unit block diagram
Drawn by
KNG
Checked by - date
Signature - date
Sheet
1 / 1
Description
CAN Wall stand
Drawing nr
UBD-0073_WS_2_CAN
Revision
3.1


WS
L = Landscape
P = Portrait
H = Height
W = Width
Grid 0
Grid 1
Tray
0V5 3.1CB
Det. Present
Size
0V24 CB
A0V5 CB
Portrait
Landscape
Top
Center
A5V CB
J0
J3
J4
3.1CB01
3.1J10
3.1J09
0182-750-063
0182-750-062
3.DSIG01
Electrical area 3.1
3.DJ01
3.DJ02
3.DJ03
3.DJ04
3.DJ05
3.DJ06
0058-750-043
0058-750-017
0058-750-012
0058-750-005
0058-750-006
0058-750-022
3.DSW01 Detector tray
3.DSW02 Grid 0
3.DSW03 Grid 1
3.DSW04 Landscape
3.DSW05 Portrait
3.DSW06 Top
3.DSW07 Center
3.DSW08 Detector present
0058-Detector holder 14x17, top, center Wall stand
x1 0182-151-044
0182-151-045
0182-151-050
0182-151-051
0182-151-058
0182-151-059
0182-151-062
0182-151-063
0182-151-064
0182-151-066
x1 0058-750-019 Not mounted
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! ÄBO_200317_01 Grid switch updated
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0073
Aproved by - date MAT 2020-04-01
Signature - date
Type of drawing Unit block diagram
Drawn by RNI
Checked by - date
Signature - date
Sheet 1 / 1
Description Detector holder 14x17, top, center Wall stand
Drawing nr UBD-0073_WS_2_Det_H_14x17_TCW
Revision 3.1



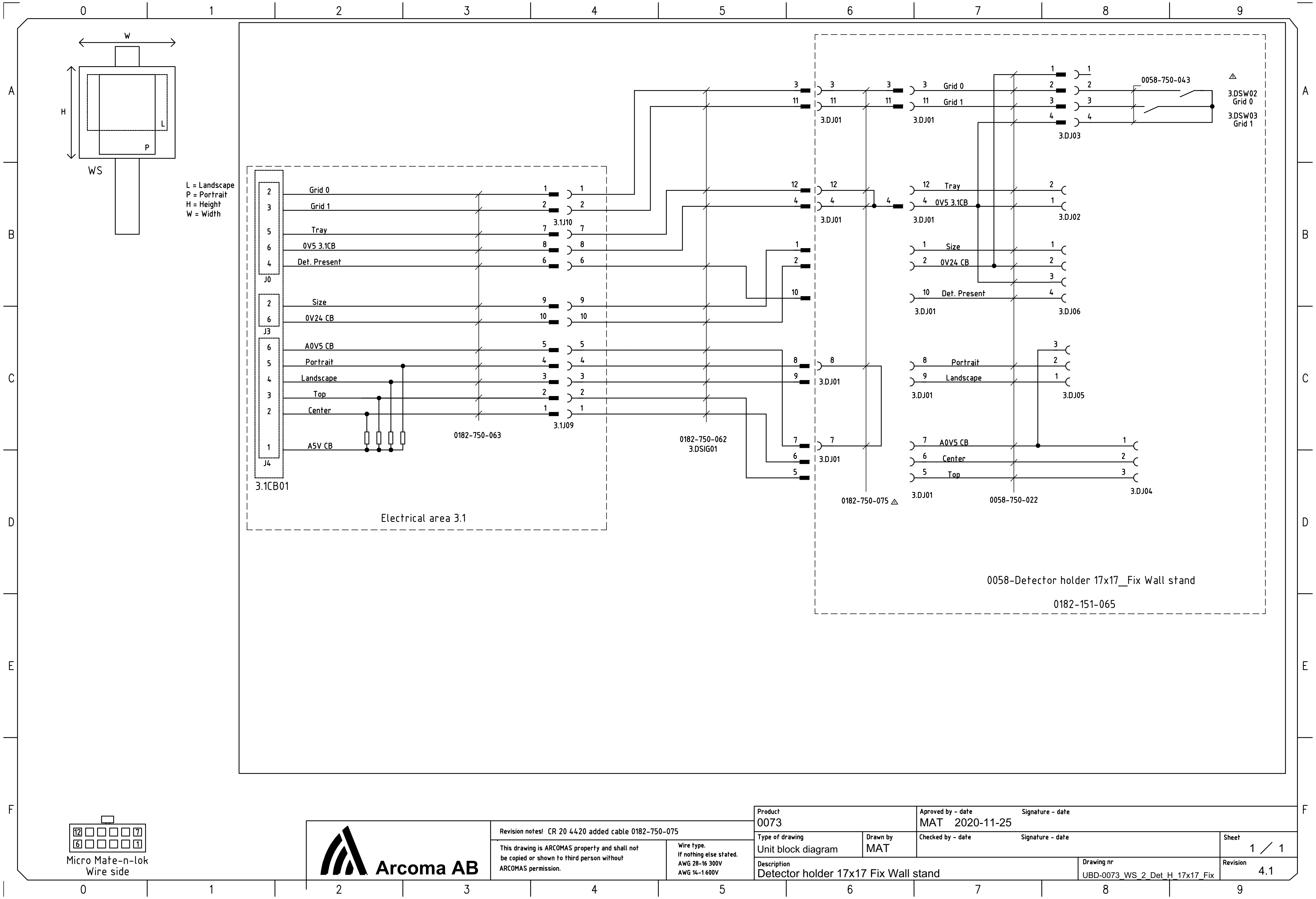
Arcoma AB

Revision notes! ÄBO_200317_01 Grid switch updated

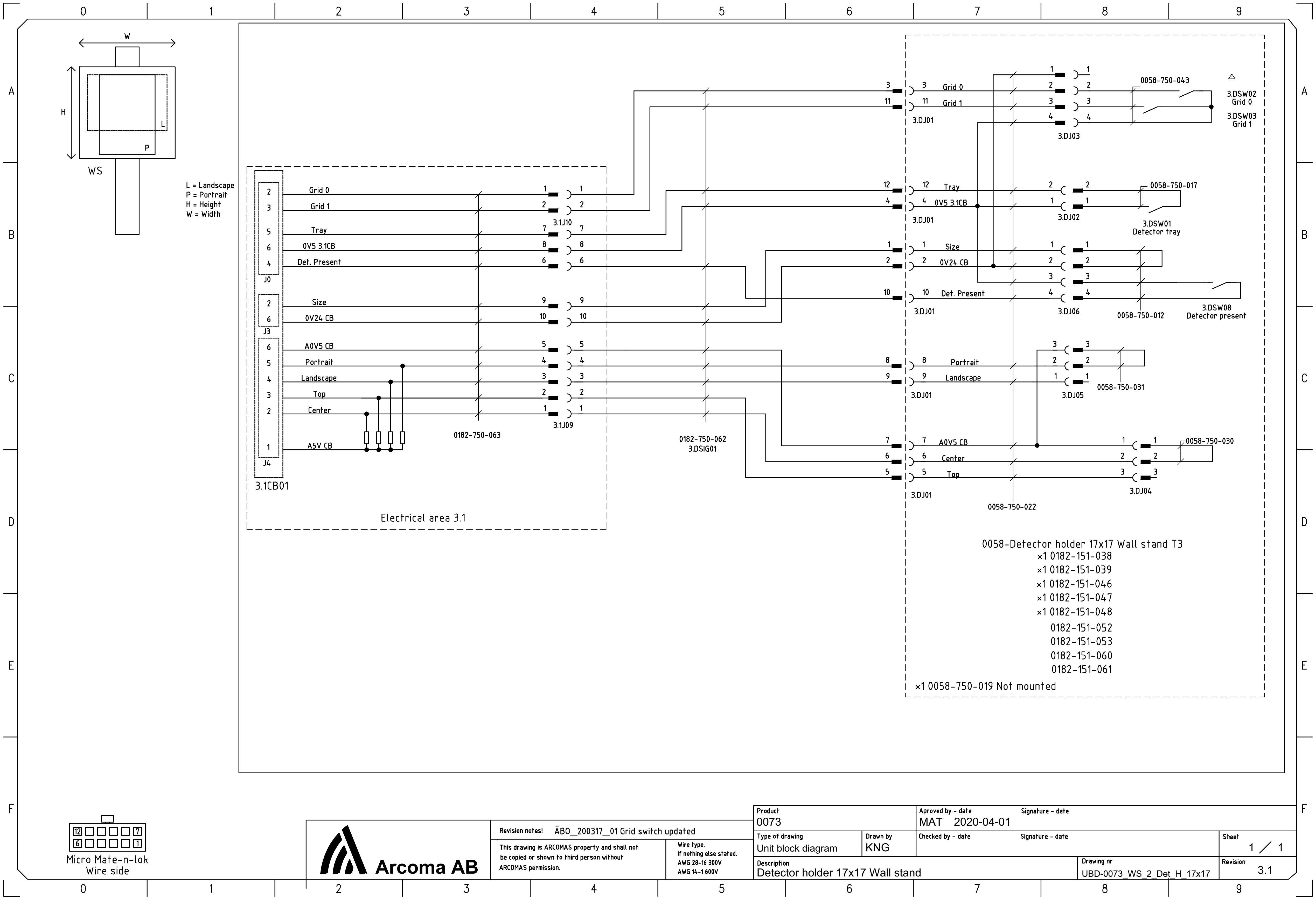
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

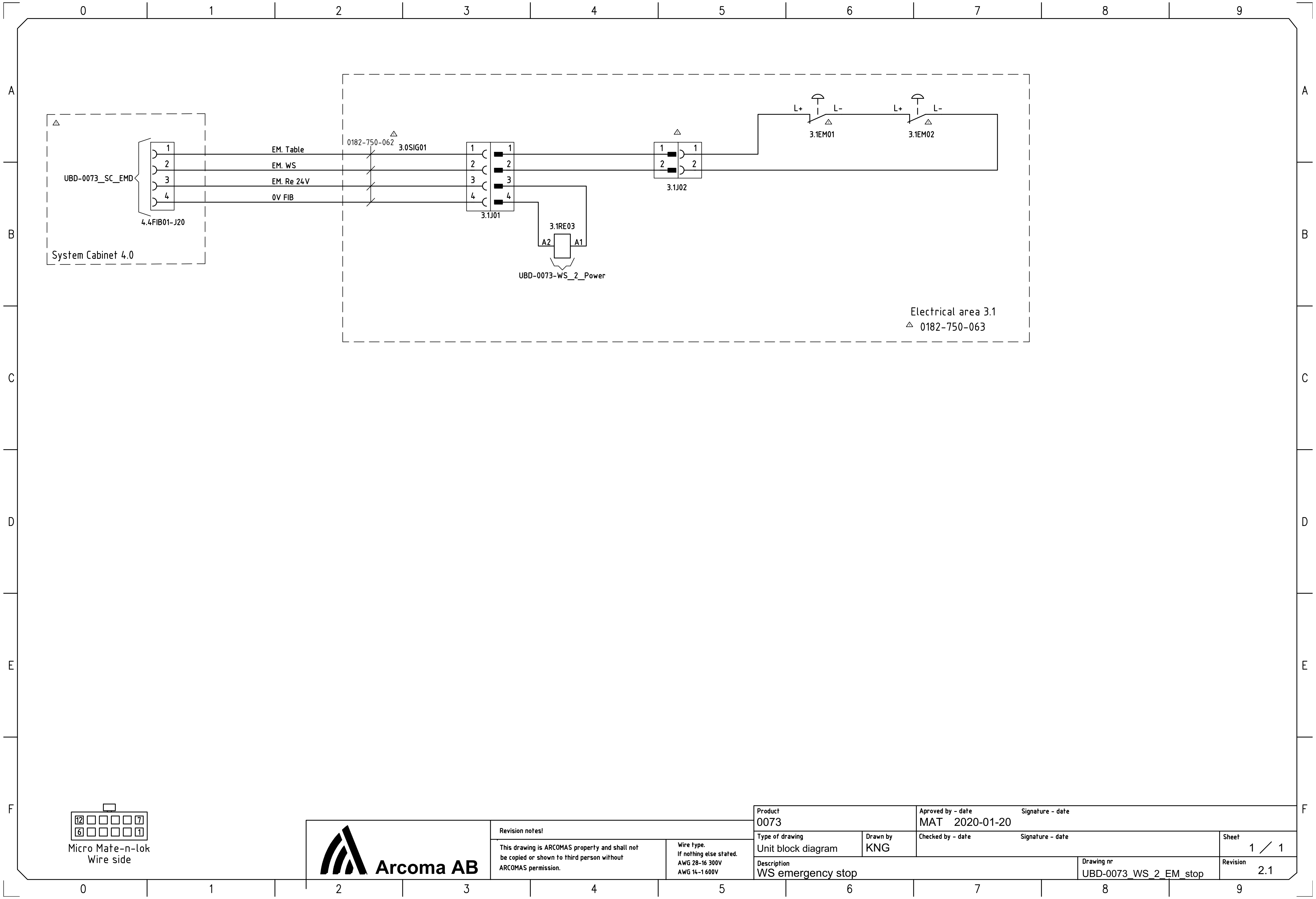
Product	Aproved by - date	Signature - date	
0073	MAT 2020-04-01		
Type of drawing: Unit block diagram	Drawn by: KNG	Checked by - date	Sheet: 1 / 1
Description: Detector holder 14x17 or 17x17, top, center Wall stand		Drawing nr: UBD-0073_WS_2_Det_H_14x17x17	Revision: 3.1



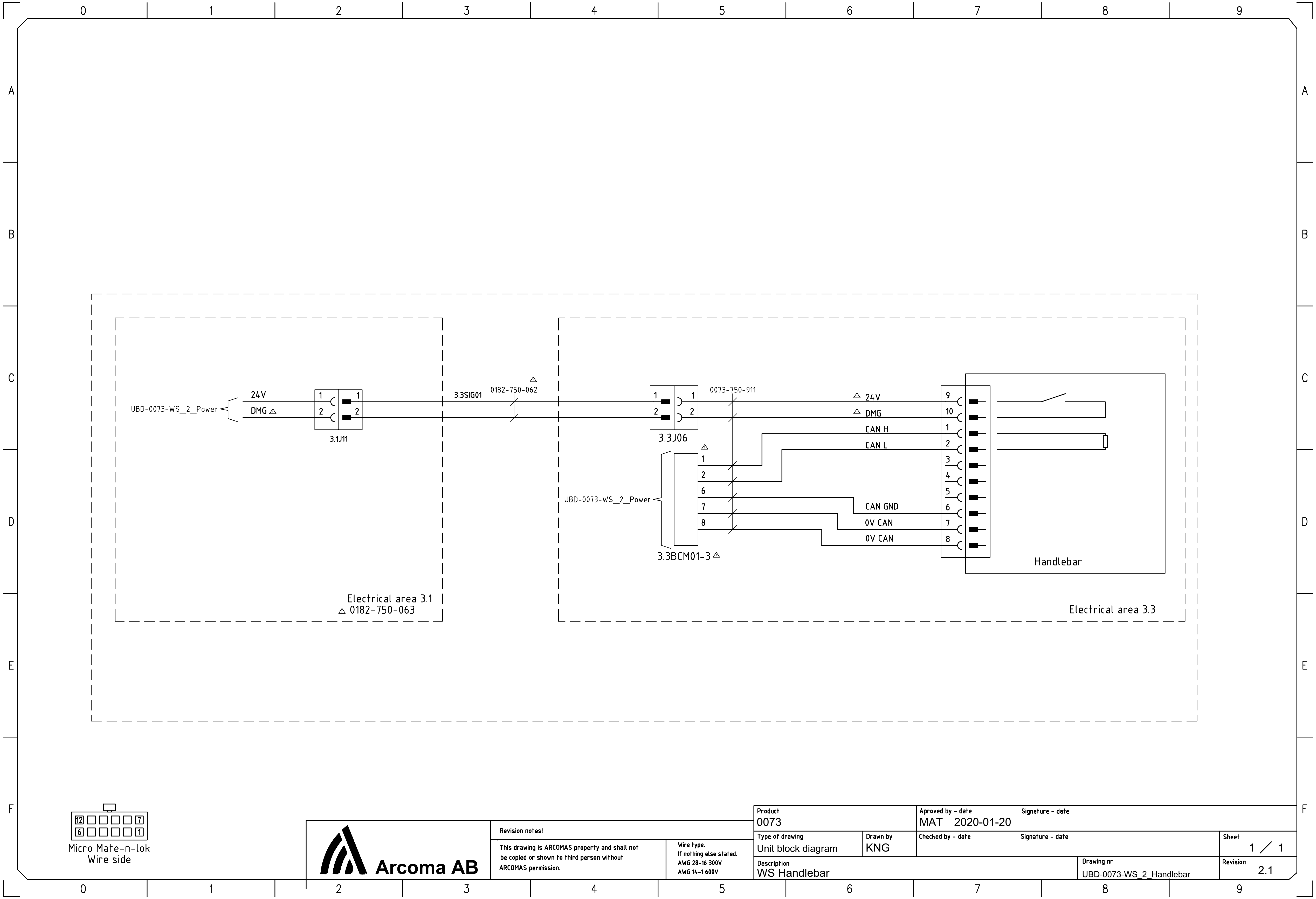
WS
L = Landscape
P = Portrait
H = Height
W = Width
3.1CB01
Electrical area 3.1
0182-750-063
0182-750-062
3.DSIG01
0182-750-075
0058-750-043
0058-750-022
3.DSW02 Grid 0
3.DSW03 Grid 1
0058-Detector holder 17x17_Fix Wall stand
0182-151-065
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes! CR 20 4420 added cable 0182-750-075
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product 0073
Aproved by - date MAT 2020-11-25
Type of drawing Unit block diagram
Drawn by MAT
Sheet 1 / 1
Description Detector holder 17x17 Fix Wall stand
Drawing nr UBD-0073_WS_2_Det_H_17x17_Fix
Revision 4.1



