

User's Guide

SensorX 23

X-Ray Product Inspection



 marel

"Original instructions"

Published by Marel ehf
Austurhraun 9
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Austurhraun 9

IS-210 Gardabaer, Iceland

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Austurhraun 9

IS-210 Gardabaer, Iceland

**DECLARATION OF CONFORMITY***Konformitätserklärung**Déclaration de Conformité**Declaración de la Conformidad*

Manufacturer: <i>Hersteller:</i> <i>Fabricant :</i> <i>Fabricante:</i>	Marel ehf Austurhraun 9 IS-210 Gardabaer, Iceland
Product: <i>Produkt:</i> <i>Produit :</i> <i>Producto:</i>	SENSORX
Type: <i>Typ:</i> <i>Type :</i> <i>Tipo:</i>	
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(*Maschinen, Machines, Maquinaria*)
- 2004/108/EC EMC Electro-Magnetic Compatibility
(*Elektromagnetische Verträglichkeit, Compatibilité électromagnétique, Compatibilidad electromagnética*)
- 2006/95/EC Low Voltage
(*Niederspannung, Basse tension, Baja tensión*)

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Place/Date:*Ort/Datum:**Lieu/Date :**Lugar/Fecha:*

Gardabaer,

June 12, 2012



STANDARD SAFETY AND WARNING NOTICE FOR ALL MAREL EQUIPMENT

All persons involved in the use and/or installation of this machinery should be aware of the following instructions.

Failure to follow these instructions or other safety instructions in the manual voids all warranties and may result in malfunction of the machinery, property damage, serious personal injury, or death.

WARNING

- **The installation and use of this product must comply with all applicable national, state, and local codes.**
- **Turn the electrical power off when working on the machinery. Turn the main electrical breaker, located on the electrical cabinet, to the OFF position and lock the breaker with a padlock.**
- **Electrical installations and repairs must be performed by a licensed electrician, in accordance with manufacturer's specifications and national and local electrical codes.**
- **Operating the machinery without the supplied guards or covers installed is a misuse of the machinery and can cause a personal hazard.**

Do Not

work on any moving parts of the machinery, such as belts, motors, belt tension adjusters, or rollers, without first **disconnecting the electrical power** and **closing the main air supply valve**. Otherwise, a serious personal injury or death may result.

Do Not

work on electrical or air cabinets without first **disconnecting the electrical power**, or a serious personal injury or death may result.

Do Not

make any changes to the emergency stop buttons.

Additional Safety Information

- Keep long hair tied back and covered.
- Avoid wearing loose clothing, jewelry, or accessories near moving machine parts. This includes ties, shirtsleeves, rings, watches, and other loose fitting items.
- Disengage the machinery to avoid moving parts when cleaning and lubricating bearings.
- Avoid moving parts when lubricating with hand-sprayed lubricants.
- Never work without another person in the vicinity.
- Wear safety glasses when doing the following:
 - using a hammer to drive pins, riveting, staking, etc.
 - drilling, grinding, etc.
 - using spring hooks or attached springs.
 - soldering, cutting wire, removing steel bands, etc.
 - cleaning parts with solvents, spray, or cleaners.
- After cleaning or maintenance, reinstall all safety devices such as guards, shields, signs, and grounding wires.
- Wear ear protection when exposed to noise exceeding 90 dB, such as when using a grinder, band saw or hammer.
- Lift items with a straight back, and push up with your leg muscles, to prevent back strain. Do not lift any equipment or parts weighing more than 30 kg (60 lb.) without assistance.
- Use only FDA or USDA approved solvents, grease or oils.

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Introduction

About This Manual

The *SensorX User's Guide* is intended to assist you in installing, operating, and maintaining SensorX, the Marel X-ray product inspection device.

Note: Before you install or use the unit, make sure you read and understand the warnings and the warranty agreement.

The manual is divided into the following main chapters:

- Introduction, a general description of SensorX and the structure of the manual.
- Safety Instructions
- Installation
- Operation – a description of the user interface and daily operational procedures.
- Maintenance
- Cleaning
- Parts Lists – mechanical parts lists and electrical diagrams.
- Appendixes

The manual also contains a glossary and an extensive index.

Customer Support and Improvements

You can help improve this manual and the equipment you purchased. If you find errors in the manual, please let us know. You can contact us at: Marel ehf., Austurhraun 9, IS-210 Gardabaer, Iceland; phone (+354) 563-8000, fax (+354) 563-8001, attn. Documentation & Localization, email: documentation@marel.com.

For customer support please contact your local Marel service partner for details. See www.marel.com or Marel's Service Department, e-mail: service@marel.com

Warranty Information

Warranties issued by Marel ehf. are revoked if the equipment has not been used according to specifications. The same applies if the equipment has been modified in any way without Marel's consent.

About SensorX

SensorX uses X-ray technology to automatically detect foreign bodies in food products. It is designed for use, for example, in poultry processing plants, where it is used for quality inspection or material flow control.

When SensorX is installed as part of a poultry processing line, X-ray images of individual pieces and information on their bone content may be forwarded to a separate trimming flowline or reject mechanism. The functionality of the trimming flowline or reject mechanism is not described here, but in the respective documentation.

Main Parts

SensorX consists of four main parts: an X-ray unit, an M6000 Controller, an X-ray sensor and a motor driven conveyor.