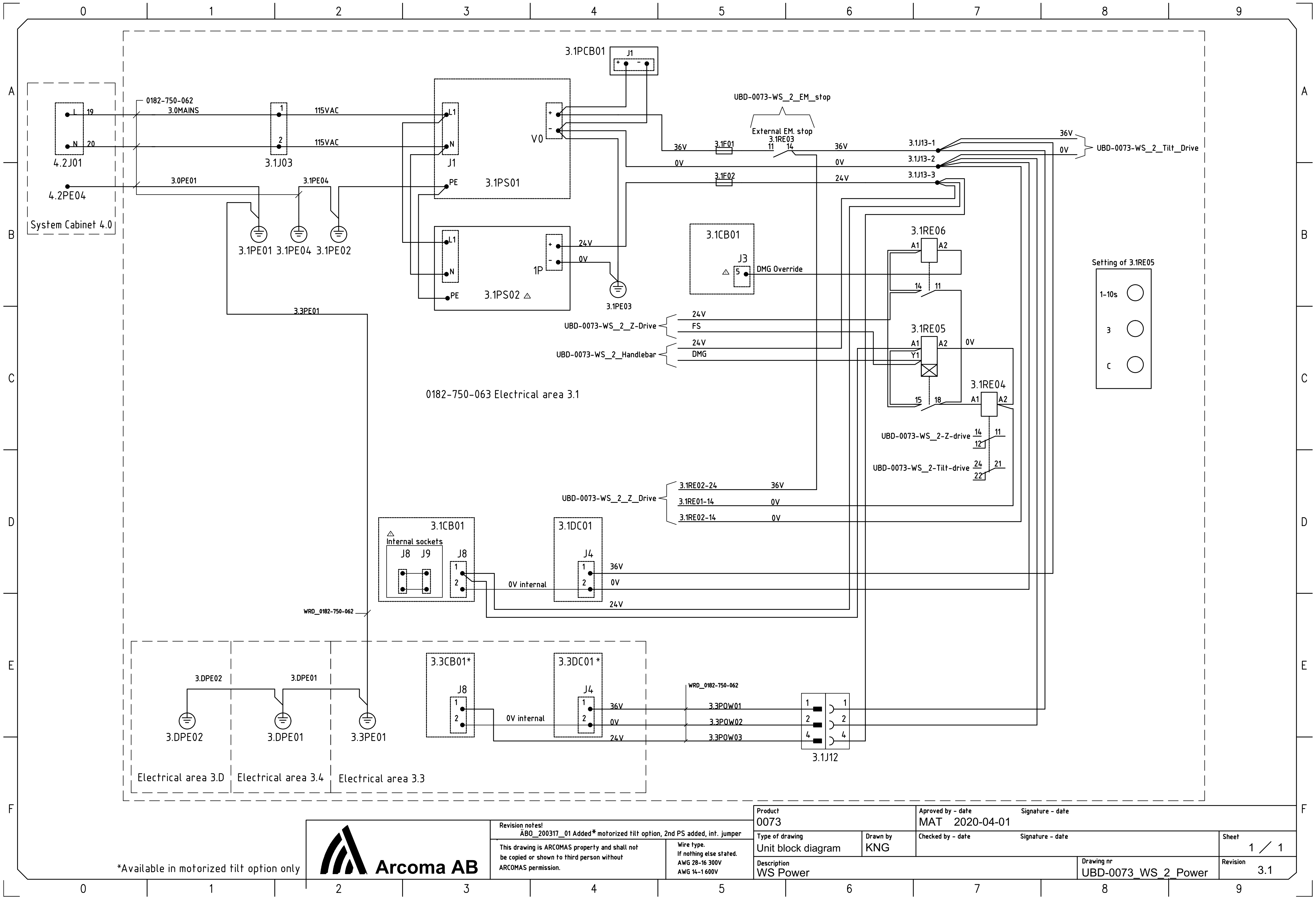
Arcoma AB	Revision notes! ÄBO_200317_01 Grid switch updated	
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	
Product: 0073	Aproved by - date: MAT 2020-04-01	Signature - date
Type of drawing: Unit block diagram	Drawn by: KNG	Checked by - date / Signature - date / Sheet: 1 / 1
Description: Detector holder 17x17 Wall stand	Drawing nr: UBD-0073_WS_2_Det_H_17x17	Revision: 3.1

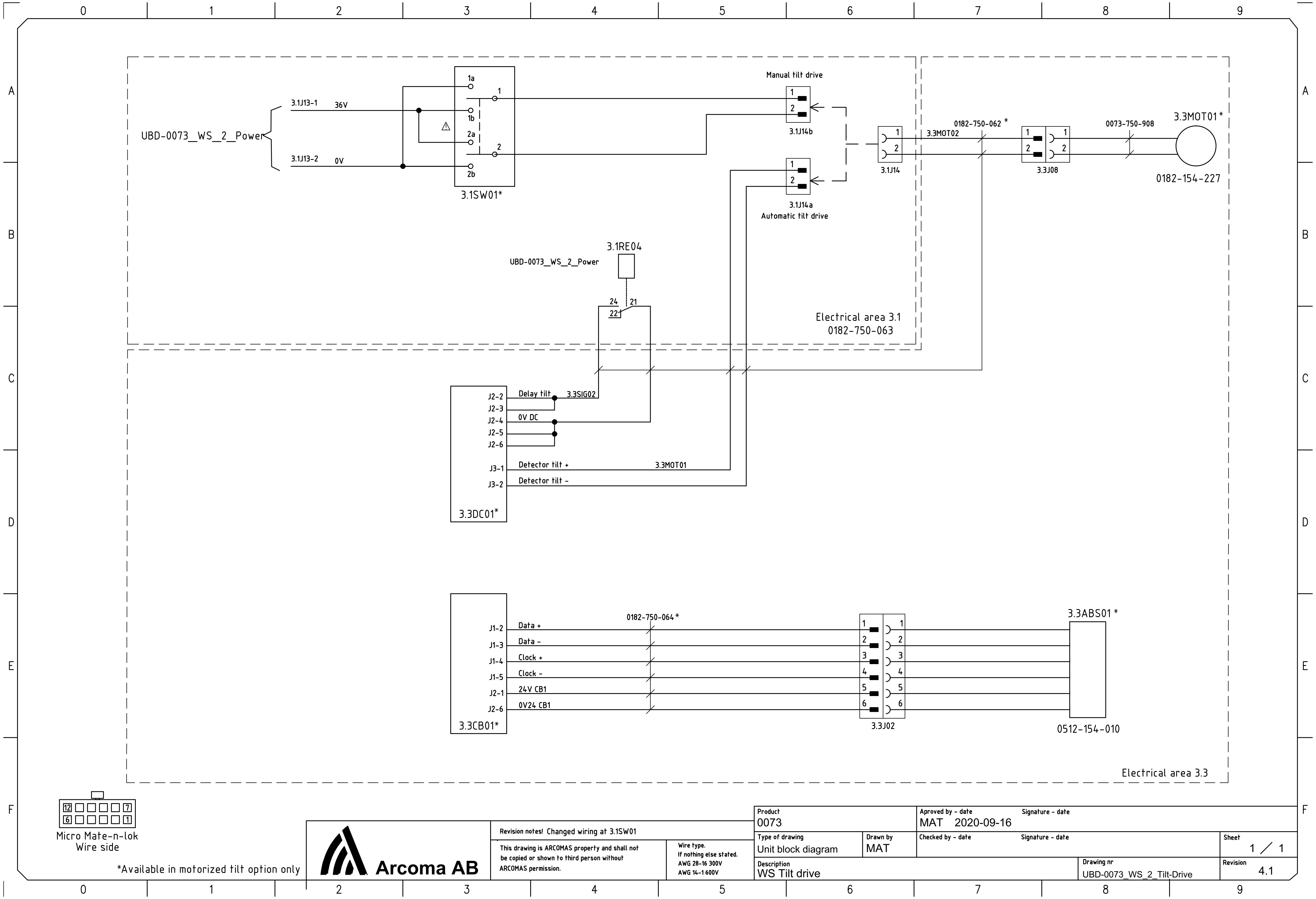


UBD-0073_SC_EMD
4.4FIB01-J20
System Cabinet 4.0
EM. Table
EM. WS
EM. Re 24V
0V FIB
0182-750-062
3.0SIG01
3.1J01
3.1J02
3.1RE03
A2
A1
UBD-0073-WS_2_Power
L+
L-
3.1EM01
3.1EM02
Electrical area 3.1
0182-750-063
Micro Mate-n-lok
Wire side
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-01-20
Signature - date
Type of drawing
Unit block diagram
Drawn by
KNG
Checked by - date
Signature - date
Sheet
1 / 1
Description
WS emergency stop
Drawing nr
UBD-0073_WS_2_EM_stop
Revision
2.1

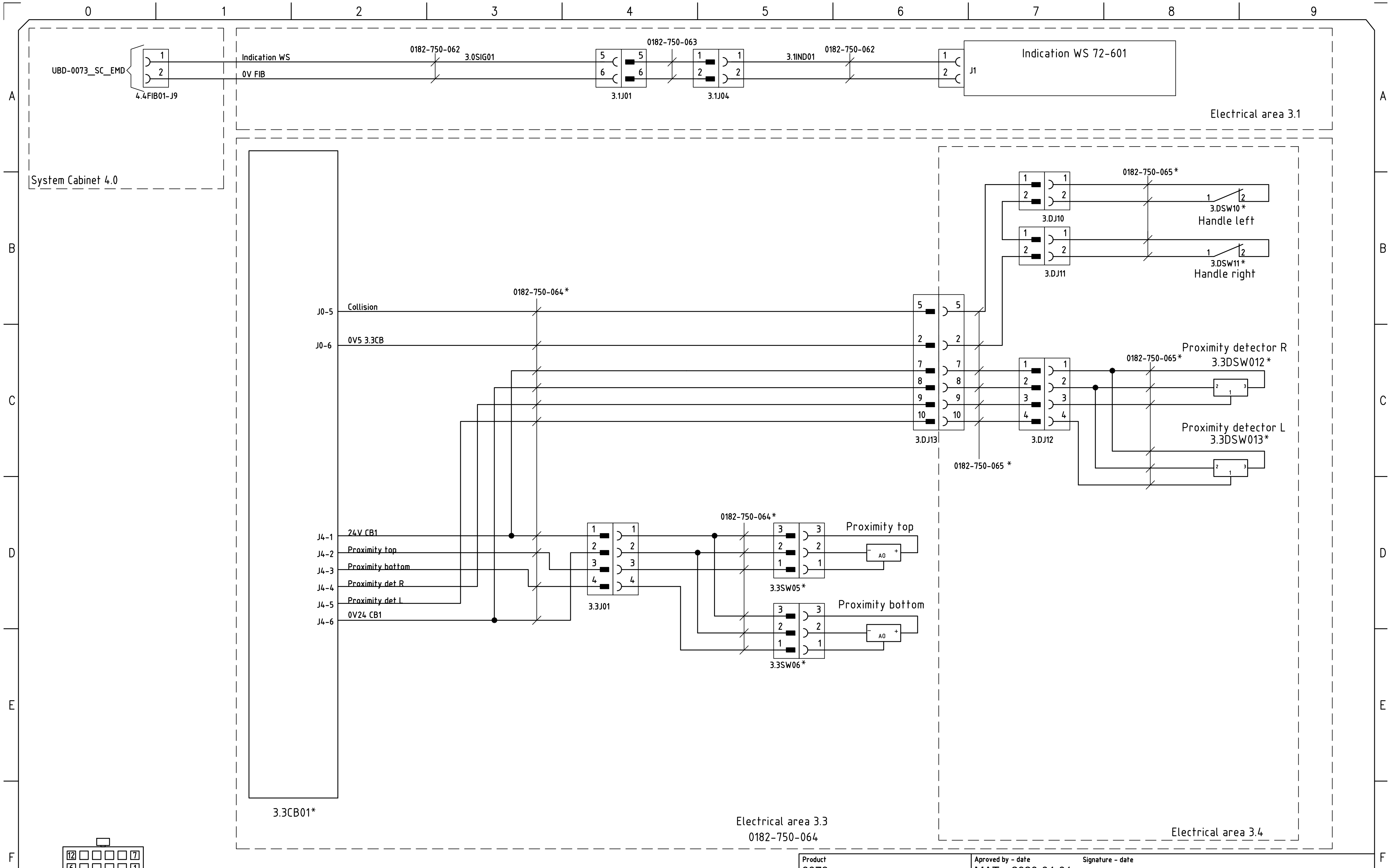


Arcoma AB	Revision notes!	Product: 0073	Aproved by - date: MAT 2020-01-20 / Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Type of drawing: Unit block diagram / Drawn by: KNG	Checked by - date / Signature - date / Sheet: 1 / 1
	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Description: WS Handlebar	Drawing nr: UBD-0073-WS_2_Handlebar / Revision: 2.1


3.1PCB01
J1
UBD-0073-WS_2_EM_stop
External EM. stop
3.1RE03
0182-750-062
3.0MAINS
115VAC
115VAC
4.2J01
3.1J03
J1
V0
3.1PS01
3.0PE01
3.1PE04
4.2PE04
System Cabinet 4.0
3.1PE01 3.1PE04 3.1PE02
3.1PS02
1P
24V
0V
3.1PE03
3.1CB01
J3
DMG Override
3.1RE06
3.1J13-1
3.1J13-2
3.1J13-3
36V
0V
24V
3.1F01
3.1F02
UBD-0073-WS_2_Tilt_Drive
Setting of 3.1RE05
1-10s
3
C
3.3PE01
UBD-0073-WS_2_Z-Drive
FS
DMG
UBD-0073-WS_2_Handlebar
3.1RE05
3.1RE04
0182-750-063 Electrical area 3.1
UBD-0073-WS_2-Z-drive
UBD-0073-WS_2-Tilt-drive
UBD-0073-WS_2_Z_Drive
3.1RE02-24
3.1RE01-14
3.1RE02-14
3.1CB01
Internal sockets
J8 J9
J8
3.1DC01
J4
0V internal
WRD_0182-750-062
3.3CB01*
3.3DC01*
3.DPE02
3.DPE01
3.DPE02
3.DPE01
3.3PE01
3.3POW01
3.3POW02
3.3POW03
3.1J12
Electrical area 3.D
Electrical area 3.4
Electrical area 3.3
*Available in motorized tilt option only
Arcoma AB
Revision notes!
ÄBO_200317_01 Added* motorized tilt option, 2nd PS added, int. jumper
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-04-01
Signature - date
Type of drawing
Unit block diagram
Drawn by
KNG
Checked by - date
Signature - date
Sheet
1 / 1
Description
WS Power
Drawing nr
UBD-0073_WS_2_Power
Revision
3.1

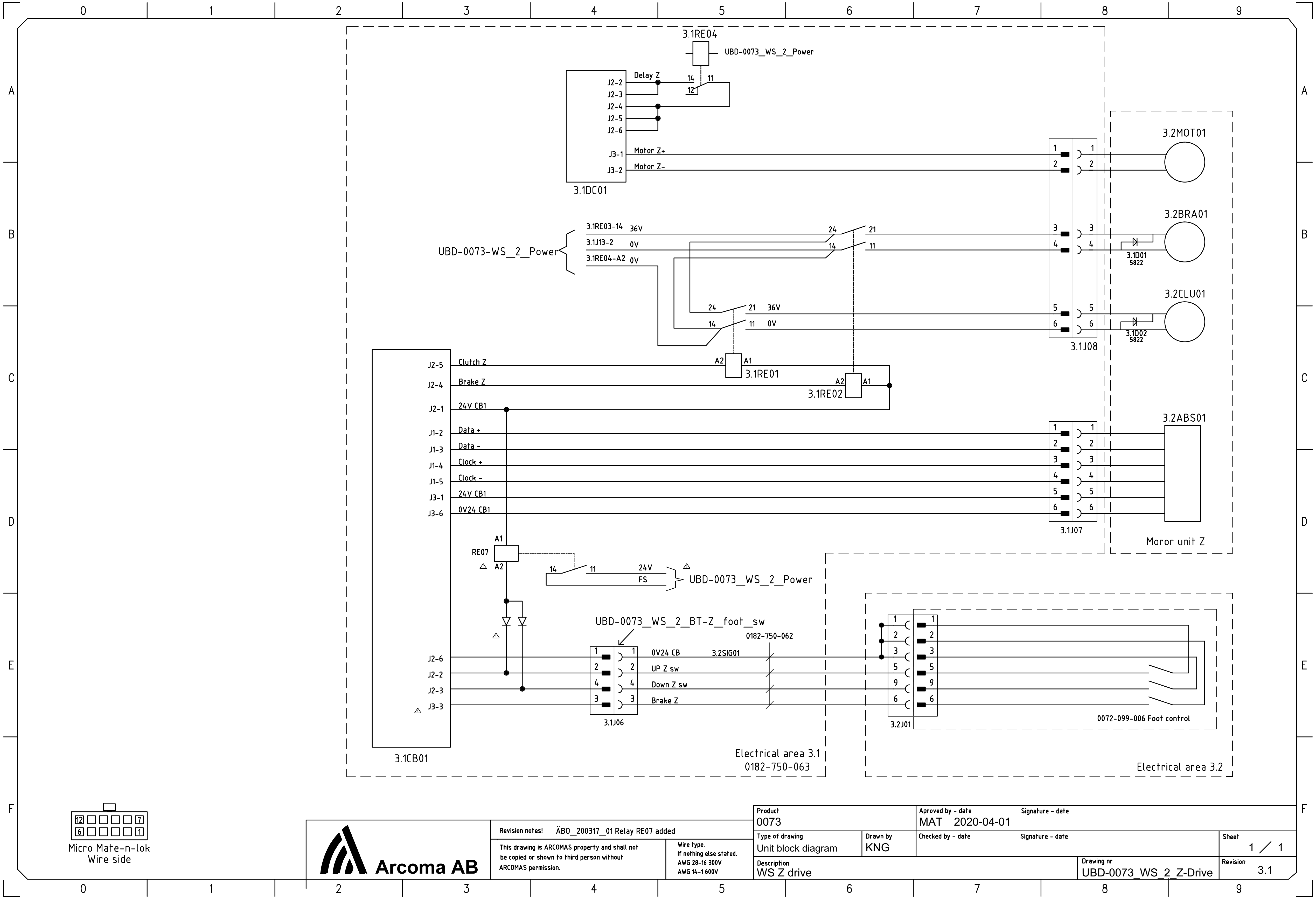


UBD-0073_WS_2_Power
3.1J13-1
36V
3.1J13-2
0V
1a
1
1b
2a
2
2b
3.1SW01*
Manual tilt drive
3.1J14b
3.1J14a
Automatic tilt drive
3.1J14
0182-750-062 *
3.3MOT02
3.3J08
0073-750-908
3.3MOT01 *
0182-154-227
3.1RE04
UBD-0073_WS_2_Power
24
21
22
Electrical area 3.1
0182-750-063
J2-2
Delay tilt
3.3SIG02
J2-3
J2-4
0V DC
J2-5
J2-6
J3-1
Detector tilt +
3.3MOT01
J3-2
Detector tilt -
3.3DC01*
0182-750-064 *
J1-2
Data +
J1-3
Data -
J1-4
Clock +
J1-5
Clock -
J2-1
24V CB1
J2-6
0V24 CB1
3.3CB01*
3.3J02
3.3ABS01 *
0512-154-010
Electrical area 3.3
Micro Mate-n-lok
Wire side
*Available in motorized tilt option only
Arcoma AB
Revision notes! Changed wiring at 3.1SW01
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-09-16
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
WS Tilt drive
Drawing nr
UBD-0073_WS_2_Tilt-Drive
Revision
4.1