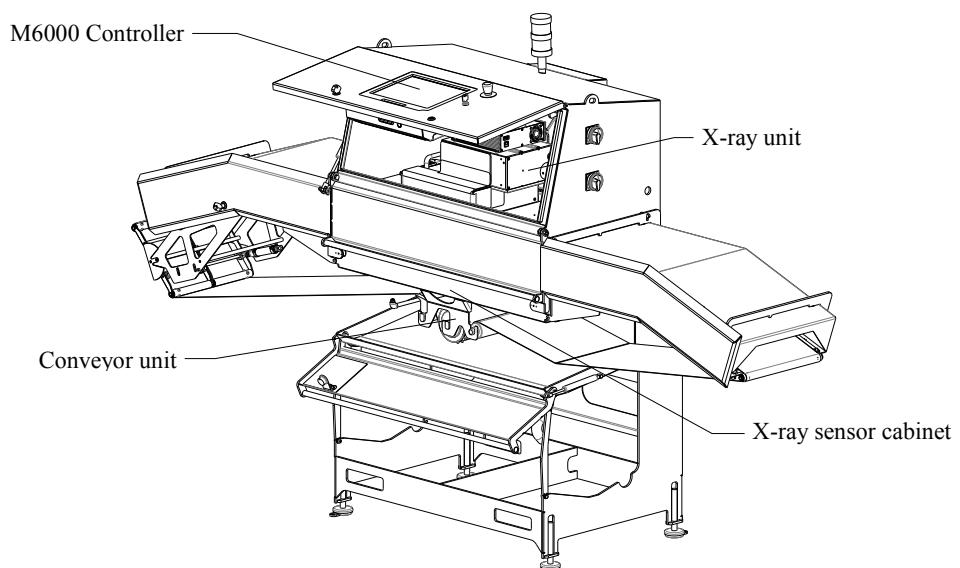


Figure 1 SensorX, main parts.

Technical Specifications

Table 1 Technical data.

Belt speed	0.52 m/s (102 feet/minute)
Power supply voltage	Single phase 230 Vac + N + PE or 3×400V + N + PE or 3×(208-230V) + PE
Power usage	1.5 kW
Frequency	50/60 Hz
Residual current circuit breaker	Type B, 500 mA
Operating Temperature	0 – 20° C (32°F – 68°F)
Water usage (optional)	Up to 1 L/min (34 oz/min)
Dimensions	3247 mm × 790 mm × 1930 mm (L x W x H) (128 7/8 in x 31 1/8 in x 76 in)
Belt width	390 mm (15 in)
Scanning width	300 mm (12 in)
Belt type/length	KE112 6785×390 mm, 295 perforations
Weight	Approx. 600 kg (1330 lb)
Noise level	<75dB(A)
X-ray potential	80kV
X-ray current	6.25mA
X-ray duty cycle	100%

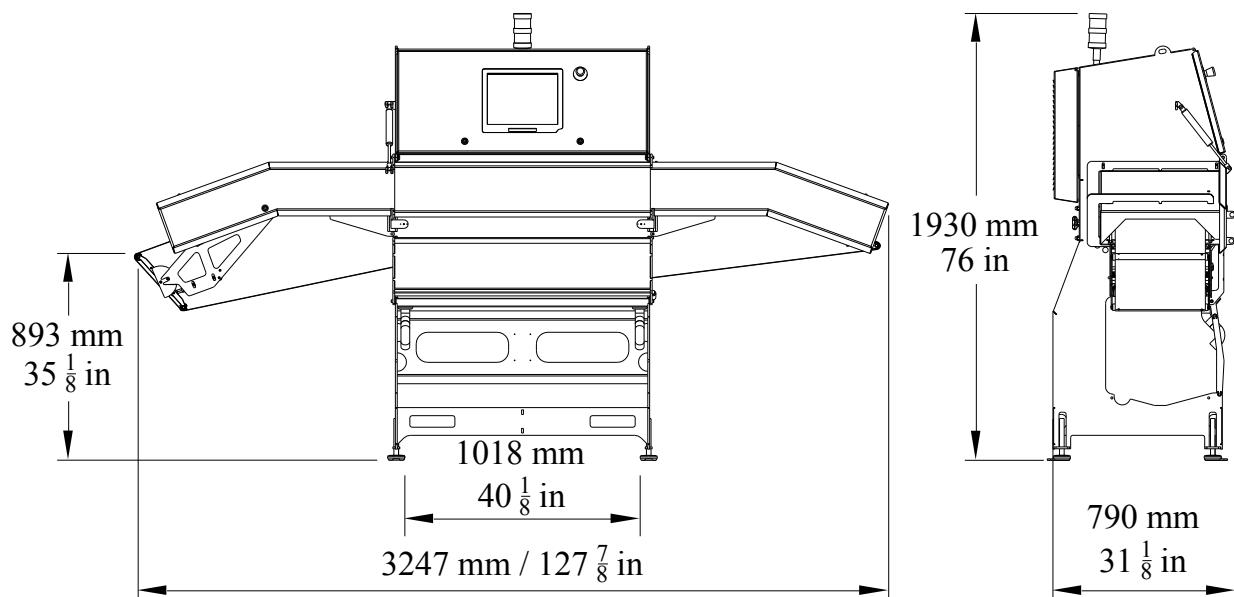


Figure 2 SensorX dimensions.

Transportation and Handling

Read these transportation and handling instructions before you attempt to lift or transport the equipment. If you fail to follow these instructions, lifting or transporting the equipment may cause death or major personal injury, or serious damage to the SensorX.

- Observe the mass of the SensorX before lifting or moving the equipment. The mass is stated on the rating plate which is located to the left of the electrical cabinet.

If you use a pallet jack for transportation, place logs or other material on top of the forks in order to prevent corrosive scratches on the structural member. Always lift under the central construction (see Figure 3).

- You can also use a fork lift to transport the SensorX. Use the transportation holes (see Figure 4).
- SensorX should not be moved without use of the transportation brackets. The transportation brackets prevent the load cells from damage during transportation.

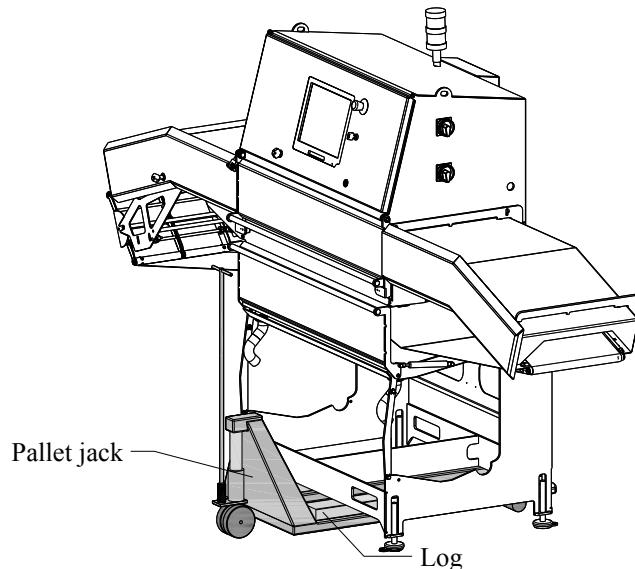


Figure 3 Transporting the SensorX with a pallet jack.

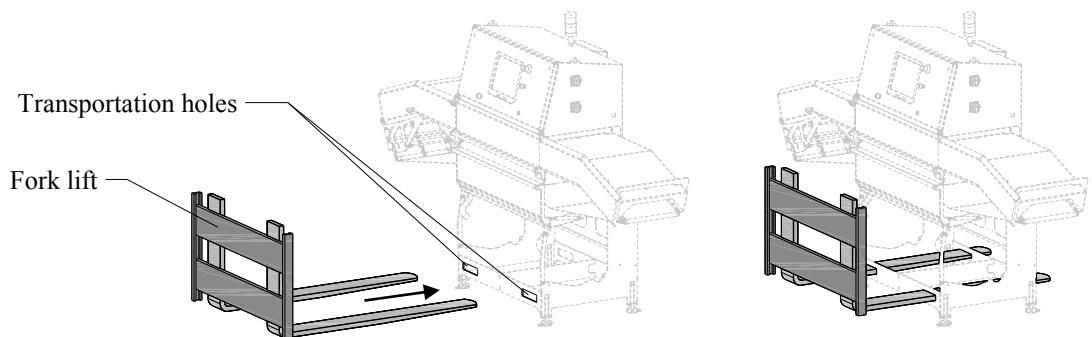


Figure 4 Transporting the SensorX with a fork lift.

Safety Instructions

General

During operation of the SensorX care should be taken to prevent accidents, especially in the places shown in Figure 5:

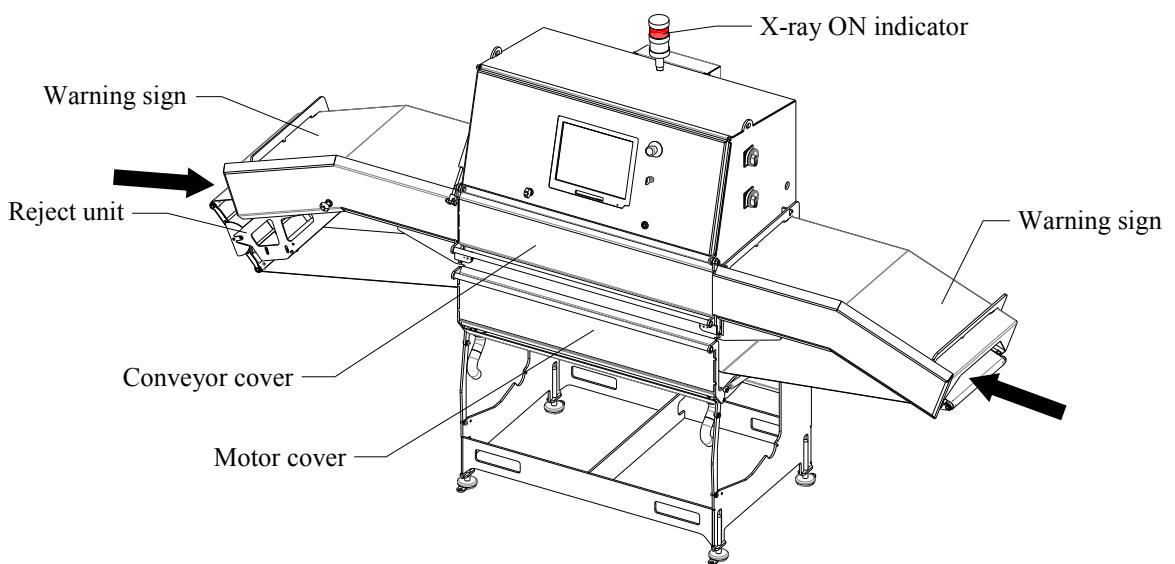


Figure 5 Potential hazard areas.

- **Entrance/exit openings**

Because of possible X-ray radiation, do not put your hand inside the entrance/exit openings. Warning signs are placed on the openings.

- **The safety covers (conveyor and motor covers)**

Always open and close the covers with care. Do not slam down the covers.

Note: The conveyor cover on SensorX has gas springs to prevent it from slamming down violently. If these gas springs are missing or starting to lose pressure, make sure to replace them to minimize the risk of accidents.

- **Reject unit**

Because of pinching hazard, do not put your hand inside the reject unit.

Safety Arrangements

Warning Labels

SensorX is supplied with the following warning labels:



- X-ray radiation. Potential X-ray hazard. Placed on the front panel cover and on entrance/exit openings.



- Electrical hazard. Placed on the front panel cover.



- Crush hazard. Placed on the reject unit.