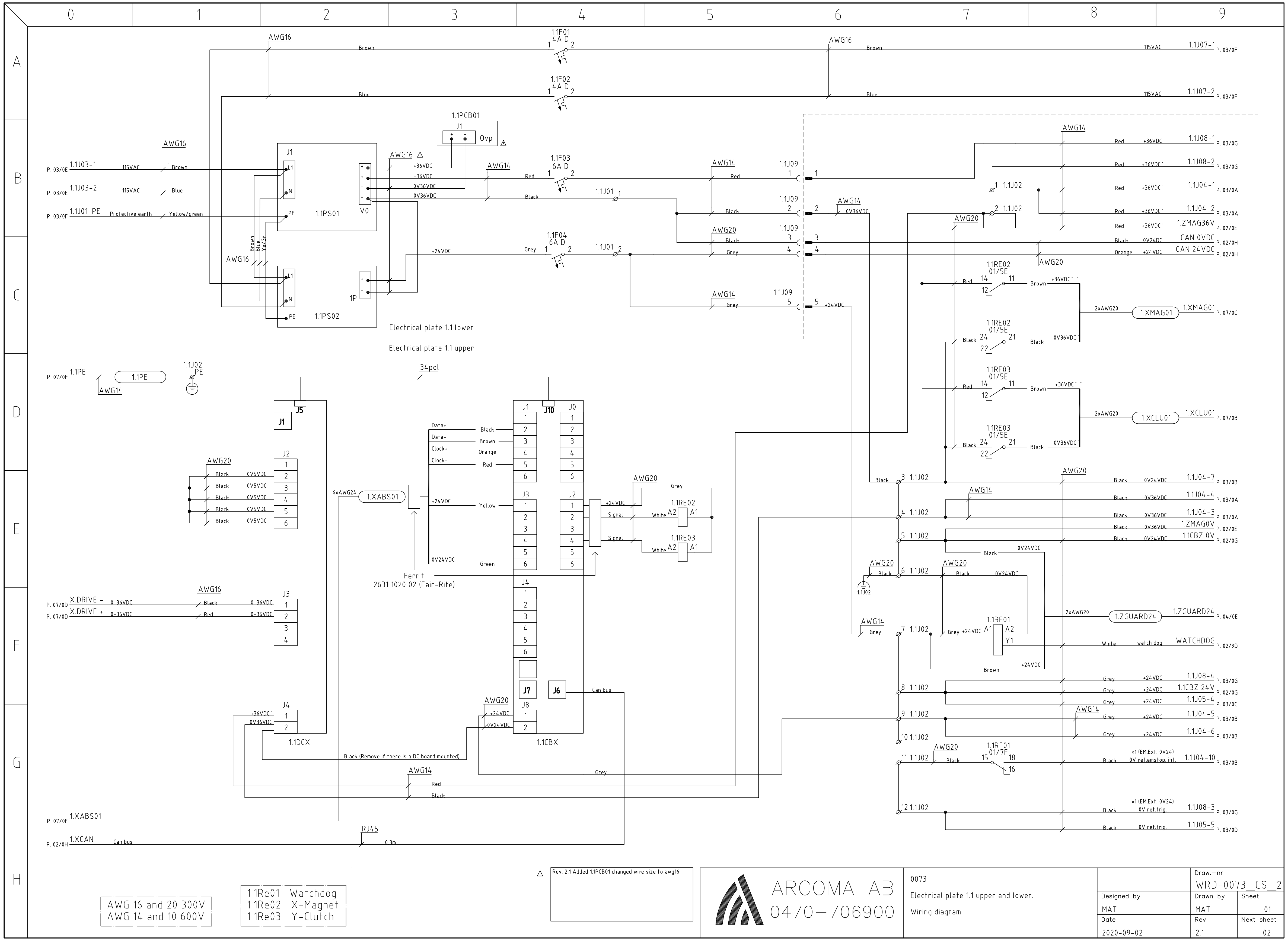
*Available in motorized tilt option only

Arcoma AB	Revision notes! ÄB0_200317_01 Added * motorized tilt option	Product: 0073	Aproved by - date: MAT 2020-04-01 / Signature - date
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Type of drawing: Unit block diagram / Drawn by: KNG	Checked by - date / Signature - date / Sheet: 1 / 1
	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V	Description: WS tilt, ind, top, bottom, R or L	Drawing nr: UBD-0073_WS_2_Tilt_Ind / Revision: 3.1

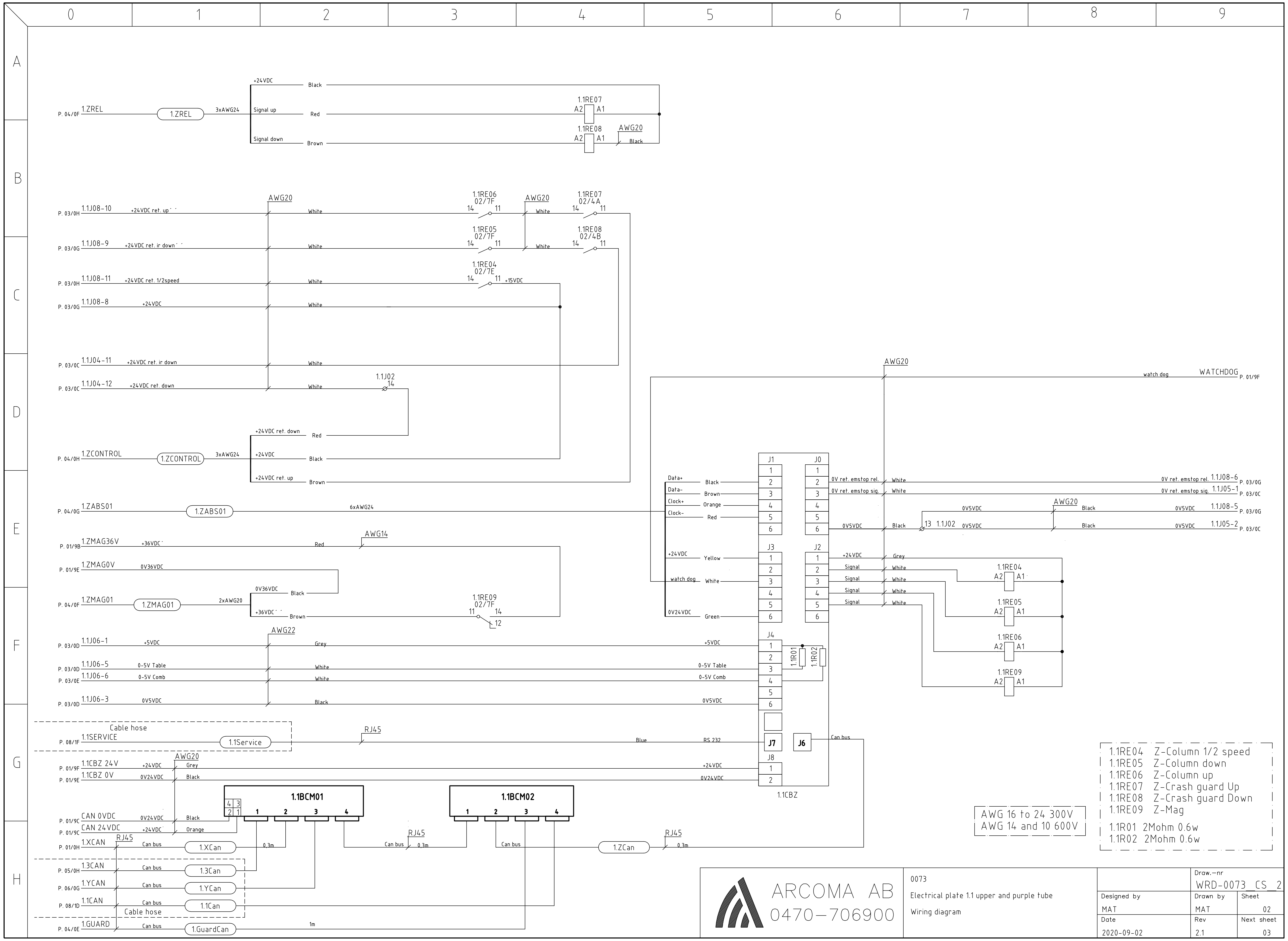


Arcoma AB	Revision notes! ÄBO_200317_01 Relay RE07 added	
	This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.	Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

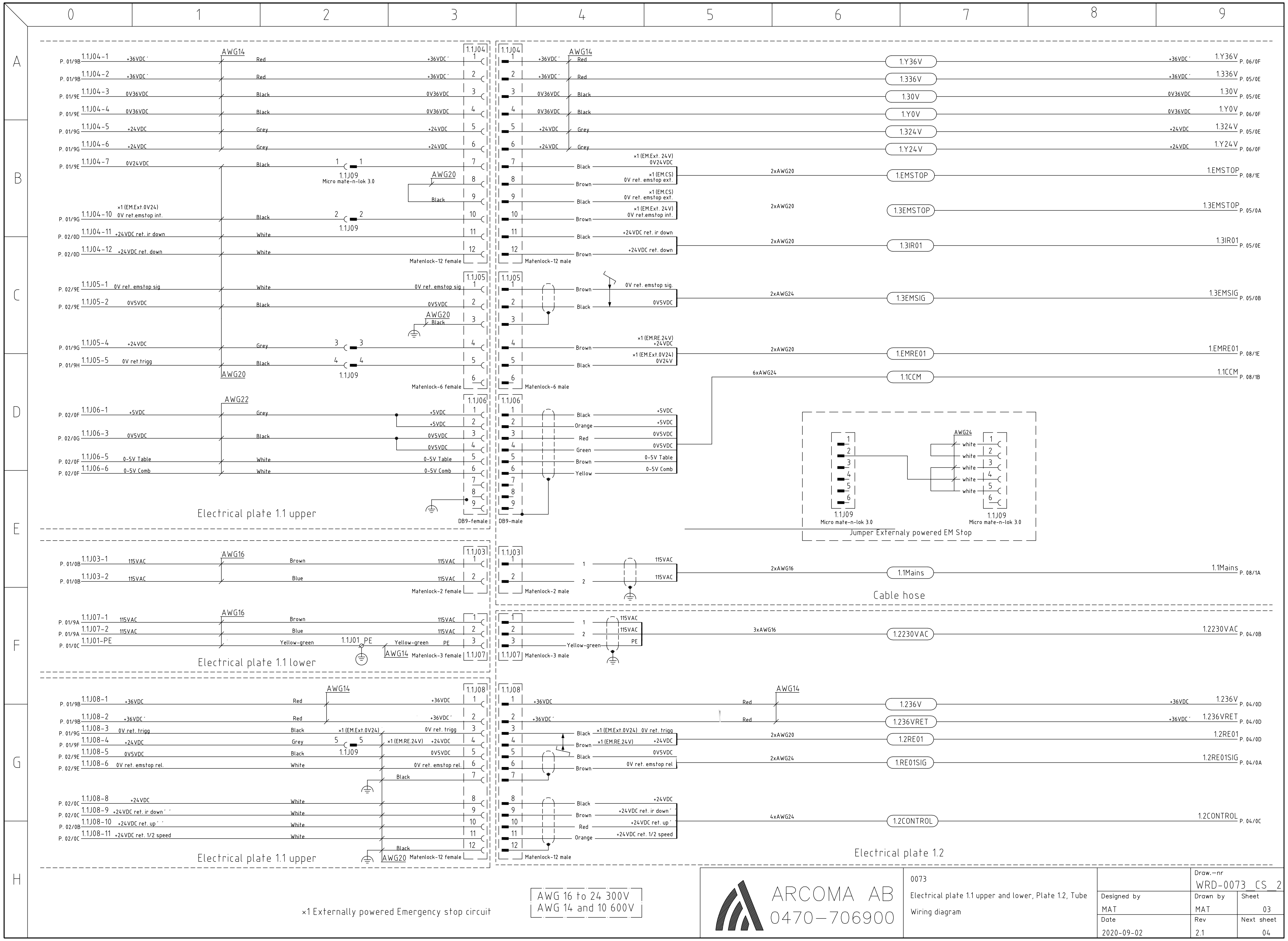
Product: 0073		Aproved by - date: MAT 2020-04-01	Signature - date
Type of drawing: Unit block diagram	Drawn by: KNG	Checked by - date	Signature - date
Sheet: 1 / 1			
Description: WS Z drive		Drawing nr: UBD-0073_WS_2_Z-Drive	Revision: 3.1

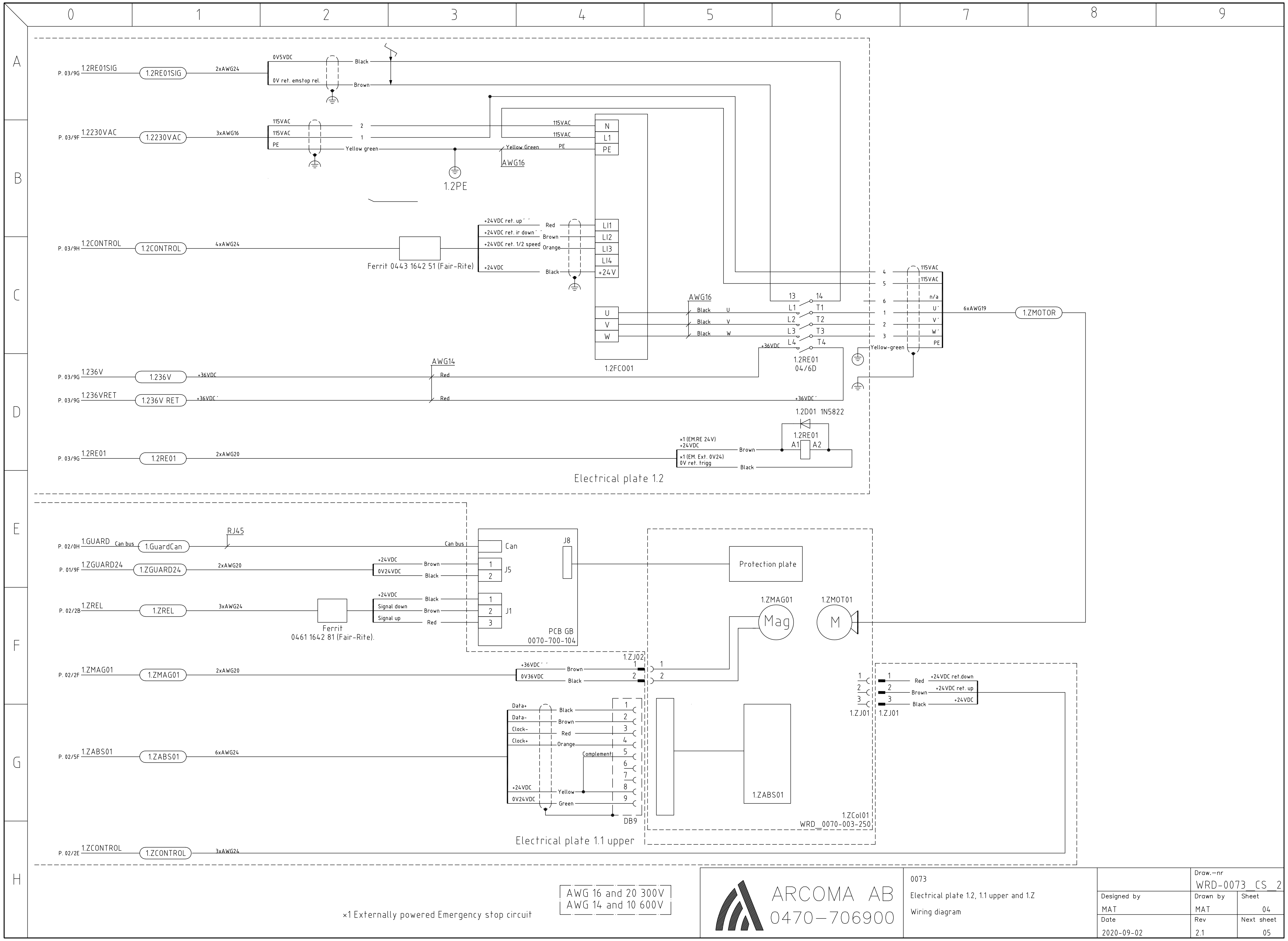


ARCOMA AB
0470-706900
0073
Electrical plate 1.1 upper and lower.
Wiring diagram
Draw.-nr WRD-0073_CS_2
Designed by MAT
Drawn by MAT
Sheet 01
Date 2020-09-02
Rev 2.1
Next sheet 02
Rev. 2.1 Added 1.1PCB01 changed wire size to awg16
AWG 16 and 20 300V
AWG 14 and 10 600V
1.1Re01 Watchdog
1.1Re02 X-Magnet
1.1Re03 Y-Clutch
Electrical plate 1.1 lower
Electrical plate 1.1 upper
1.1PS01
1.1PS02
1.1PCB01
1.1DCX
1.1CBX
Ferrit
2631 1020 02 (Fair-Rite)
Black (Remove if there is a DC board mounted)