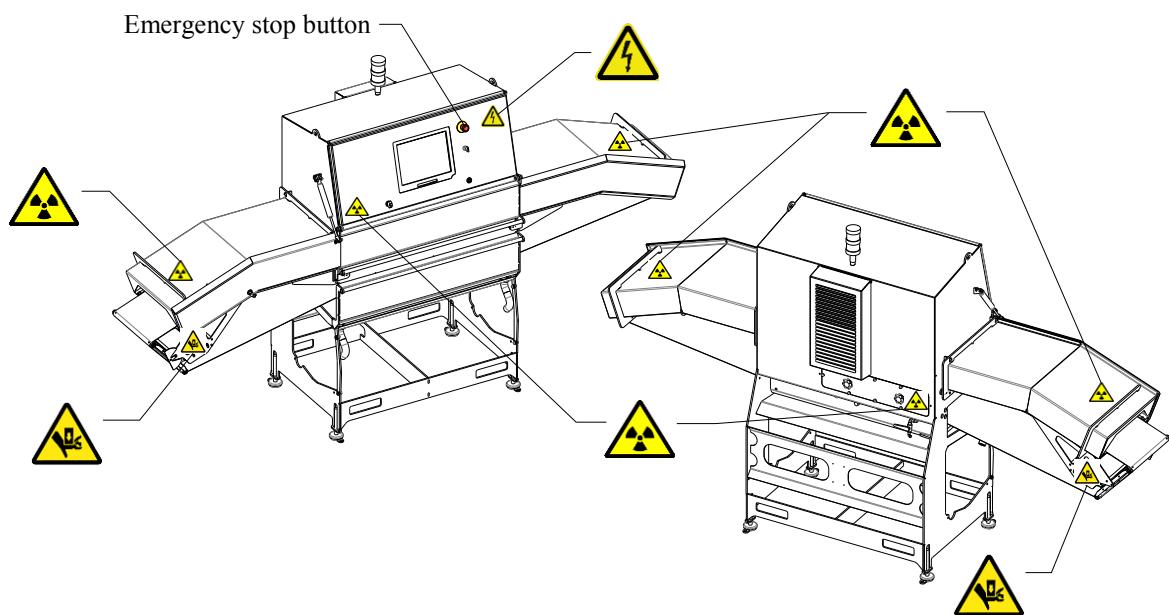


Figure 6 Warning labels on SensorX.

Do Not

Although the SensorX has been designed and constructed with the highest level of safety in mind, it is very important to emphasize that proper use is the most important factor in a safe and trouble-free operation. Therefore

- **Do not** use the unit without authorization.
- **Do not** extend any part of your body into any openings on the unit while X-ray generation and scanning is in progress.
- In case raw material is stuck in the unit, turn the X-rays off momentarily, open the conveyor compartment, and attend to the problem safely.
- **Do not** disconnect electrical power from the unit until at least 15 minutes after it has been stopped. This allows the internal cooling fans to remove heat from the X-ray generator after the generator has been turned off.

Radiological Safety Procedures and Precautions

SensorX is designed with the utmost safety in mind when it comes to possible X-ray radiation leakage.

The unit is supplied with numerous safety features to ensure that X-ray generation is not initiated unless all required conditions are met.

The X-ray cabinet is made of stainless steel, adequate in thickness to prevent any radiation leakage. The entrance and exit openings are designed to allow only a minimum amount of leakage radiation. This leakage radiation is under limits given by radiation protection authorities.

IMPORTANT! Do not attach extra parts, cable ladders for example, to the machine. Drilling holes in certain parts of the machine may cause excessive radiation leakage.

Safety Circuit

The safety circuit is an electronic circuit that prevents the operation of the machine if the machine is in an unsafe state. This affects both the generation of X-rays and the operation of the conveyor motor.

The safety circuit can have two states:

- **Open:** This means that some component of the safety system does not allow the start of X-rays and belt.
- **Closed:** All components of the safety system are in a safe state. X-ray generation and conveyor belt can be started.

The safety circuit consists of several components as shown in the diagram in Figure 7:

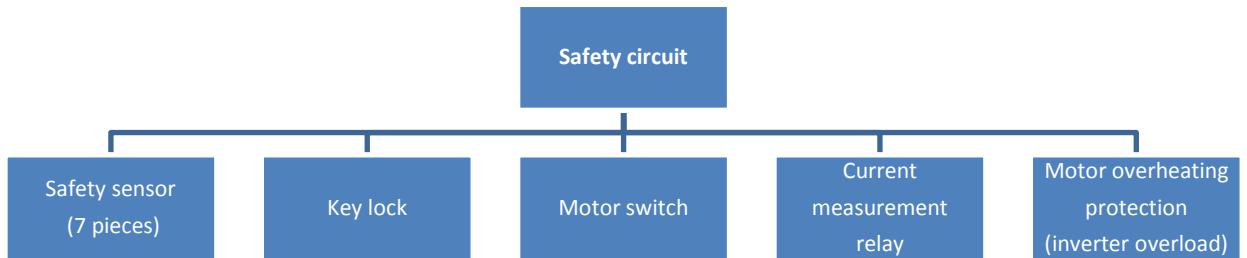


Figure 7 Safety circuit.

To close the safety circuit, all components of the safety circuit must be in a safe state.

The safety sensors are proximity sensors which are placed on doors and panels. The current measurement relay monitors if the X-ray indicator is working properly. The motor overheating protection will turn off the motor in case of a motor overload.

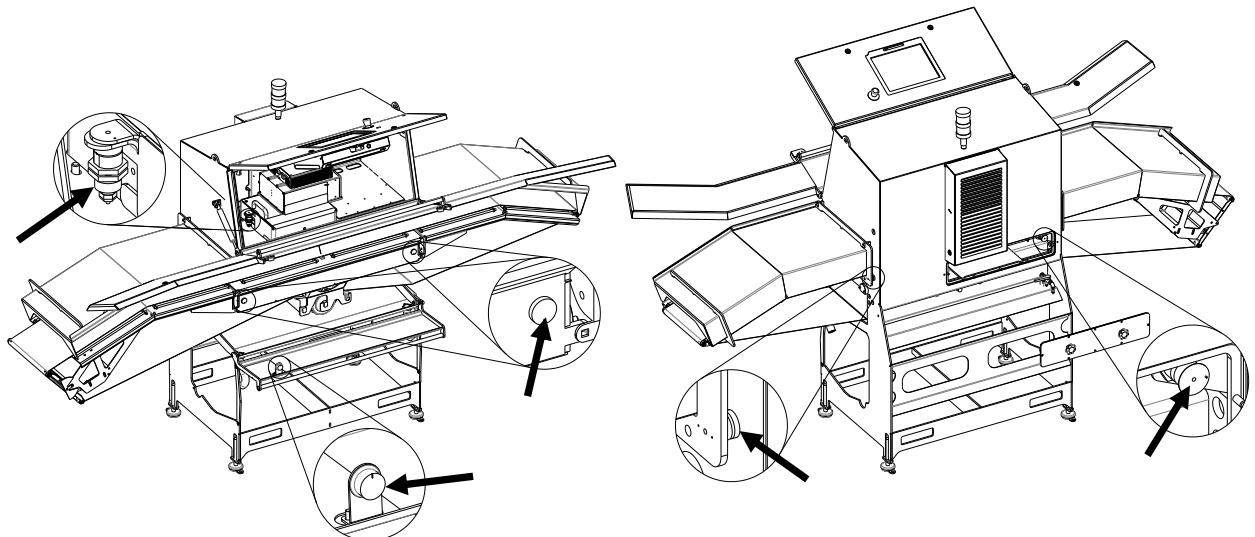


Figure 8 Positions of safety sensors.

Installation

Site Requirements

The location of SensorX is decided upon by the buyer and Marel ehf., but the following points are important when choosing the proper location:

- **Floor:** SensorX should be placed on an even and stable surface and bolted to the floor.
- **Accessibility:** There should be sufficient space around the machine for easy access for cleaning and maintenance.
- **Temperature:** The room temperature must not get below 0° C (32° F).

Verifying the Equipment

Before you install SensorX, verify the following:

- Inspect the equipment for damages incurred during shipment, such as scratches or dents. If the equipment has been damaged, do not operate because of potential X-ray hazard. Report damages immediately to Marel ehf. or your local Marel representative to have our technical personnel attend to the problem.
- Fill out the Installation Test Sheet. This will normally be performed by a qualified Marel service engineer.
- Compare the equipment you have received to the packing list to see if the shipment is complete. Report any discrepancies to Marel ehf.

Installing SensorX

To install SensorX:

- 1 Position SensorX and other auxiliary equipment according to floor plans.
- 2 When SensorX is in position, remove the fork lift or pallet jack.
- 3 Adjust all legs under the machine, so SensorX is level, length- and widthwise.
- 4 Drill holes for the floor bolts that will keep SensorX in place. If you are installing other units attached to SensorX, position these as well and drill holes for the bolts.
- 5 Adjust the legs under the infeed unit to ensure a smooth transfer of raw material from the infeed unit to SensorX.
- 6 Position the bolts in the assigned holes, and tighten (see Figure 9).
- 7 Connect electrical, air, and water supplies (see Figure 10 Figure 10)

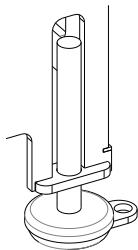


Figure 9 Floor bolts.

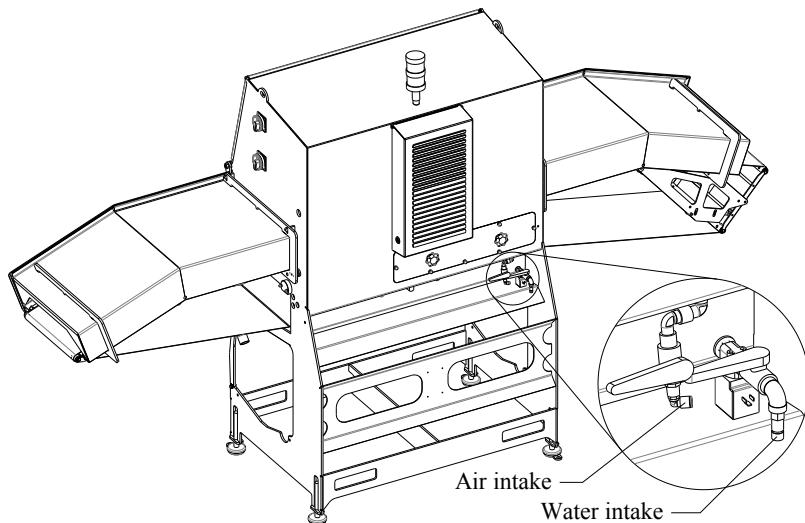


Figure 10 Air and water intake.

IMPORTANT! Do not attach cable ladders or such to the machine. Drilling holes in certain parts of the machine may cause excessive radiation leakage.

Electrical Installations

SensorX uses a 3-phase electrical supply:

- 3 x 400V + N + PE
or
- 3 x 230V + GND
or
- 3 x 208V + GND
or
- 1PH 230V + N + PE

The mains is to be terminated in the electrical cabinet. Refer to the electrical diagrams for details. The mains rating is listed on the rating plate on the electrical cabinets.

Make sure that cables are run so they do not affect the function of the SensorX or disturb workers on the line. Cables must never induce danger, electrical or mechanical, to the workers.

Termination of cables is done after all units in the installation have been put in their final position. Ensure that all conduits between units are tight.

WARNING! Electrical installations are to be performed by a licensed electrician only and in accordance with manufacturer's specifications and national and local electrical codes.

Pneumatic Installations

Compressed air is used to operate air cylinders in various places on the SensorX.

SensorX requires a supply of clean and dry air according to ISO standard 8573-1 class 3 (see Table 2).

Table 2 Quality of compressed air.

ISO 8573-1

Class	Solids		Water	Oil
	Particle size max μm	Concentration maximum mg/m^3	Max Pressure Dew point $^\circ\text{C}$	Concentration mg/m^3
1	0.1	0.1	- 70	0.01
2	1	1	- 40	0.1
3	5	5	- 20	1
4	15	8	+ 3	5
5	40	10	+ 7	25
6	-	-	+ 10	-
7	-	-	Not Specified	-

Pressure dew point is the temperature to which compressed air must be cooled before water vapor in the air starts to condense into water particles.

Note: Recommended local air pressure is minimum 7 bar. Pressure below the recommended 7 bar will noticeably affect the operating speed of the SensorX while pressure above 10 bar may damage the machine.

- 1 Make sure the air supply plumbing is clean before you connect the machine.
- 2 Set the operating air pressure at 6 bar (85-87 Psi) by adjusting the air regulator in the air cabinet.

The lifespan of air valves and cylinders is affected by the quality of the air supplied. It is therefore important that you only use clean and dry air.

Check List

Use this checklist for the initial start of SensorX.