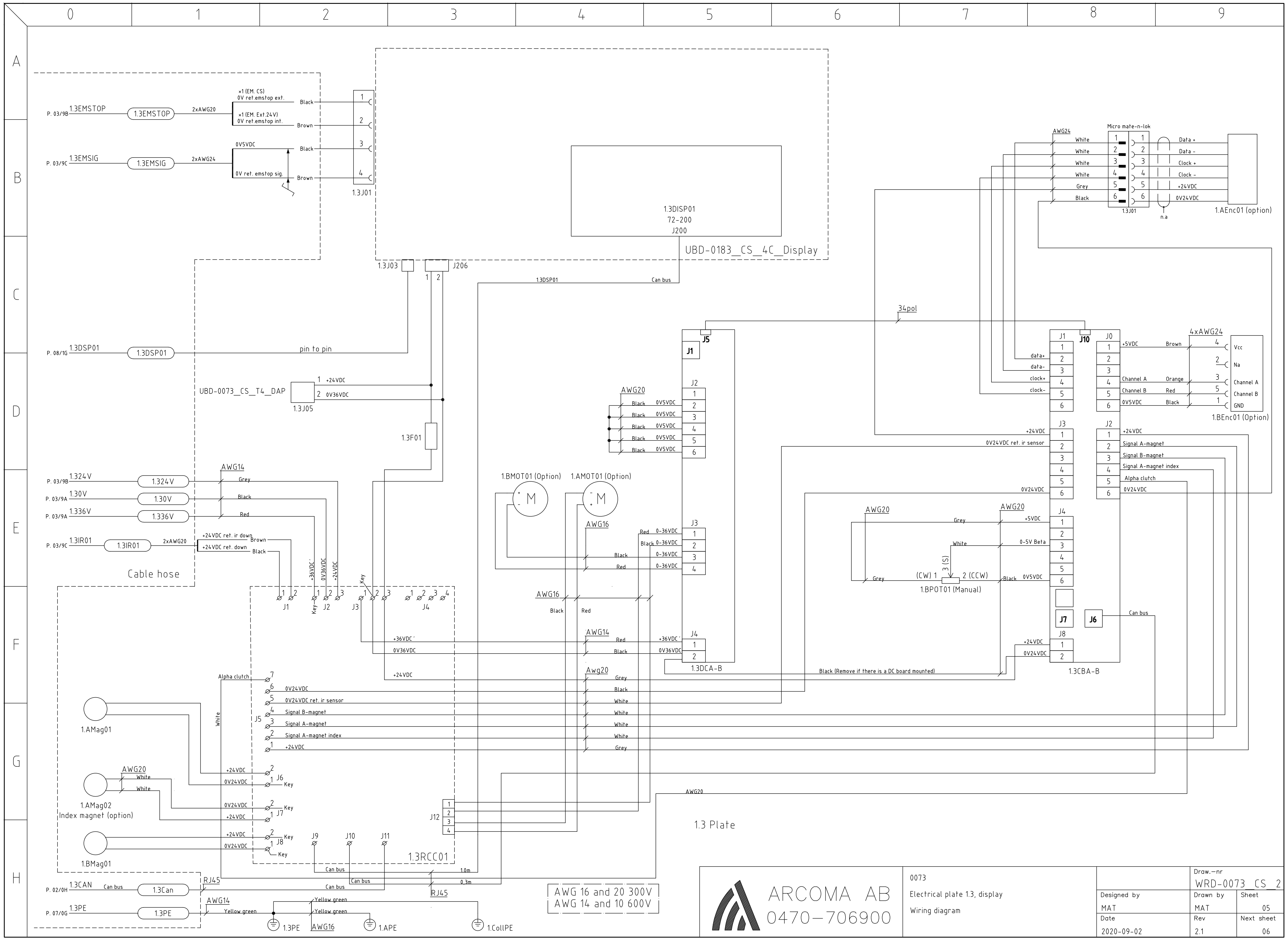


1.1RE04 Z-Column 1/2 speed
1.1RE05 Z-Column down
1.1RE06 Z-Column up
1.1RE07 Z-Crash guard Up
1.1RE08 Z-Crash guard Down
1.1RE09 Z-Mag
1.1R01 2Mohm 0.6w
1.1R02 2Mohm 0.6w
AWG 16 to 24 300V
AWG 14 and 10 600V
ARCOMA AB
0470-706900
0073
Electrical plate 1.1 upper and purple tube
Wiring diagram
Draw.-nr WRD-0073_CS_2
Designed by MAT
Drawn by MAT
Sheet 02
Date 2020-09-02
Rev 2.1
Next sheet 03

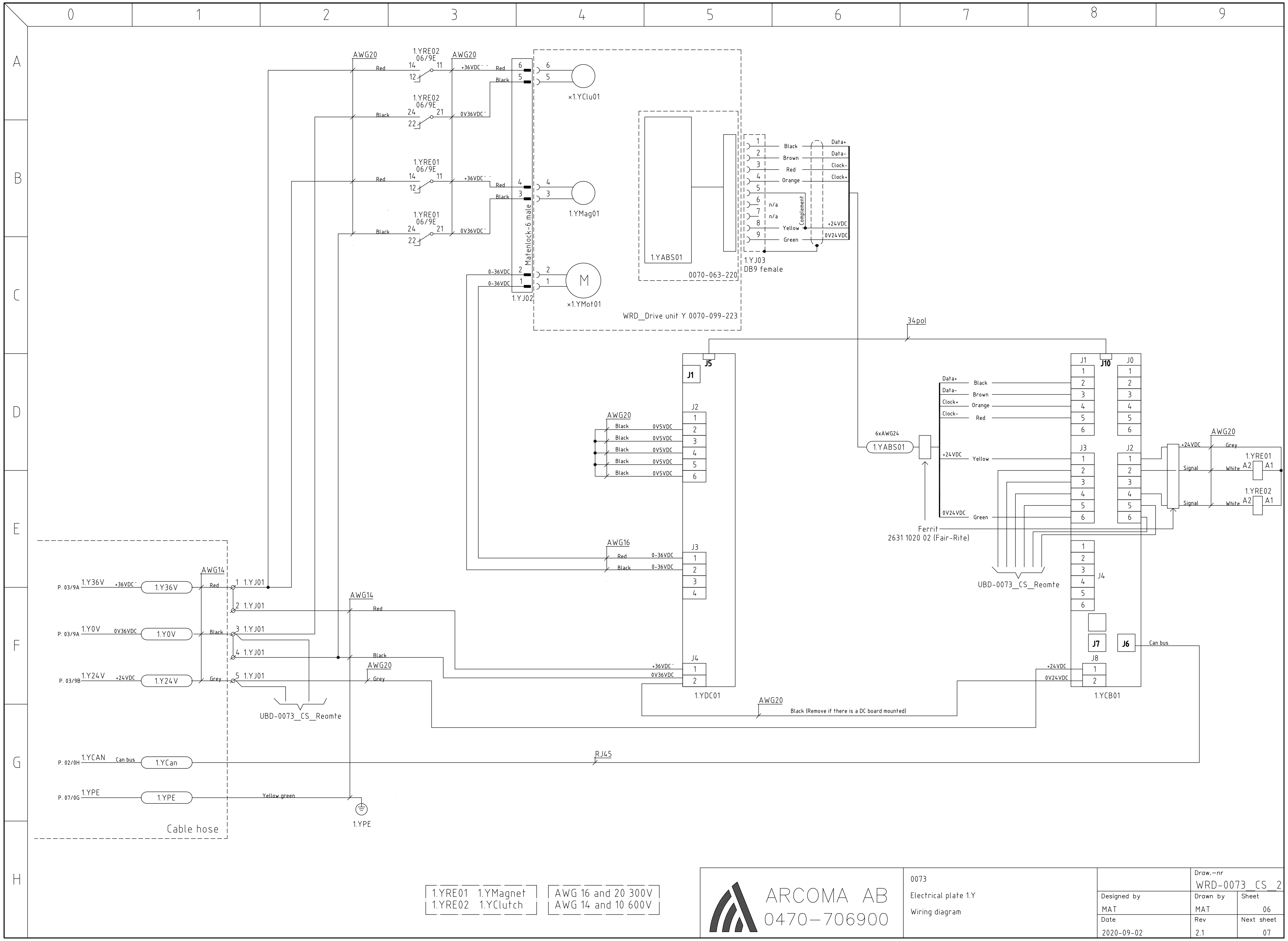

Electrical plate 1.1 upper
Electrical plate 1.1 lower
Electrical plate 1.2
Cable hose
Jumper Externaly powered EM Stop
x1 Externally powered Emergency stop circuit
AWG 16 to 24 300V
AWG 14 and 10 600V
ARCOMA AB
0470-706900
0073
Electrical plate 1.1 upper and lower, Plate 1.2, Tube
Wiring diagram
Draw.-nr
WRD-0073_CS_2
Designed by
MAT
Drawn by
MAT
Sheet
03
Date
2020-09-02
Rev
2.1
Next sheet
04



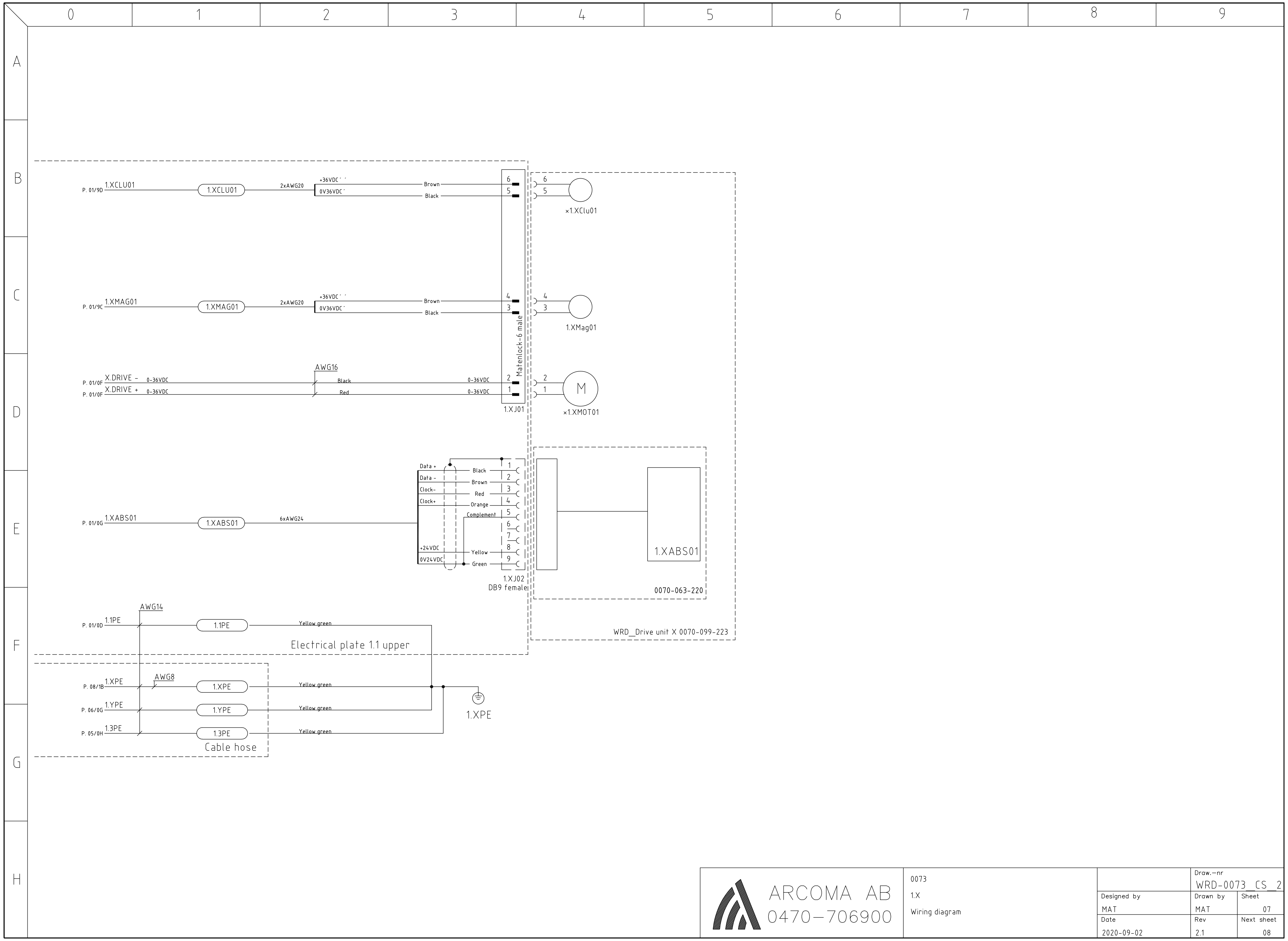
1.2RE01SIG
1.2230VAC
1.2CONTROL
Ferrit 0443 1642 51 (Fair-Rite)
1.2PE
AWG16
1.2FC001
1.2ZMOTOR
1.236V
1.236V RET
1.2D01 1N5822
1.2RE01
1.2RE01
Electrical plate 1.2
1.GUARD
1.GuardCan
RJ45
1.ZGUARD24
1.ZREL
Ferrit
0461 1642 81 (Fair-Rite).
PCB GB
0070-700-104
Protection plate
1.ZMAG01
1.ZMOT01
1.ZJ02
1.ZMAG01
1.ZABS01
DB9
1.ZABS01
1.ZJ01
1.ZCol01
WRD_0070-003-250
Electrical plate 1.1 upper
1.ZCONTROL
AWG 16 and 20 300V
AWG 14 and 10 600V
×1 Externally powered Emergency stop circuit
ARCOMA AB
0470-706900
0073
Electrical plate 1.2, 1.1 upper and 1.Z
Wiring diagram
Designed by
MAT
Date
2020-09-02
Draw.-nr
WRD-0073_CS_2
Drawn by
MAT
Sheet
04
Rev
2.1
Next sheet
05



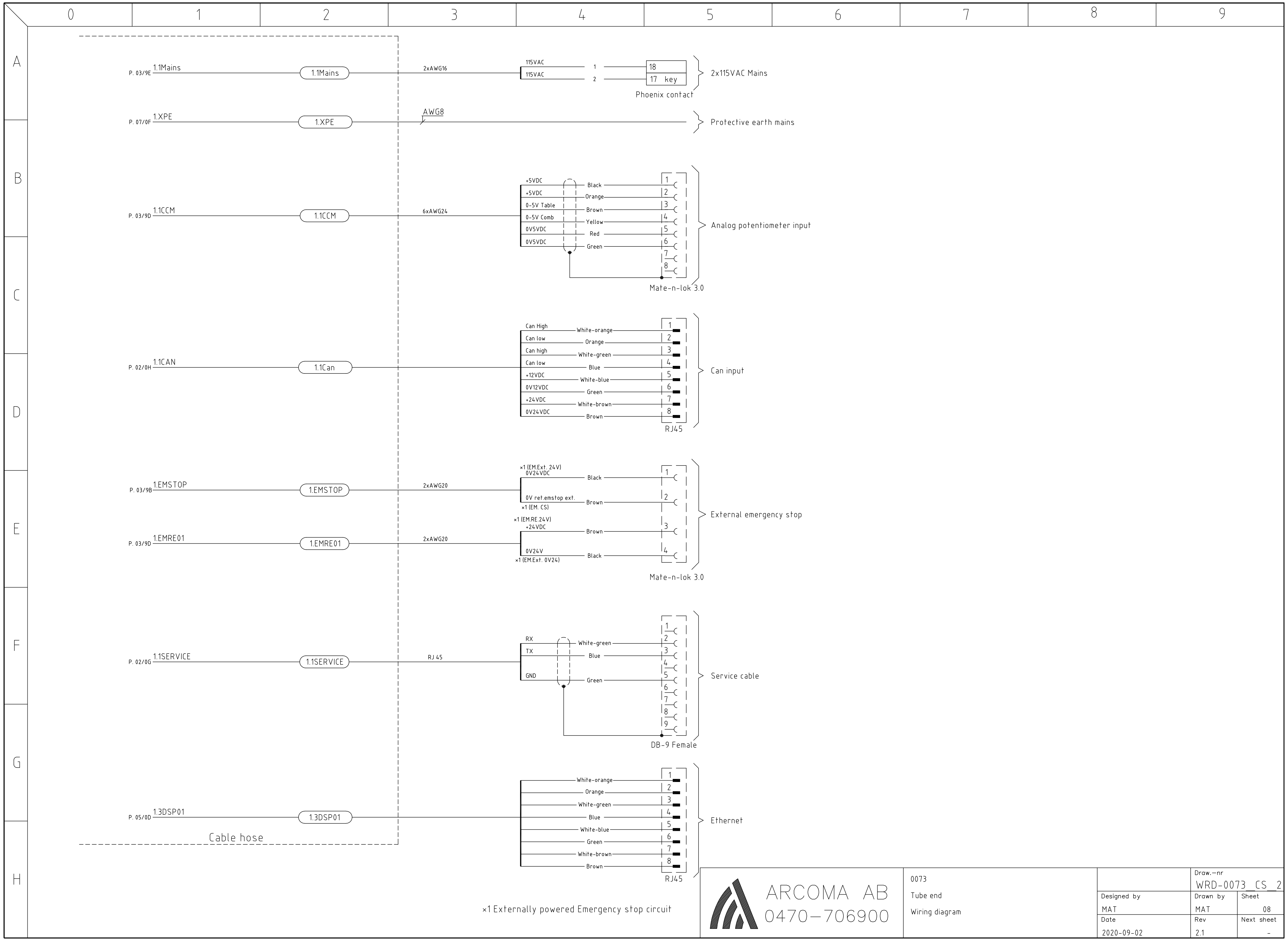
UBD-0183_CS_4C_Display
1.3DISP01
72-200
J200
UBD-0073_CS_T4_DAP
Cable hose
1.3 Plate
1.3RCC01
1.3DCA-B
1.3CBA-B
1.AEnc01 (option)
1.BEnc01 (Option)
1.BMOT01 (Option)
1.AMOT01 (Option)
1.BPOT01 (Manual)
1.AMag01
1.AMag02
Index magnet (option)
1.BMag01
1.3PE
1.APE
1.CollPE
AWG 16 and 20 300V
AWG 14 and 10 600V
ARCOMA AB
0470-706900
0073
Electrical plate 1.3, display
Wiring diagram
Designed by
MAT
Date
2020-09-02
Draw.-nr
WRD-0073_CS_2
Drawn by
MAT
Sheet
05
Rev
2.1
Next sheet
06



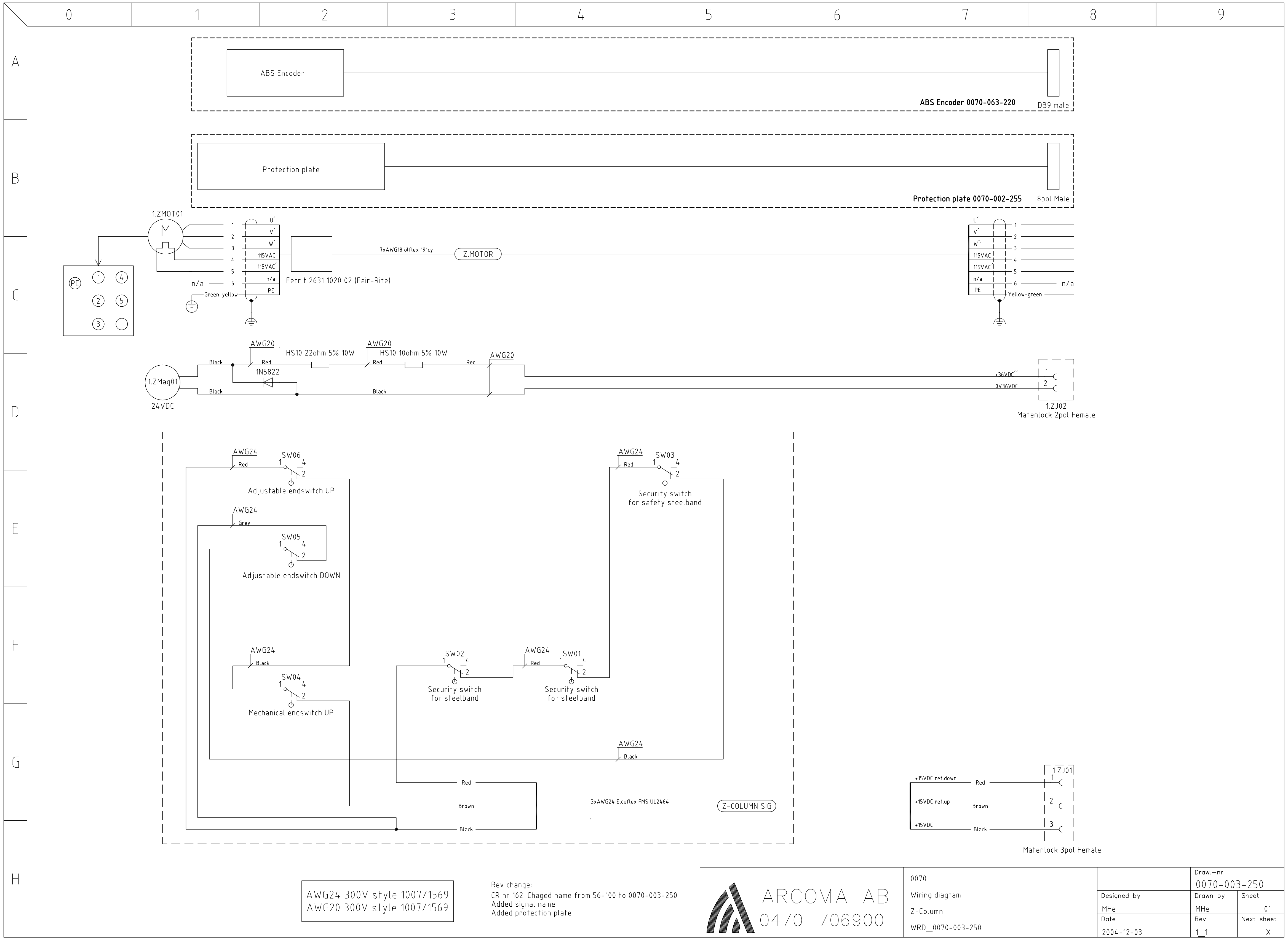
1.YRE01 1.YMagnet
1.YRE02 1.YClutch
AWG 16 and 20 300V
AWG 14 and 10 600V
ARCOMA AB
0470-706900
0073
Electrical plate 1.Y
Wiring diagram
Draw.-nr
WRD-0073_CS_2
Designed by
MAT
Drawn by
MAT
Sheet
06
Date
2020-09-02
Rev
2.1
Next sheet
07
WRD_Drive unit Y 0070-099-223
Cable hose
UBD-0073_CS_Reomte
1.YDC01
1.YCB01
1.YPE