	The power outlet matches the power intake as specified on the rating plate.
	All unused cable glands in the electrical cabinet are sealed.
	The electrical cabinet is dry and no moisture can get in. If the cabinet is damp, check the heaters.
	The M6000 Controller turns on when you power on SensorX. If not, check if there is 24 Vdc power to the M6000 Controller (see electrical diagrams and part list on page 43).

Operation

Operation Procedures

This section is a summary of SensorX operation. It can be used as a reference, but should not be considered as a replacement of the more detailed instructions later in the Operation chapter.

Before operation

- 1 Check the Power-on indicator to see if the machine is powered on. If the indicator is off, turn the Main switch to ON.
- 2 Make sure there is no water on the plastic strips in the product area above and under the conveyor belt. Large drops of water will diminish the radiation intensity and affect image acquisition.
- 3 Put the conveyor belt and wear strip frames in their proper places and wipe off the plastic strips.

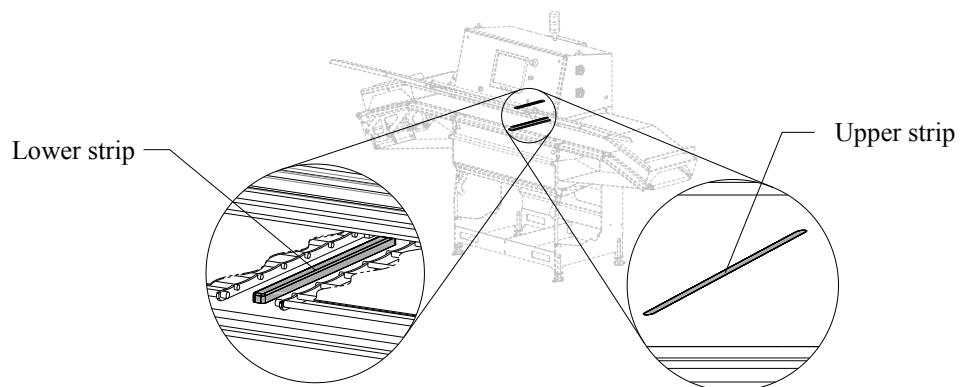


Figure 11 Wipe off the strips.

- 4 Close the conveyor and motor covers, insert and turn the X-ray key.
- 5 Press the green On button to start X-ray generation and the belt.
- 6 Let the machine warm up for at least 30 minutes.
- 7 Calibrate the machine.
- 8 Select the appropriate program for the product to be processed.

- 9** Run a test block twice through the SensorX, either during production or just before production start.

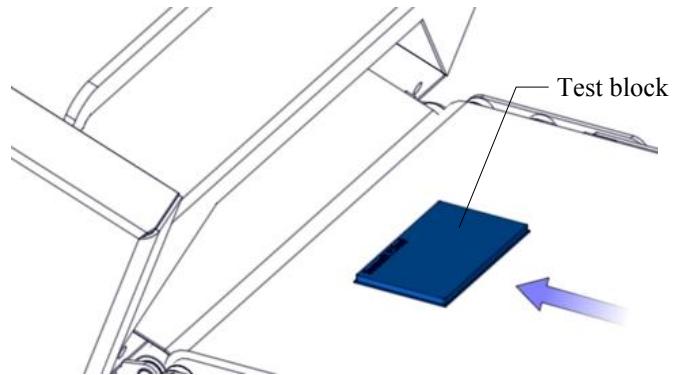


Figure 12 Test procedure.

- 10** Check if the test was successful: the SensorX screen shows two “holes” in the block (see Figure 13), and the block is then caught in time by the SensorX reject mechanism.

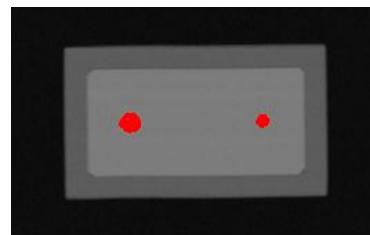


Figure 13 Successful block test.

- 11** The machine is now ready for operation.

Note: When you leave SensorX connected to electrical power, you should always **remove** the key from the X-ray lock and store it in a safe place to prevent unauthorized operation of the unit.

During Operation

- 1** Infeed: monitor the separation between pieces and their location on the belt.
- 2** Calibrate the machine during production breaks.
- 3** If the product type changes, you may want to switch to another program.
- 4** Make sure the raw material is fed correctly to the machine. Use the marker lines on the conveyor belt to position the material correctly. You can confirm the position by looking at the image on the Main screen.
- 5** Do not let the pieces overlap on the conveyor belt.



Figure 14 Positioning raw material on the conveyor.

- 6** As the pieces become thicker and/or larger, the scope of the X-ray beam narrows. Therefore, make sure the pieces are correctly positioned. The X-ray beam is 330 mm (13 in) wide when it hits the conveyor belt.

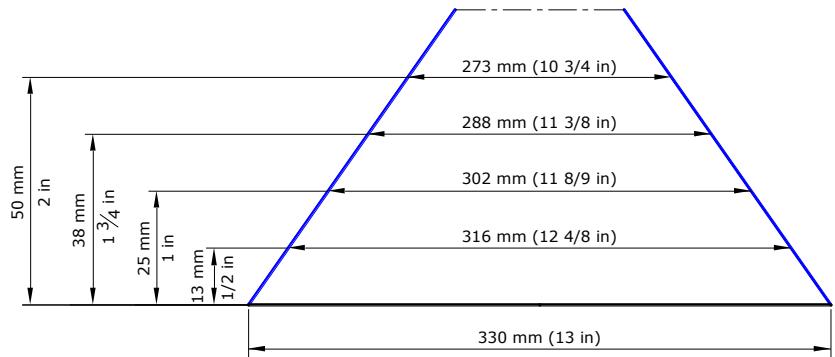


Figure 15 X-ray beam ranges (scanning width for < 50 mm (2 in) pieces).

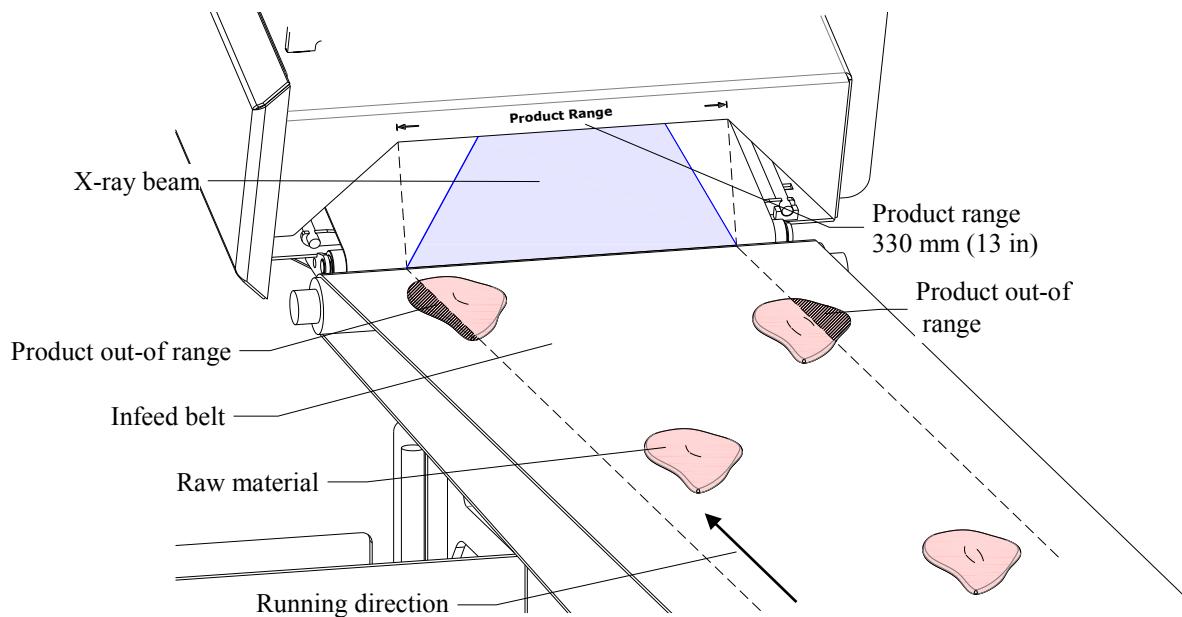


Figure 16 Positioning raw material in the product range.

Note: A bone in the out-of-range area will not be detected and the piece will go through the machine as a bone-free piece.

After Operation

- 1** Press the Off button to shut down X-ray radiation and the belt.
- 2** Remove the X-ray key to prevent unauthorized operation.

- 3** Leave power on the machine, and put the Motors switch to Off.

Note: When you leave SensorX connected to electrical power, you should always **remove** the key from the X-ray lock and store it in a safe place to prevent unauthorized operation of the unit

We recommend that you always leave SensorX powered on during production breaks and off-periods. This will keep the unit's internal temperature control active and prevent variations in temperature, one of the factors that can affect the unit's performance.

Example: during cleaning the Mains switch should be ON and the Motors switch should be OFF

Controls and Indicators

This section describes the location of controls and indicator lamps on SensorX.

The Mains breaker and Motors switch are located on the right side of the electrical cabinet.

Figure 7 shows the position of the controls and indicators and Table 3 provides their description.

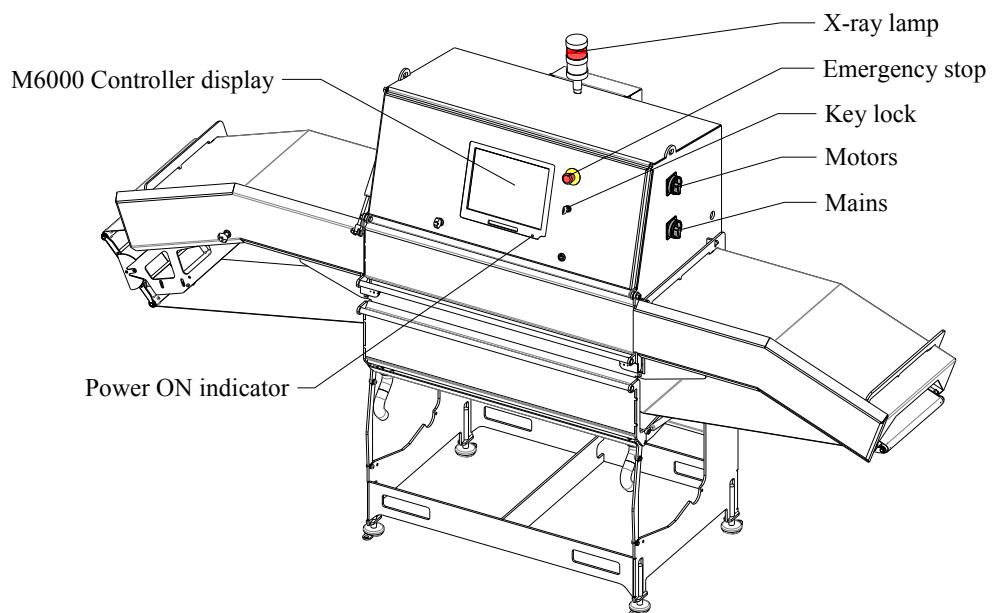


Figure 17 Controls and indicators.

Table 3 Description of controls and indicators.

Emergency Stop button	Instantly stops all operation of the unit, including the conveyor belt and X-ray radiation. You cannot start the unit again, unless you pull this button out first and reset the safety circuit.
Start/Stop button	On the M6000 display. Turns the X-ray generator and the conveyor belt on and off.
X-ray key lock	Turn this key to Enabled position to enable X-ray radiation. The key cannot be removed in the Enabled position. Turning the key to Disabled position will terminate X-ray radiation.
	Note: Remove the key to prevent unauthorized operation of the machine.
Power ON	Power On indicator, illuminates green when the Mains switch is in ON position.
M6000 Controller	Displays X-ray images and provides the user interface for operating, calibrating, and adjusting various parameters.
Motors	Disconnects the motor power, but still leaves a 24V current on the M6000 Controller. A lockout padlock can be placed on this switch, if needed.
Mains breaker	Disconnects the mains power supply to the unit.
X-ray alarm	A red alarm light, located on the top of the unit. The light is connected to the X-ray generator controller and is constantly illuminated when the X-ray generator is emitting radiation.
X-ray indicator	On the M6000 display. —Xray ON” is displayed when X-ray generation is active. When X-ray generation is inactive, —Xray OFF” is displayed.
Belt indicator	On the M6000 display. —Belt ON” is displayed when the conveyor belt is running, —Blt OFF” when it is not.