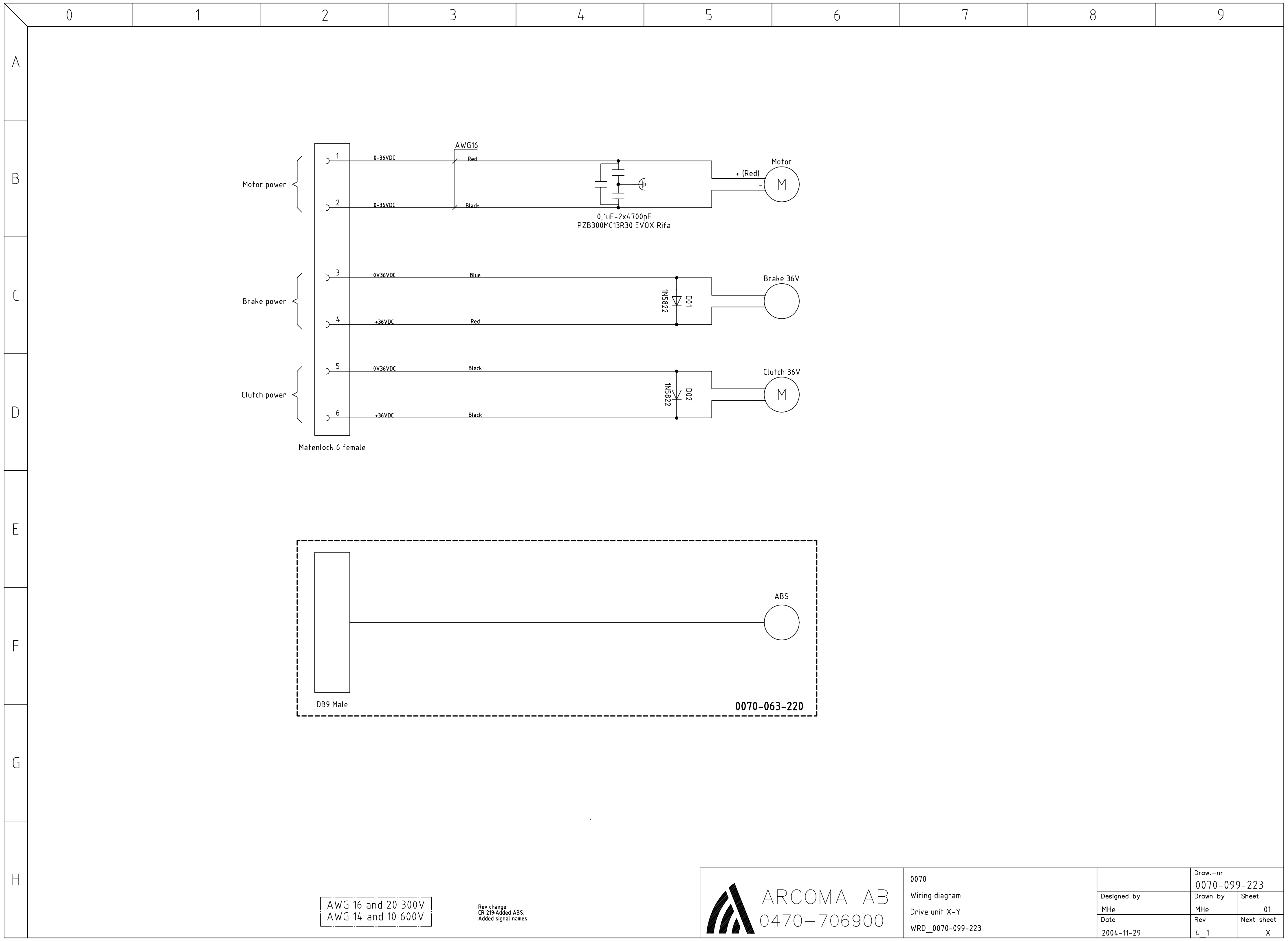


1.XCLU01
2xAWG20
+36VDC
0V36VDC
Brown
Black
×1.XClu01
1.XMAG01
1.XMag01
X.DRIVE -
X.DRIVE +
0-36VDC
AWG16
Red
M
×1.XMOT01
1.XJ01
Matenlock-6 male
1.XABS01
6xAWG24
Data +
Data -
Clock-
Clock+
Orange
Complement
+24VDC
0V24VDC
Yellow
Green
1.XJ02
DB9 female
0070-063-220
WRD_Drive unit X 0070-099-223
AWG14
1.1PE
Yellow green
Electrical plate 1.1 upper
AWG8
1.XPE
1.YPE
1.3PE
Cable hose
ARCOMA AB
0470-706900
0073
1.X
Wiring diagram
Designed by
MAT
Date
2020-09-02
Draw.-nr
WRD-0073_CS_2
Drawn by
MAT
Rev
2.1
Sheet
07
Next sheet
08

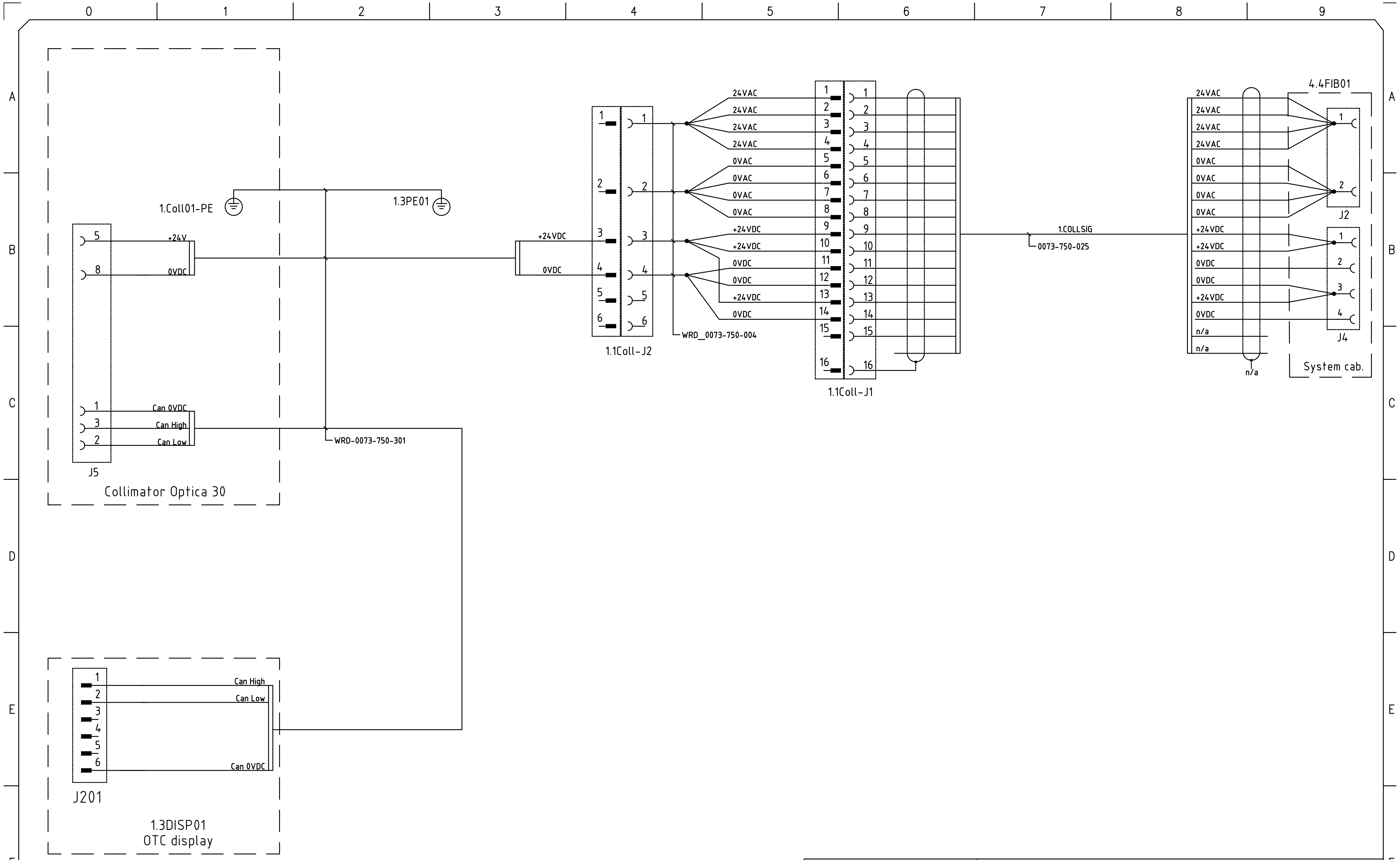


1.1Mains
2xAWG16
115VAC
Phoenix contact
2x115VAC Mains
1.XPE
AWG8
Protective earth mains
1.1CCM
6xAWG24
+5VDC
0-5V Table
0-5V Comb
0V5VDC
Black
Orange
Brown
Yellow
Red
Green
Mate-n-lok 3.0
Analog potentiometer input
1.1CAN
1.1Can
Can High
Can low
Can high
+12VDC
0V12VDC
+24VDC
0V24VDC
White-orange
White-green
Blue
White-blue
White-brown
RJ45
Can input
1.EMSTOP
2xAWG20
x1 (EM.Ext. 24V)
0V ret.emstop ext.
x1 (EM. CS)
x1 (EM.RE 24V)
0V24V
x1 (EM.Ext. 0V24)
1.EMRE01
External emergency stop
1.1SERVICE
RJ45
RX
TX
GND
DB-9 Female
Service cable
1.3DSP01
Ethernet
Cable hose
x1 Externally powered Emergency stop circuit
ARCOMA AB
0470-706900
0073
Tube end
Wiring diagram
Designed by
Draw.-nr
WRD-0073_CS_2
Drawn by
MAT
Sheet
08
Date
2020-09-02
Rev
2.1
Next sheet
-


ABS Encoder
ABS Encoder 0070-063-220
DB9 male
Protection plate
Protection plate 0070-002-255
8pol Male
1.ZMOT01
Ferrit 2631 1020 02 (Fair-Rite)
7xAWG18 ölflex 191cy
Z.MOTOR
115VAC
n/a
PE
Green-yellow
Yellow-green
AWG20
HS10 22ohm 5% 10W
HS10 10ohm 5% 10W
1N5822
1.ZMag01
24VDC
Black
Red
+36VDC
0V36VDC
1.ZJ02
Matenlock 2pol Female
AWG24
SW06
Adjustable endswitch UP
SW05
Adjustable endswitch DOWN
SW04
Mechanical endswitch UP
SW03
Security switch
for safety steelband
SW02
Security switch
for steelband
SW01
Security switch
for steelband
Grey
Brown
3xAWG24 Elcuflex FMS UL2464
Z-COLUMN SIG
+15VDC ref.down
+15VDC ref.up
+15VDC
1.ZJ01
Matenlock 3pol Female
AWG24 300V style 1007/1569
AWG20 300V style 1007/1569
Rev change:
CR nr 162. Chaged name from 56-100 to 0070-003-250
Added signal name
Added protection plate
ARCOMA AB
0470-706900
0070
Wiring diagram
Z-Column
WRD_0070-003-250
Draw.-nr
0070-003-250
Designed by
MHe
Drawn by
MHe
Sheet
01
Date
2004-12-03
Rev
1_1
Next sheet
X



AWG16
Motor power
Brake power
Clutch power
0-36VDC
Red
Black
0,1uF+2x4700pF
PZB300MC13R30 EVOX Rifa
+ (Red)
Motor
M
0V36VDC
+36VDC
Blue
1N5822
D01
D02
Brake 36V
Clutch 36V
Matenlock 6 female
ABS
DB9 Male
0070-063-220
AWG 16 and 20 300V
AWG 14 and 10 600V
Rev change:
CR 219:Added ABS.
Added signal names
ARCOMA AB
0470-706900
0070
Wiring diagram
Drive unit X-Y
WRD_0070-099-223
Draw.-nr
0070-099-223
Designed by
MHe
Drawn by
MHe
Sheet
01
Date
2004-11-29
Rev
4_1
Next sheet
X

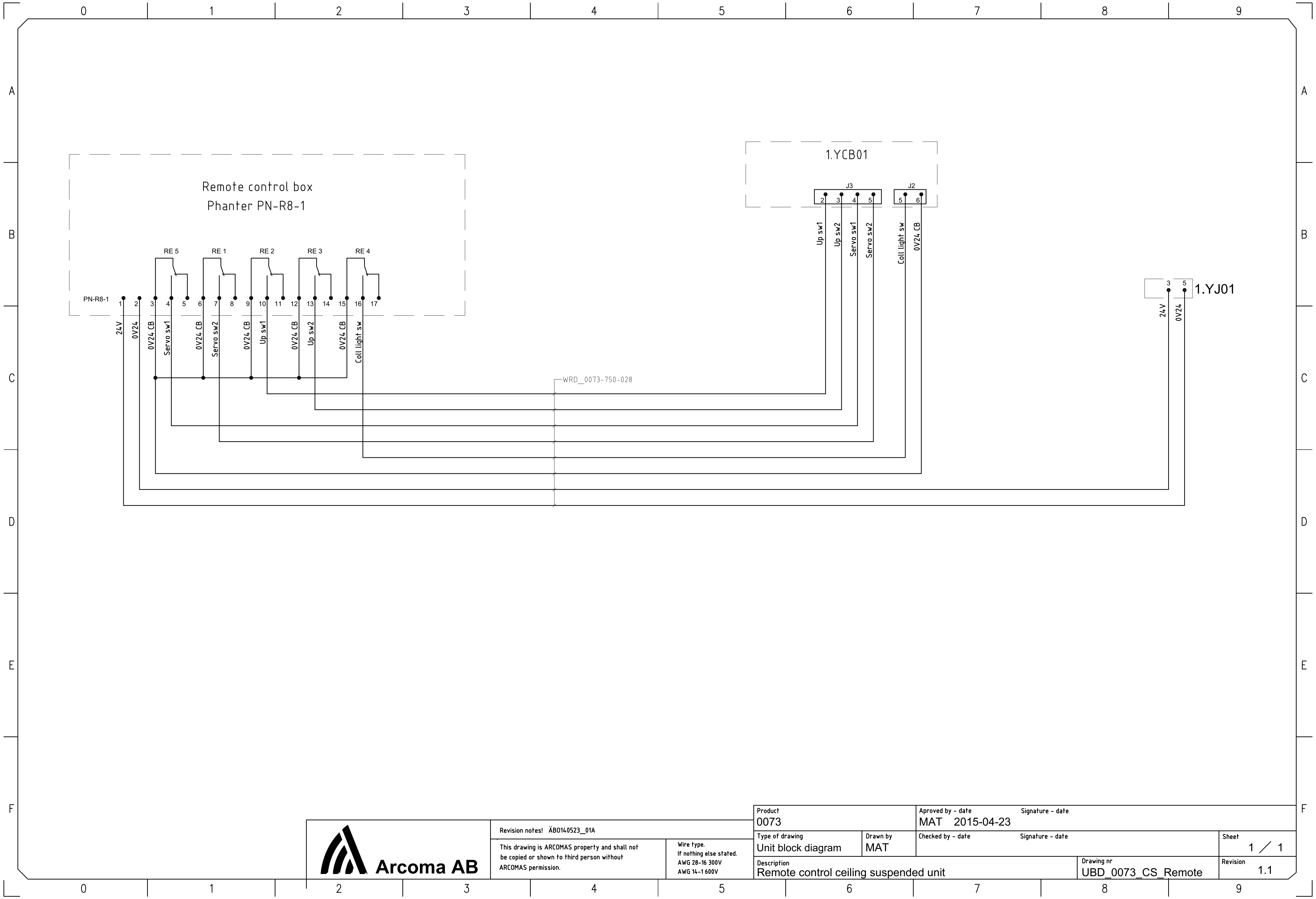


Product: 0073		Aproved by - date: MAT 2020-05-13	Signature - date
Type of drawing: Unit block diagram	Drawn by: RNI	Checked by - date	Signature - date / Sheet: 1 / 1
Description: Collimator Optica 30		Drawing nr: UBD-0073_CS_2_Coll_Op30	Revision: 1.1

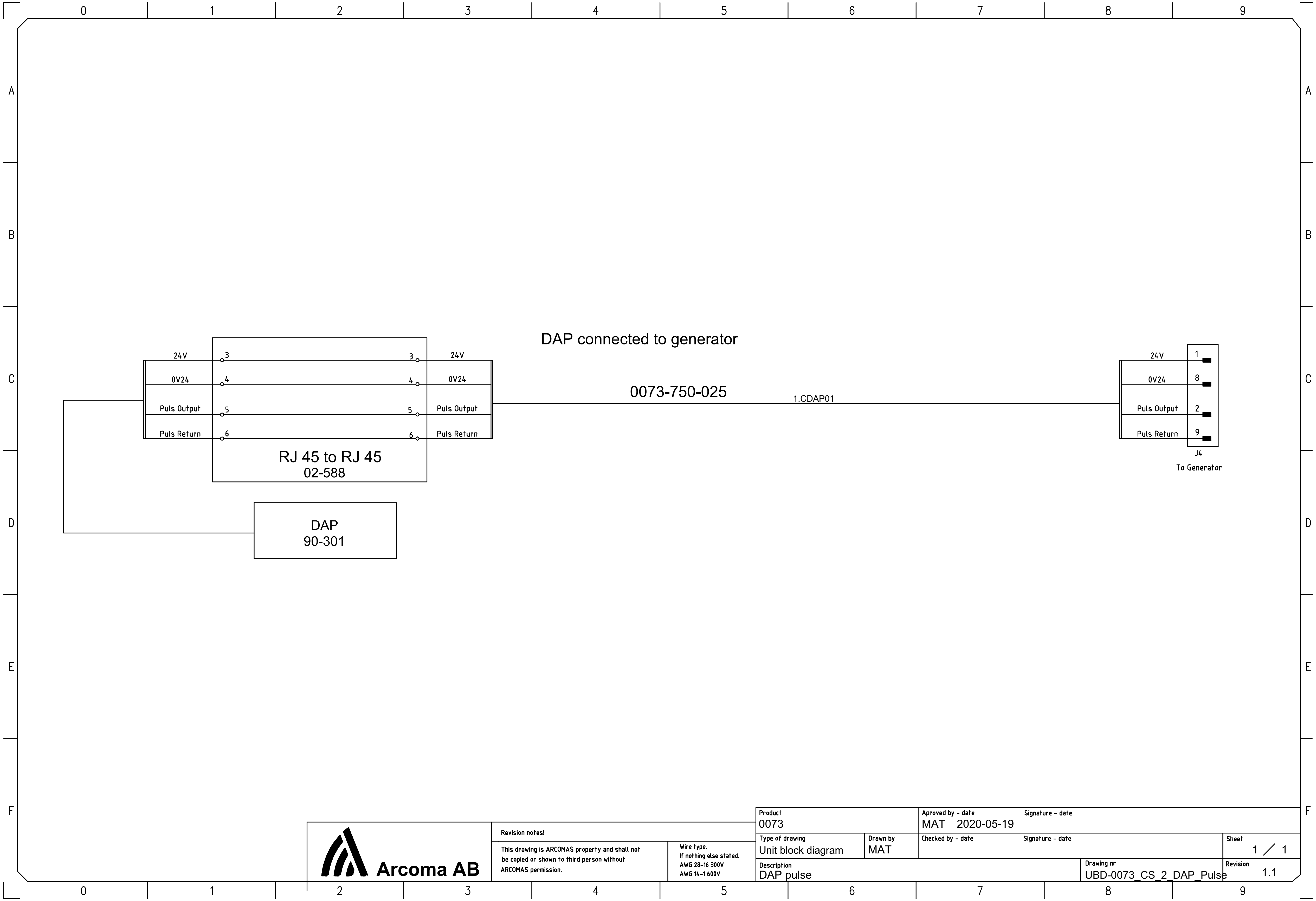
Arcoma AB

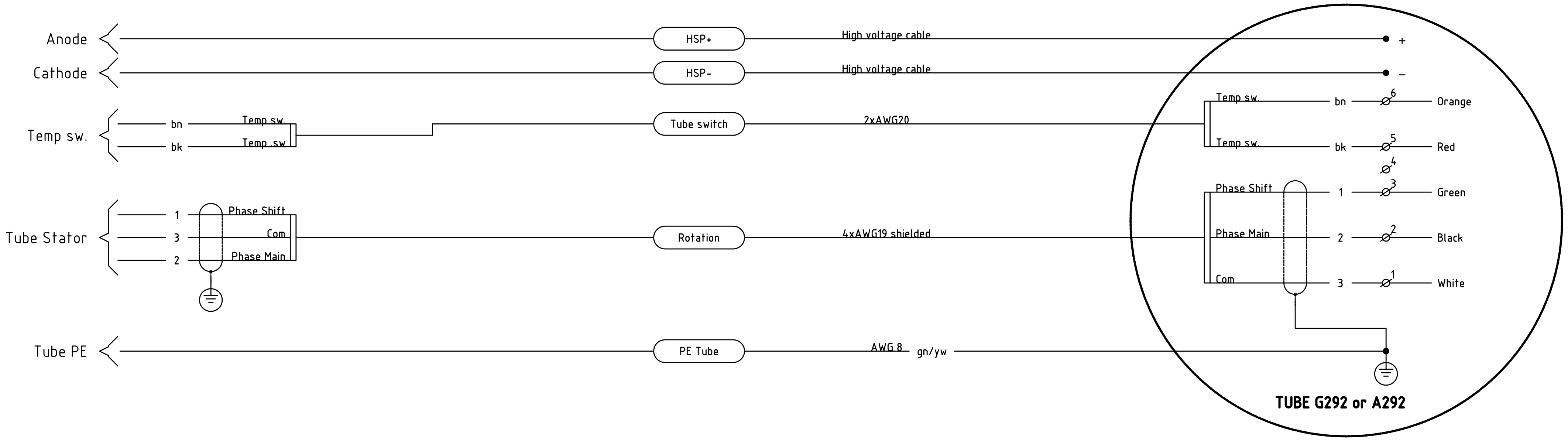
Revision notes!

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V



Remote control box
Phanter PN-R8-1
RE 5
RE 1
RE 2
RE 3
RE 4
PN-R8-1
24V
0V24
0V24 CB
Servo sw1
0V24 CB
Servo sw2
0V24 CB
Up sw1
0V24 CB
Up sw2
0V24 CB
Coll light sw
1.YCB01
J3
J2
Up sw1
Up sw2
Servo sw1
Servo sw2
Coll light sw
0V24 CB
WRD_0073-750-028
1.YJ01
24V
0V24
Revision notes! ÄB0140523_01A
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Arcoma AB
Product
0073
Aproved by - date
MAT 2015-04-23
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
Remote control ceiling suspended unit
Drawing nr
UBD_0073_CS_Remote
Revision
1.1


DAP connected to generator
24V
0V24
Puls Output
Puls Return
3
4
5
6
RJ 45 to RJ 45
02-588
0073-750-025
1.CDAP01
1
8
2
9
J4
To Generator
DAP
90-301
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Arcoma AB
Product
0073
Aproved by - date
MAT 2020-05-19
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
DAP pulse
Drawing nr
UBD-0073_CS_2_DAP_Pulse
Revision
1.1



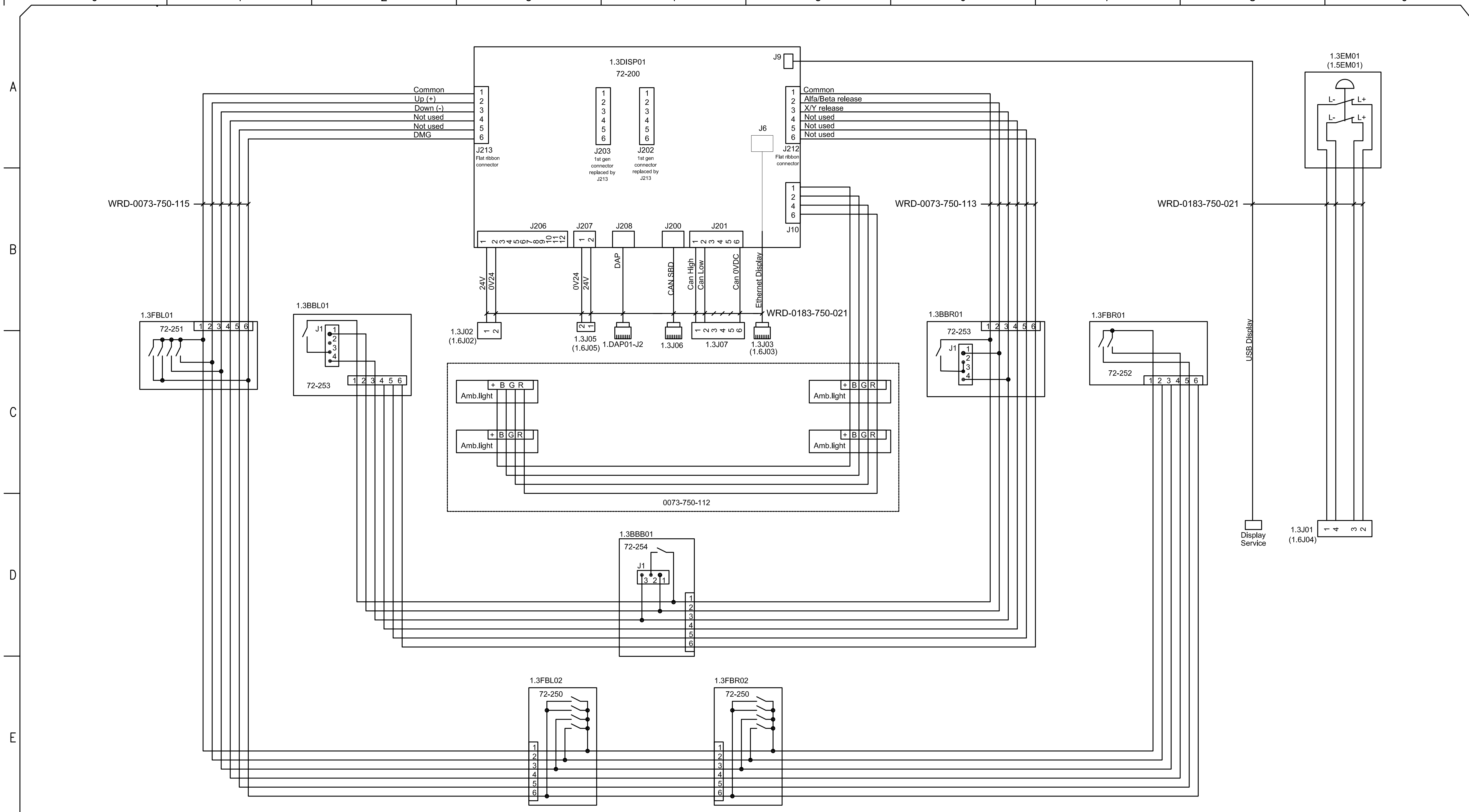
Arcoma AB

Revision notes!

This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

Product	Aproved by - date	Signature - date	
0073	MAT 2015-09-02		
Type of drawing / Unit block diagram	Drawn by / MAT	Checked by - date / Signature - date	Sheet / 1 / 1
Description / X ray tube		Drawing nr / UBD_0073_CS-Tube	Revision / 1.1



WRD-0183-750-021 Cable 1.3DSP01

72-253
Jumper settings

J1	Function
1-2	αβ
3-4	XY
1-2 and 3-4	αβ and XY (preset)

72-254
Jumper settings

J1	Function
1-2	αβ
2-3	XY (preset)

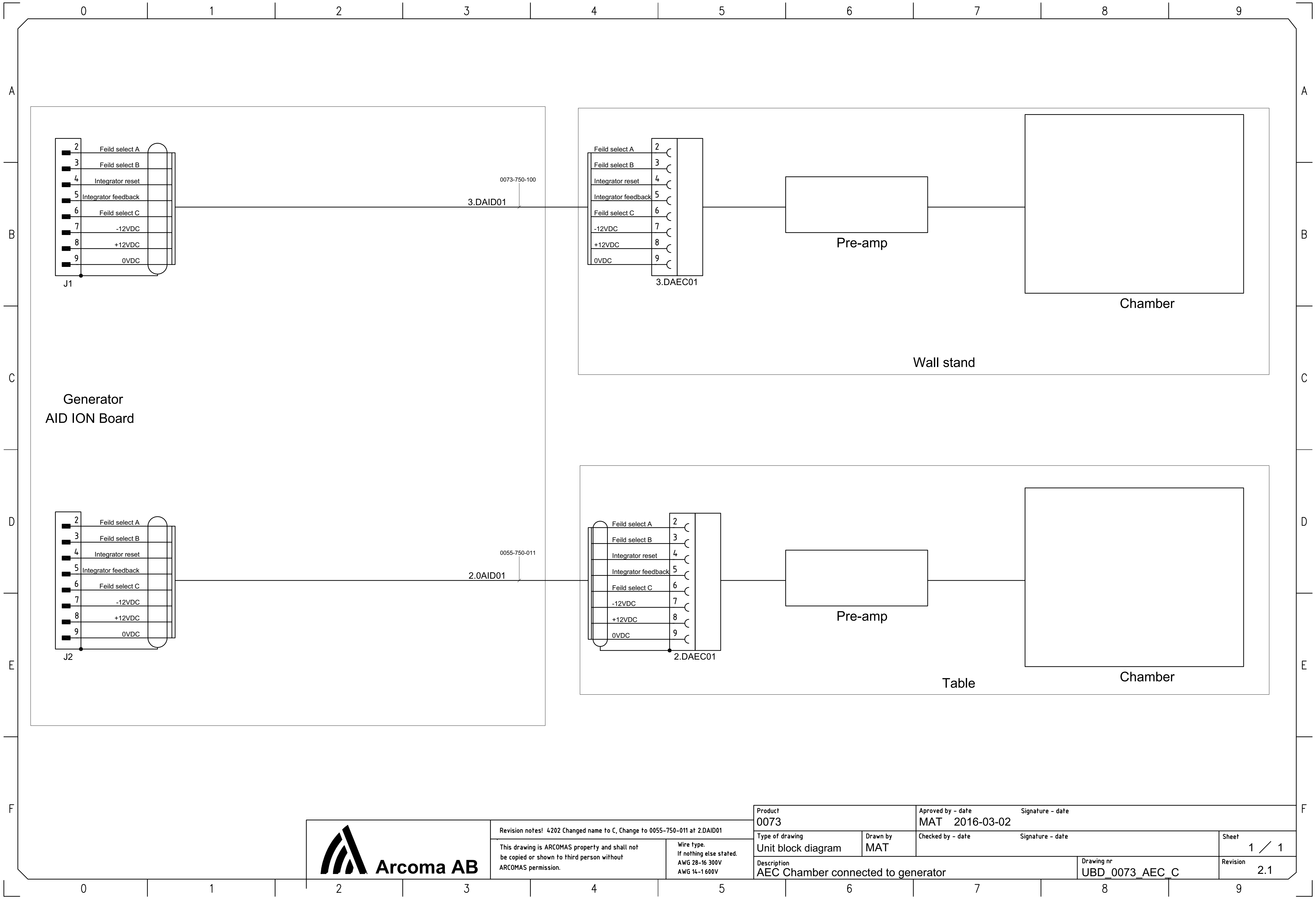
Arcoma AB

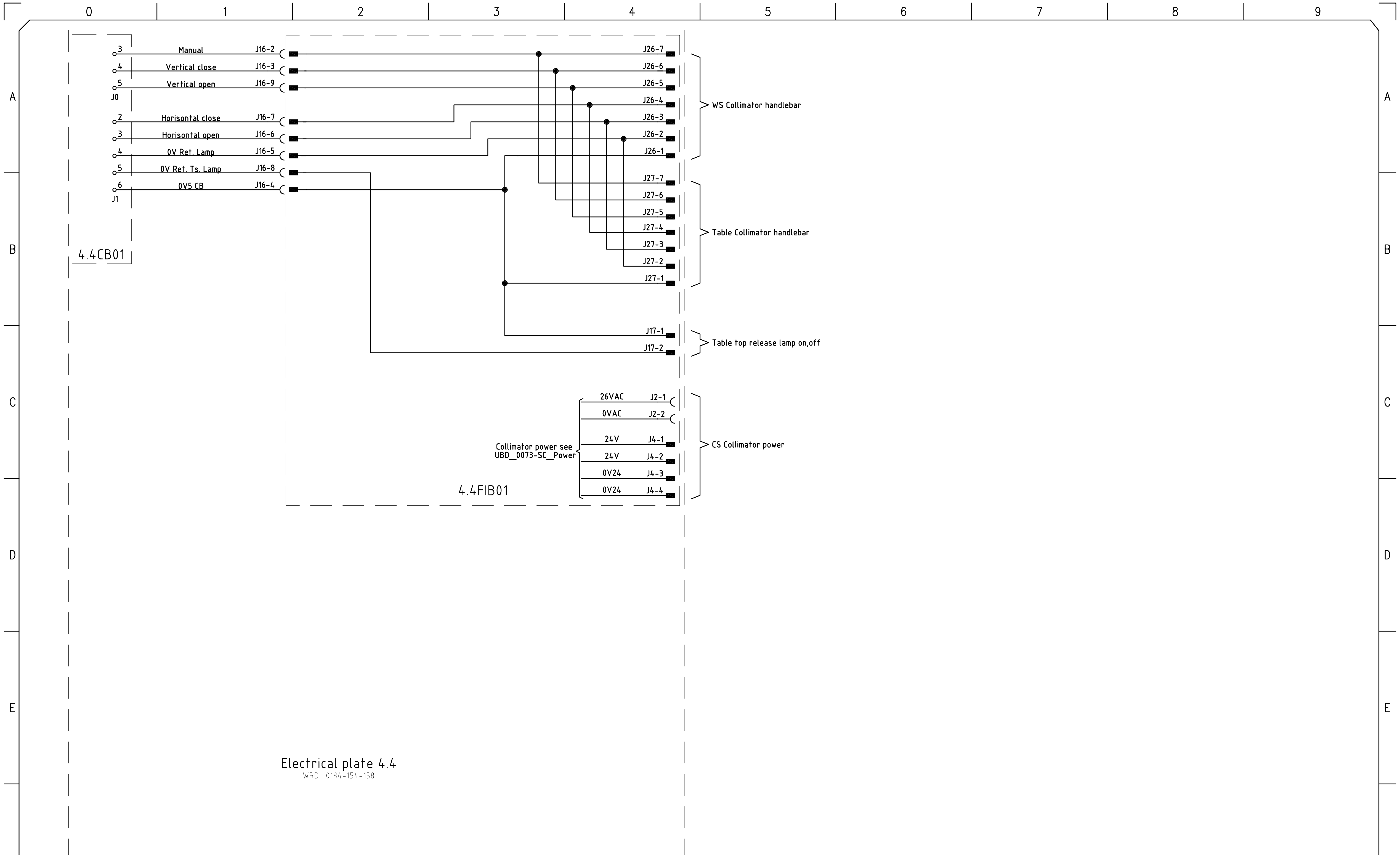
Revision notes!

Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V

Product: 0180	Aproved by - date: JHE 2020-11-23	Signature - date	
Type of drawing: Unit block diagram	Drawn by: RNI	Checked by - date	Signature - date	Sheet: 1 / 1
Description: 0180 Ceiling suspended unit display 4C	Drawing nr: UBD-0183-CS_2_4C_Display	Revision: 2.1	

500A


Generator
AID ION Board
J1
Feild select A
Feild select B
Integrator reset
Integrator feedback
Feild select C
-12VDC
+12VDC
0VDC
0073-750-100
3.DAID01
3.DAEC01
Pre-amp
Chamber
Wall stand
J2
0055-750-011
2.0AID01
2.DAEC01
Pre-amp
Chamber
Table
Arcoma AB
Revision notes! 4202 Changed name to C, Change to 0055-750-011 at 2.DAID01
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2016-03-02
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
1 / 1
Description
AEC Chamber connected to generator
Drawing nr
UBD_0073_AEC_C
Revision
2.1



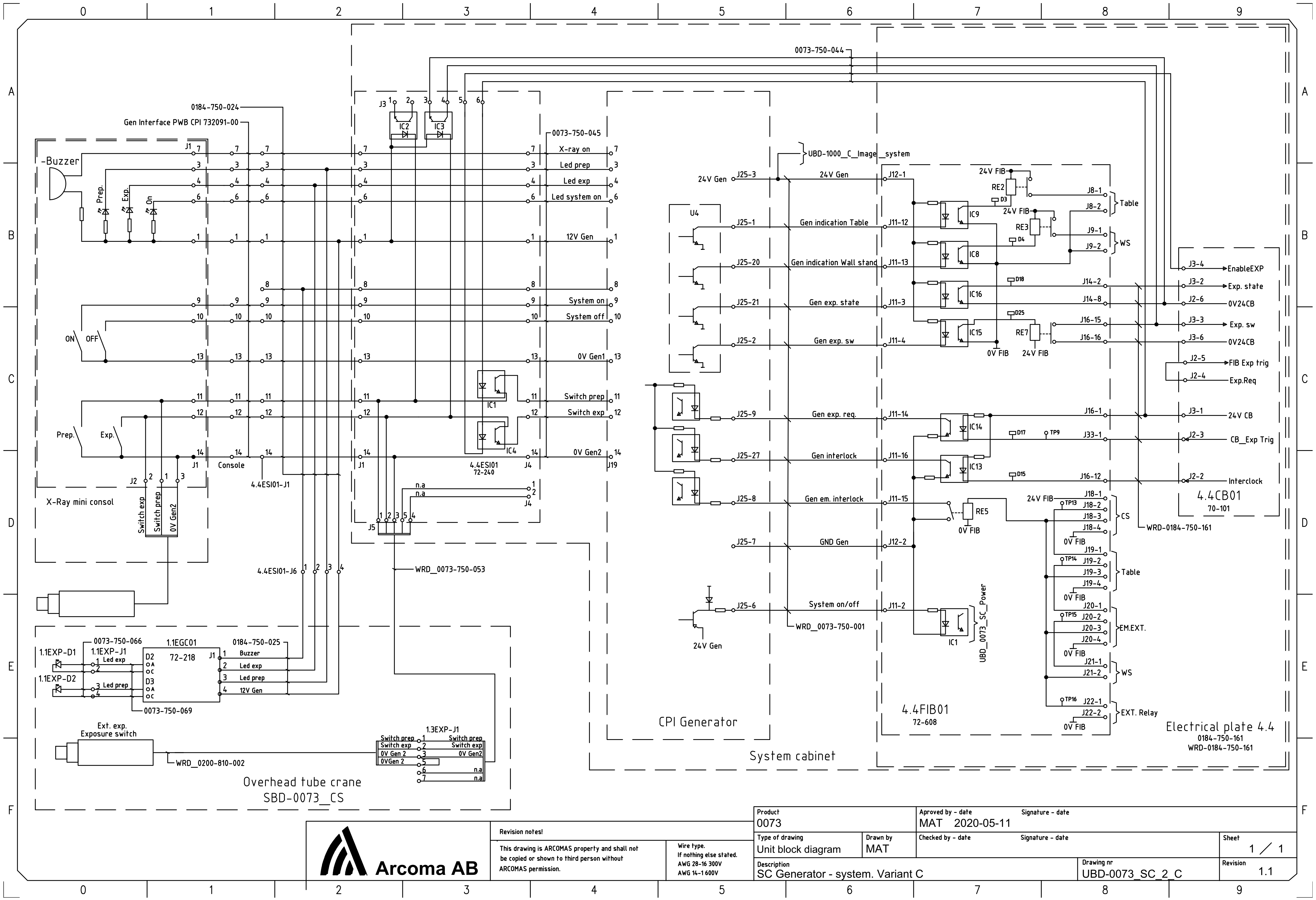
Arcoma AB

Revision notes! See last page.

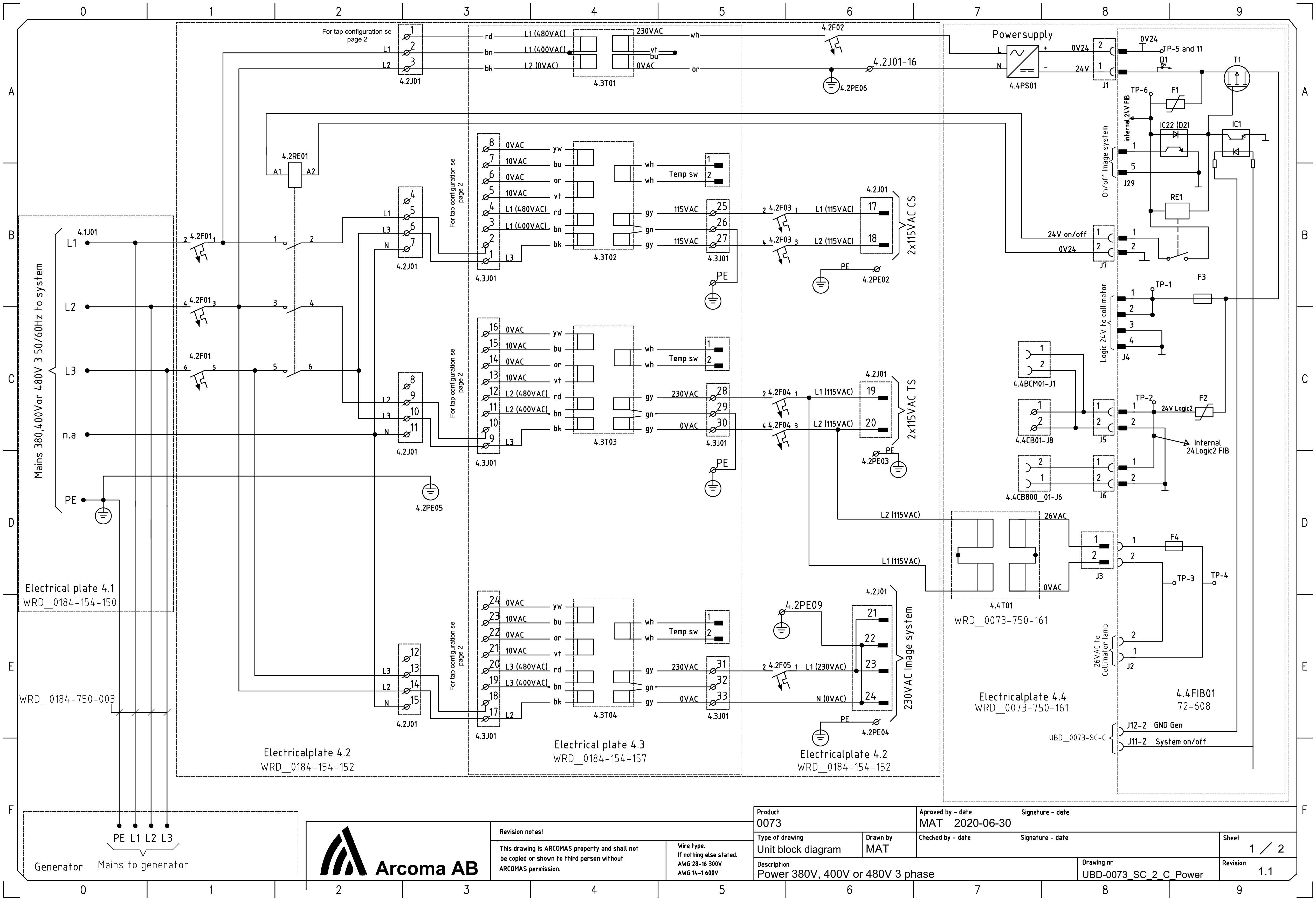
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.

Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V

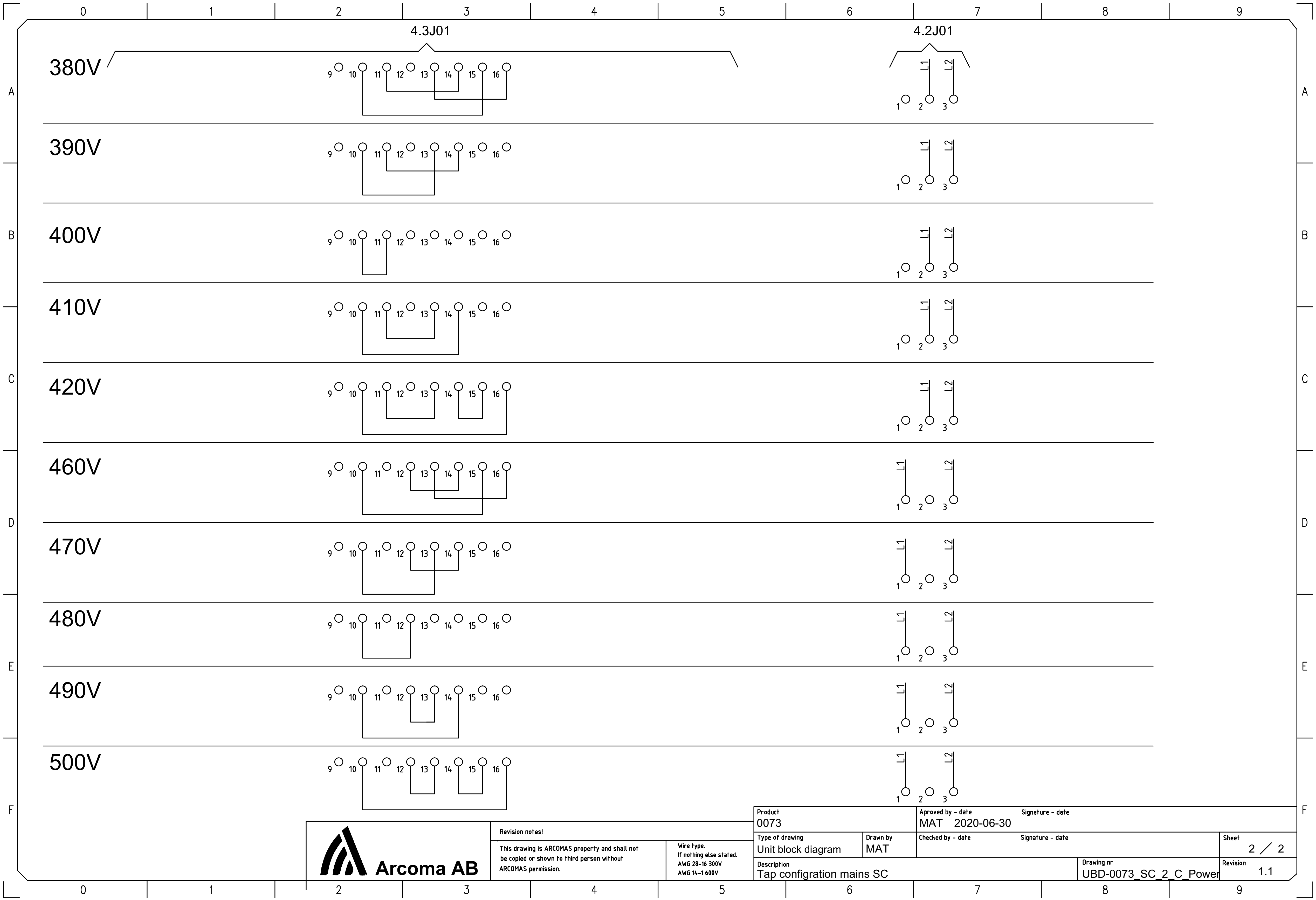
Product	Aproved by - date	Signature - date	
0073			
Type of drawing: Unit block diagram	Drawn by: MAT	Checked by - date: MAT 2013-08-06	Sheet: 1 / 1
Description: SC Collimator		Drawing nr: UBD_0073_SC_Coll	Revision: 1.1



0184-750-024
Gen Interface PWB CPI 732091-00
-Buzzer
Prep.
Exp.
On
ON
OFF
X-Ray mini consol
Switch exp
Switch prep
0V Gen2
Console
4.4ESI01-J1
4.4ESI01-J6
0073-750-044
0073-750-045
X-ray on
Led prep
Led exp
Led system on
12V Gen
System on
System off
0V Gen1
Switch prep
Switch exp
0V Gen2
4.4ESI01
72-240
WRD_0073-750-053
UBD-1000_C_Image_system
24V Gen
Gen indication Table
Gen indication Wall stand
Gen exp. state
Gen exp. sw
Gen exp. req.
Gen interlock
Gen em. interlock
GND Gen
System on/off
WRD_0073-750-001
CPI Generator
System cabinet
4.4FIB01
72-608
UBD_0073_SC_Power
Table
WS
CS
EM.EXT.
EXT. Relay
EnableEXP
Exp. state
0V24CB
Exp. sw
FIB Exp trig
Exp.Req
24V CB
CB_Exp Trig
Interclock
4.4CB01
70-101
WRD-0184-750-161
Electrical plate 4.4
0184-750-161
WRD-0184-750-161
0073-750-066
1.1EGC01
72-218
0184-750-025
1.1EXP-D1
1.1EXP-J1
1.1EXP-D2
Led exp
Led prep
Buzzer
12V Gen
0073-750-069
Ext. exp.
Exposure switch
WRD_0200-810-002
1.3EXP-J1
Overhead tube crane
SBD-0073_CS
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-05-11
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 1
Description
SC Generator - system. Variant C
Drawing nr
UBD-0073_SC_2_C
Revision
1.1



Mains 380,400V or 480V 3 50/60Hz to system
L1
L2
L3
n.a
PE
4.1J01
4.2F01
4.2RE01
4.2J01
4.3J01
4.3T01
4.3T02
4.3T03
4.3T04
4.2F02
4.2F03
4.2F04
4.2F05
4.2J01-16
4.2PE02
4.2PE03
4.2PE04
4.2PE05
4.2PE06
4.2PE09
2x115VAC CS
2x115VAC TS
230VAC Image system
For tap configuration se page 2
Temp sw
Powersupply
4.4PS01
4.4T01
4.4BCM01-J1
4.4CB01-J8
4.4CB800_01-J6
On/off Image system
Logic 24V to collimator
26VAC to Collimator lamp
Internal 24Logic2 FIB
24V on/off
UBD_0073-SC-C
J12-2 GND Gen
J11-2 System on/off
Electrical plate 4.1
WRD_0184-154-150
WRD_0184-750-003
Electricalplate 4.2
WRD_0184-154-152
Electrical plate 4.3
WRD_0184-154-157
Electricalplate 4.4
WRD_0073-750-161
4.4FIB01
72-608
Generator
Mains to generator
Arcoma AB
Revision notes!
This drawing is ARCOMAS property and shall not be copied or shown to third person without ARCOMAS permission.
Wire type. If nothing else stated. AWG 28-16 300V AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-06-30
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Sheet
1 / 2
Description
Power 380V, 400V or 480V 3 phase
Drawing nr
UBD-0073_SC_2_C_Power
Revision
1.1


4.3J01
4.2J01
380V
390V
400V
410V
420V
460V
470V
480V
490V
500V
9 10 11 12 13 14 15 16
L1 L2
1 2 3
Arcoma AB
Revision notes!
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Wire type.
If nothing else stated.
AWG 28-16 300V
AWG 14-1 600V
Product
0073
Aproved by - date
MAT 2020-06-30
Signature - date
Type of drawing
Unit block diagram
Drawn by
MAT
Checked by - date
Signature - date
Sheet
2 / 2
Description
Tap configration mains SC
Drawing nr
UBD-0073_SC_2_C_Power
Revision
1.1

10 Fuses

The fuses part number, size, type, designation and function are listed in the table below. Turn off the power to the system when removing and replacing fuses. Replace only with the exactly same type of fuses.

10.1 Overhead Tube Crane

Table 10-1 Fuse chart electrical plate 1.1

Designation	Size	Type	Manufacturer	Function
1.1F01	4AD	C60SP 1P D4A	Schneider Electric	115V Freq.
1.1F02	4AD	C60SP 1P D4A	Schneider Electric	115V Freq.
1.1F03	6AD	C60SP 1P C6A	Schneider Electric	36V AC
1.1F04	6AD	C60SP 1P C6A	Schneider Electric	24V AC

Table 10-2 Fuse chart Display Unit

Designation	Size	Type	Manufacturer	Function
1.3F01	1AT	326 series - SloBlo ceramic body 6.3x32 mm	Littlefuse	Display 24 V power

10.2 System Cabinet

Table 10-3 Fuse chart electrical plate 4.2

Designation	Size	Type	Manufacturer	Function
4.2F01	C20A	C60SP 3P C20A	Schneider Electric	Mains power
4.2F02	C1A	C60SP 1P C1A	Schneider Electric	Internal 230 VAC
4.2F03	C6A	C60SP 2P C6A	Schneider Electric	Ceil 2x115 VAC
4.2F04	C6A	C60SP 2P C6A	Schneider Electric	Table 2x115 VAC
4.2F05	C6A	C60SP 1P C6A	Schneider Electric	Detectors 230 VAC

10.3 Two Column Table

Table 10-4 Fuse chart electrical plate 2.1

Designation	Size	Type	Manufacturer	Function
2.1F01	6A	C60SP 1P C6A	Schneider Electric	24 VDC Logic

Table 10-5 Fuse chart 2.1DC01 and 2.1DC02

Designation	Size	Type	Manufacturer	Function
2.1DC01–F1	15A	326 series - 3AG SloBlo glass body 6.3x32 mm	Littlefuse	36 VDC motor power
2.1DC01–F2	15A	326 series - 3AG SloBlo glass body 6.3x32 mm	Littlefuse	36 VDC motor power

10.4 Wall Stand Z Motorized

Table 10-6 Fuse chart 4.4FIB01 placed in the system cabinet

Designation	Size	Type	Manufacturer	Function
3.1F01	10AT	326 series - 3AB SloBlo ceramic body 6.3x32 mm	Littlefuse	36 VDC Z-motor
3.1F02	3AT	326 series - 3AB SloBlo ceramic body 6.3x32 mm	Littlefuse	WS 24 V Logic

11 Technical Specification

11.1 Subsystem

11.1.1 Power requirements

Mains voltage for the System	400VAC 3Phase+N, +/-10%, 50/60Hz 400VAC 3Phase, +/-10%, 50/60Hz 480VAC 3Phase, +/-10%, 50/60Hz Long-time (positioning) 2 A 50/60 Hz. Momentary (exposure):150 A, 50/60 Hz (Short term peak value), (recommended fuse 63 A, thermal breaker, B curve.) Class 1
Heat dissipation	1713 BTU/H

11.1.2 Power line requirements

Generator Series and Mains Voltage	Generator Momentary Line Current	Apparent Mains Resistance	Recommended Minimum			
			Mains Disconnect to Generator (15 ft/5 m max)	Generator Service Rating	Distribution Transformer Rating	Ground Wire Size
50 kW 400 VAC, 3p	100 A	0.17 Ω	13.3 mm² (AWG 6)	100 A	65 kVa	13.3 mm² (AWG 6)
65 kW 400 VAC, 3p	125 A	0.13 Ω			85 kVa	
80 kW 400 VAC, 3p	155 A	0.10 Ω			105 kVa	
50 kW 480 VAC, 3p	80 A	0.24 Ω			65 kVa	
65 kW 480 VAC, 3p	105 A	0.19 Ω			85 kVa	
80 kW 480 VAC, 3p	130A	0.15 Ω			105 kVa	

11.1.3 Radiographic Specification

Radiographic performance	
kVp range:	40 to 150 kV
kVp steps:	variable in 1 kV steps
kVp accuracy:	± (5 % + 1 kV) measured 5 ms after the beginning of the exposure: ±2% between 70-80 kVp

Radiographic performance	
Rise time (10-90%):	< l.5 ms (typically< 1.0 ms) with 30 m (100 ft) Locaflex L3 or equivalent HV cables (4.4 µF ±10%)
Time range:	1.0 to 6300 ms
Exposure time steps:	Variable in 1 ms steps via protocol: Variable according to ISO 497 Series R'20 via console
Exposure time accuracy:	± (2% + 0.5 ms) from 5 ms to 6300 ms and > 0.5 mAs ± (10% + 1 ms) for> 0.1 mAs and for < 5 ms or ≤ 0.5 mAs for 30 m (100 ft) HV cables
mAs range:	0.1 to 630 mAs (50 kW) 0.1 to 800 mAs (65 kW) 0.1 to 1000 mAs (80 kW) Note for Minimum mAs: mAs Mode: 0.3 mAs (> 60 kV, 28 mA, 11 ms) mA, ms Mode: 0.3 mAs (> 60 kV, 10 mA, 30 ms) mAs or mA, ms Mode: 0.1 m As (40 - 60 kV, 10 mA, 10 ms)
mAs accuracy:	± (10 % + 0.2 mAs) ± (10% + 0.05) mAs: 0.1 mAs - 0.5 mAs (preliminarily specified for the range beyond IEC standard
mA range:	10 to 630 mA (50 kW) 10 to 800 mA (65 kW) 10 to 1000 mA (80 kW
mA steps:	Variable in 0.1 mAs steps via protocol: Variable according to ISO 497 Series R'20 via console
mA Accuracy (10 mA -1000 mA):	± (5% +1 mA) for exposures ≥ 5 ms and > 0.5 mAs: ± (20%) mA for exposures > 0.1 mAs and for< 5 ms or: ≤ 0.5 mAs: (0.1- 0.25 mAs, mA 50 mA)
Coefficient of linearity:	≤ 0.1 for kV and mAs parameters

Radiographic performance	
Coefficient of reproducibility:	≤ 0.05 (Station to Station) for exposures ≥25 mA or 3.2 ms
Duty Cycle:	Not to exceed 5 consecutive boosts, followed by a minimum 10 second wait period

Output Parameter and Loading Factor		
Output Parameter	**Generator Series**	**Loading Factor**
Maximum X-ray tube voltage and highest X-ray tube current at that voltage	50 kW 65 kW 80 kW	150 kV, 320 mA 150 kV, 400 mA 150 kV, 500 mA
Maximum X-ray tube current and highest X-ray tube voltage at that current	50 kW 65 kW 80 kW	630 mA, 80 kV 800 mA, 81 kV 1000 mA, 80 kV
Combination of X-ray tube current and X-ray tube voltage resulting in highest output power	50 kW 65 kW 80 kW	500 mA, 100 kV, 0.1 s 630 mA, 100 kV, 0.1 s 800 mA,100 kV, 0.1 s
Nominal shortest irradiation time (AEC exposures)	All models (AEC control is available over the full kV and mA range)	< 2 ms with a dedicated or 3 of 5 field AEC board AEC control is achieved by varying the ms of the exposure. The AEC ms range is 15 ms to an installer-programmable maximum not to exceed 600 mAs.
AEC Accuracy	All models	Coefficient of variation of measured air kerma ≤ 0.05

11.2 Collimator

X-ray rating up to	150 kVp
Collimation	Square field multilayer
Inherent filtration	Min. 1.2 mm Al/75KV
Selectable additional filtration	0 mm Al + 0 mm CU 1 mm Al + 0.1 mm Cu 1 mm Al + 0.2 mm Cu 2mm Al + 0.3 mm Cu
Square X-ray field selection	Min: 0.3 x 0.3 cm Max: 48 x 48 cm (± 1 % at 1 m SID) (to reach 43 x 43 cm at 90 cm SID)

11.3 X-ray Tube

Inherent filtration	0.7 mm Al/75KV
Added filtration	0.8 mm Al
Total filtration	1.5 mm Al (0.7+0.8)

For more detailed x-ray tube technical specifications, see the provided tube insert and housing datasheets.

11.4 Environmental Requirements

Ambient transport and storage temperature	-25°C - +70°C
Ambient operating temperature	+10°C- +40°C
Transport and storage humidity (relative)	10-90%, non-condensing
Operating humidity (relative)	30-75% RH, non-condensing
Maximum transport and storage altitude	3000 m
Maximum operating altitude	3000 m
Maximum air pressure	700–1060 hPa
Noise	55dB or less (except single noise)

11.5 Ceiling Suspended X-Ray Tube Support

11.5.1 General

Rotation range ceiling (beta)	>340°
Rotation range tube arm (alpha)	>±135°
Column (Z stroke)	1750 mm

11.5.2 Configuration

Overhead tube crane	The overhead tube crane is a mechanical part of an X-ray system.

11.5.3 Weight

Total weight Overhead tube crane (4x4m traverse and ceiling rail) including cabling	340 kg
Overhead tube crane (including tube and collimator, ceiling wagon, column)	165 kg
Traverse (X-ray assembly, 4 m)	95 kg
Ceiling rail Y (4 m standard)	28 kg/each

11.5.4 Electrical Characteristics

Mains voltage	230 VAC, 50/60 Hz center tapped single phase 4 A

11.5.5 Classification

Classification according to IEC 60601-1.

Class	Class I equipment. All dead metal parts of the equipment are electrical connected to protective earth.
Applied part	Type B
Protection against ingress of water	IPXO
Mode of operation	Intermittent operation: 20%, maximum 1 min. ON / 4 min. OFF
Use of anaesthetic mixtures	The equipment is not suitable for use in the presence of flammable anaesthetic mixtures with air or with oxygen or with nitrous oxide.

11.5.6 Speed

	Low speed	Maximum speed
Z movement	60 mm/s	
X movement	250 mm/s	500 mm/s
Y movement	250 mm/s	500 mm/s
α movement	16°/s	
β movement	16°/s	
Image receptor holder movement (with 50 kg mass)	166 mm/s	350 mm/s

11.6 Cabinet

Dimensions (L x W x H) mm	750 x 600 x 1125 mm
Weight	Max 134 kg

11.7 Table

11.7.1 Column

Lowest table top position (from the floor to the table top surface)	550 mm
Column (Z stroke)	380 mm

11.7.2 Table Top

Table top dimensions	2424 mm x 850 mm
Table top transparent area	2360 mm x 601 mm
Table top thickness	21.5 mm
Length of stroke, X direction	± 600 mm
Length of stroke, Y direction	± 150 mm
Movement range of the imaging unit	>650 mm
Movement range of the detector	up to 850 mm

11.7.3 Weight

Table	Approximately 150 kg
Imaging unit	Approximately 21 kg
Table top	Approximately 47 kg
Maximum patient load	300 kg

11.7.4 Electrical Characteristics

Maximum power without external electronics	500 W

11.7.5 Attenuation Equivalent

Table top	< 0.9 mm AL at 3.7 mm HVL
Detector holder	≤ 0.6 mm AL at 3.7mm HVL

11.8 Wallstand

Column, Z stroke	1580 +10/-10
Rotation range detector holder wagon (Only the tiltable detector holder wagon).	-20° - 90°
Attenuation Equivalent Detector holder	≤ 0.6 mm AL at 3.7mm HVL
Weight	200 kg ±10
Maximum speed Z movement	200 mm/s

12 Complying Standards

IEC 60601-1:2005+AMD1:2012+AMD2:2020 (edition 3.1)

- Medical electrical equipment: General requirements for basic safety and essential performance.

IEC 60601-1-2:2014 (4th edition)

- Medical electrical equipment : General requirements for basic safety and essential performance - Collateral Standard: Electromagnetic disturbances - Requirements and tests.

IEC 60601-1-3:2008+AMD1:2013

- Medical electrical equipment: General requirements for basic safety and essential performance - Collateral Standard: Radiation protection in diagnostic X-ray equipment.

IEC 60601-1-6: 2010+AMD1:2013+AMD2:2020

- Medical electrical equipment: General requirements for basic safety and essential performance - Collateral standard: Usability.

IEC 60601-2-28:2017

- Medical electrical equipment: Particular requirements for the basic safety and essential performance of X-ray tube assemblies for medical diagnosis.

IEC 60601-2-54:2009+AMD1:2015+AMD2:2018

- Particular requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy.

Complying Standards

13 Options

System

- Tube: 400k Hu, 600 kHu
- Integrated DAP
- Generator: 50 kW, 65 kW, 80 kW
- Stitching
- Wireless Remote control
- External servo button with emergency stop

Wallstand

- No tilt / No tilt detector
- User interfaces: Wireless foot pedal, Second foot pedal: Wireless or tethered foot pedal
- Patient lateral armrest
- Grids: ratio 10:1 SID: 110, 140 or 180

Table

- User interfaces: Wireless foot pedal, Second foot pedal: Wireless or tethered foot pedal, Strip type, Hand control for collimator adjustments
- Table top accessories:
  - Patient handgrip
  - Compression belt (high-end, cost-effective)
  - Lateral cassette holder
- Other:
  - Form pads for positioning
  - Mattress
- Grids: ratio 10:1 SID: 110, 140 or 180

14 Accessories

14.1 General

WARNING!

Due to squeezing hazards from motorized movements, only accessories approved by the Manufacturer are allowed.

14.1.1 General Accessories

Part no.	Description
0510–099–001	Cable carriage (1 piece)
0072–099–210	External servo button incl. emergency stop
0512–099–001	Unistruts for rails 4x4m
0512–099–002	Unistruts for rails 4x5m
0512–099–003	Mounting kit, unistruts for rails 4x4m
0512–099–004	Mounting kit, unistruts for rails 4x5m

14.1.2 Table

Part no.	Description
0072–095–170	Patient kit includes:
	- Compression belt, cost effective
	- Patient handgrip (2 pieces)
	- Mattress
0072-099-014	Patient handgrip
0055-099-001	Mattress, Comfort
0055-099-007	Mattress, 2200 mm
0055–099–009	Hand control for automatic collimator (1 piece)
0072-099-011	Lateral cassette holder
0072-099-004	X, Y, Z Foot control
0055-099-025	X, Y Foot control strip type
0072-099-028	Compression belt, cost effective
0072-099-029	Compression belt, high-end
0080-099-051	Form pad, small-rectangle

Part no.	Description
0080-099-050	Form pad, medium-wedge
0080-099-052	Form pad, large-head

14.1.3 Wallstand

Part.no.	Description
0182–099–320	Wall brackets WS

14.1.4 Detector

Part.no.	Description
CXDI-401C, wireless 43x43 compact	Canon detector
CXDI-402C, wireless 43x43	Canon detector
CXDI-410C, wireless 43x43	Canon detector
CXDI-701C, wireless 35x43	Canon detector
CXDI-702C, wireless 35x43	Canon detector
CXDI-710C, wireless 35x43	Canon detector
CXDI-810C, wireless ~28x35	Canon detector

14.1.5 Grid

Part.no.	Description
0180-099-050	Grid 40 lp/cm, 10:1 Ratio, F115, Al type
0180-099-051	Grid 40 lp/cm, 10:1 Ratio, F150, Al type
0180-099-052	Grid 40 lp/cm, 10:1 Ratio, F180, Al type
0180-099-060	Grid 52 lp/cm, 10:1 Ratio, F110, Al type
0180-099-076	Grid 52 lp/cm, 10:1 Ratio, F140, Al type
0180-099-061	Grid 52 lp/cm, 10:1 Ratio, F180, Al type
0180-099-082	Grid 52 lp/cm, 10:1 Ratio, F115, Carbon cover
0180-099-083	Grid 52 lp/cm, 10:1 Ratio, F180, Carbon cover

15 Spare parts

Refer to Spare part catalogue document *1000-095-072_x.y* for the spare part list.

15.1 General

Note!

Contact the manufacturer for information about how to exchange spare parts.

16 Waste Disposal

The manufacturer is responsible for disposal of the system. To avoid environment pollution and human injury, we therefore request that you contact the manufacturer or your dealer if you wish to cease operation of your system with the intention of disposal.

For disposal of other components, refer to corresponding documentation.

Follow the rules and regulations of your relevant authorities in the disposal of this system, accessories, options, consumables, media, and their packing materials.

17 Appendix A

17.1 Glossary

A

Accessories	Extra facilities to the system which easily can be mounted by the user.
AEC	Automatic Exposure Control.
Alpha	A direction for a rotation movement.

B

Beta	A direction for a rotation movement. The tube turns around the Z-axis.
Btu/hr	British thermal unit/hour.
BU/Back-up	A precautionary measure that shuts off the exposure, if the AEC chamber does not.
Bucky	See Detector holder.

C

CE	A CE-marked product verifies that the Manufacturer guarantees that the product fulfils the EU fundamental health, environment and security requirements.
Centering	The field of image is centered over the detector.
Collision	Either a physical collision with an obstacle or the node cannot reach its end position.
CR	Image plates.

D

DAP meter	Dose Area Product meter. The DAP-meter is placed next to the collimator and measures the amount of X-ray radiation that leaves the collimator.
Diode	Electrical component that leads voltage and current in one direction.
Dealer	See “Supplier”.
Detector	Image receptor for X-ray that does not require a cassette. The reception and transfer of an image is digital.

E

EMC	Electromagnetic Compatibility.
End stop	See mechanical end stop and software end stop.
Exposure	An image is taken against an image receptor.

G

Guard function	Collision detection of the Z-movement (option).
Guard sensor	A sensor in the top of the Z-column that registers variations of force.

I

IEC	International Electrotechnical Commission.
Image receptor	Receptor for images: Film, CR, DR, or Cassette.
Image receptor holder	Holder for the image receptor (Film, CR, DR or Cassette).
Index	Mechanical position markings, for instance alpha 0°, +90° and -90°.
Intermittence	The number of repetitions / unit of time. Recurrent cycles.
ISO	International Organization for Standardization.

M

Mechanical end stop	A physical device that stops an automatic or manual movement if the software end stop is out of order.
Motorized movement	A motor assisted movement.

N

Node	A control and supervision unit, consists of printed circuit board and node specific software.

O

O.D.	Optic Density.
Options	Extra facilities that demand updating of the System software and hardware before use. Options demand installation of an authorized service technician.

P

Position	A location in the room (X, Y and Z).

S

SID	Source to image distance. The distance between the focus spot in the X-ray tube and the active image receptor surface. FFD is also used.
Software end stop	A non-physical device that stops an automatic or manual movement. The software end stop is placed before the mechanical end stop.
SSW	Service software.
Supplier	The company that sells the System to the user (hospital).

T

Table frame	The metallic frame that carries the Table top. The frame is attached to the bottom of the Table top.

W

Working area	The size of the Table top including X- and Y-stroke.

X

X-movement	The System moves in the X-direction.

Y

Y-movement	The System moves in the Y-direction.

Z

Z-node	The Z-node controls the Z-movement.
Z-movement	The System moves in the Z-direction.

18 Appendix B

18.1 Annual Maintenance Checklist

Make a copy of this paper before filling in.

If there is any discrepancy please use the table to make a note.

Hospital:...

Id no:...

Sign:..

18.1.1 System

☐ 1. Measure the system protective earth.

☐ 2. Check the emergency stops.

18.1.2 Ceiling Suspended X-Ray Tube Support

☐ 1. Check the tightening of bolts fixing the ceiling rails Y to the Unistrut rails. _______ (Nm)

☐ 2. Check the tightening of bolts fixing the travels rails X distance plates (total 12 screws). _______ (Nm)

☐ 3. Clean the wheels of the side position bearings and check for damage.

☐ 4. Check the tightening of screws for the X-ray tube turning plate, see **Fig. 6-3** _______ (Nm)

☐ 5. Check the lifting cord for damage and make sure it runs smoothly.

☐ 6. Check the guard function in the column, see step **18.** on page **296**

☐ 7. Check the alignment of the X-ray and light field.

☐ 8. Check the alignment of the overhead tube crane.

☐ 9. Check the tube angulation, see step **23.** on page **296**

☐ 10. Check the tightening of the four X-ray clamp screws. _______ (Nm)

☐ 11. Check the X-ray tube for oil leakage.

☐ 12. Check that there is no play between the collimator and the X-ray tube.

☐ 13. Check the function of the maneuver handle buttons.

- ☐ 14. Check the function of the column Z brake.
- ☐ 15. Check the overhead tube crane column segments (full stroke).
- ☐ 16. Clean the wheel tracks.
- ☐ 17. Clean the wheels.
- ☐ 18. Check the fastening of the overhead tube crane wagon side position wheel. ______ (Nm)
- ☐ 19. Check the movement of the overhead tube crane to all positions in X-, Y- and Z-directions.

19 Installation report

19.1 Attention

The installation report is an important form for Arcoma AB to receive feed-back from our dealers, in order to keep track of delivered systems and their current status. The report is required from all performed installations in order to comply with CFR 21 §1020.30.

The CE-mark to MDD Class II products is fulfilled through MDD ANNEX II 93/42/EEC where our Quality system is an essential part.

We kindly ask you to take the time needed to fulfil the report. The installation report form are delivered with each system (included in the Service and Installation Manual). There is also a digital form (this document) available which can be used.

Please send the fulfilled and signed report to service@arcoma.se. Sending the report confirms that you have installed the unit and that it is working properly on site.

If you encounter product related issues during the installation, it is important that we receive this information as input to our CAPA-process (Corrective and Preventive Action). For such reports please contact service@arcoma.se (+46 470 70 69 70).

INFORMATION FROM THE DEALER

Product Identification

Equipment type:____________________

System Serial number:________________

Date:______________________________

Dealer:____________________________ **Installer:** ___________________________

Site Identification

Hospital/address:____________________

Department:________________________ **Lab/room:**__________________________

☐ I hereby confirm that the installation is performed in accordance with this Installation and service manual.

Signature of Installer

Date ____________________

Signature ______________________________

CANON MEDICAL SYSTEMS USA, INC.

Made For life