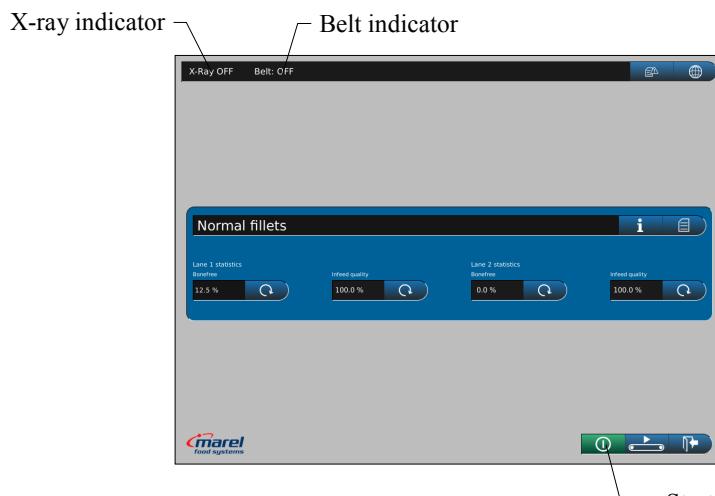


Figure 18 SensorX, Main screen.

User Interface

The following sections describe the SensorX M6000 user interface. The user interface, which is displayed on the M6000 Controller, is designed for the operator and an administrator, the foreman for example, who is normally responsible for the daily operation of the unit.

The Main Screen

After power on, the SensorX Main screen appears on the controller.



Figure 19 SensorX Main screen.

Troubleshooting

This section describes unexpected scenarios that may occur and how you should react.

Description:	Action:
X-ray generator does not start	Make sure all safety devices are in a proper state.
Diminished bone detection accuracy	The unit may need calibration. Also, make sure the plastic strips above and below the conveyor belt inside the unit are clean and dry. If the belt has collected much dirt, clean the belt and adjust the scraper.
Defect reject mechanism	Check if the air supply to the reject mechanism is in order.
Other problems	Power off the machine, and then turn the power on again after 30 seconds. This will reset all software components. If all measures fail, contact your local Marel representative or Marel ehf. to have our technical personnel attend to the problem.

Maintenance

General Instructions

This chapter describes preventive maintenance of SensorX and various adjustments that may have to be made to the machine.

In order to ensure optimal performance and maximum lifespan for SensorX, the following should be maintained:

- Keep the SensorX clean.
- Keep the mains breaker on at all times. Normally, do not unplug the machine as this will shut off the thermostat in the electrical cabinet and moisture may condense in the stainless steel cabinet.
- Keep the water nozzles clean. Check the nozzle every 40 working hours.

The conveyor belt on SensorX requires continuous monitoring. The belt soaks up particles from the raw material and darkens after being in use for a while. Therefore:

- Clean the belt carefully (see page 32 for more details).
- Replace the belt when necessary.
- Check if perforations are in order.

Maintenance Schedule

The maintenance schedule for SensorX is shown in Table 4.

Table 4 Maintenance schedule.

Every 5 operating hours (minimum):	<ul style="list-style-type: none">• Run the test block through the SensorX.
Every 40 operating hours:	<ul style="list-style-type: none">• Check the water nozzle, if used.
Daily:	<ul style="list-style-type: none">• Check that the conveyor belt is clean and free of dirt particles. Replace the belt, if necessary.• Check the motor for abnormal noise or oil leak.
Weekly:	<ul style="list-style-type: none">• Make sure the steel safety switches on the safety covers are in order.• Make sure the emergency stop is in order.

- | | |
|--|--|
| | <ul style="list-style-type: none"> • Check the condition of the filter and replace if necessary. • Check the condition of roller bushings. |
|--|--|

Maintenance Procedures

Procedures for maintaining individual parts of SensorX are described in the following.

Belt

- Remove the belt from the machine for cleaning. Remove the tensioning roller and the scraper.
- Check the perforation along the belt's edges for wear. If the holes are worn, the belt should be replaced.

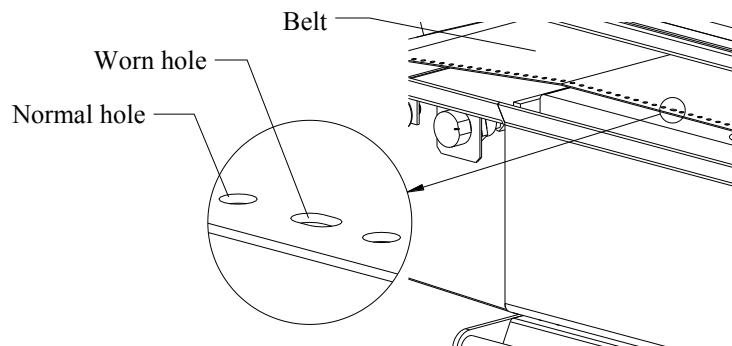


Figure 20 Wear in belt perforation.

Motor

The SensorX conveyor motor is a drum motor equipped with an encoder bearing. The motor is controlled by a frequency inverter and all adjustments on the inverter are performed on the M6000 Controller.

The motor is maintenance-free. Nevertheless, the following should be observed:

- Inspect the motor every day of operation. This is necessary to ensure that the motor runs normally and that there is no abnormal noise from the motor. Check for oil leak.

Emergency Stop Button

Test the emergency stop button at least once every week to check if the button functions as designed. Press the emergency stop, and notice if the X-ray generation and belt stop.

Filter

Check condition of the filter every week. Flip down the lower duct and lift up the filter frame and place the filter between the two filter frames.

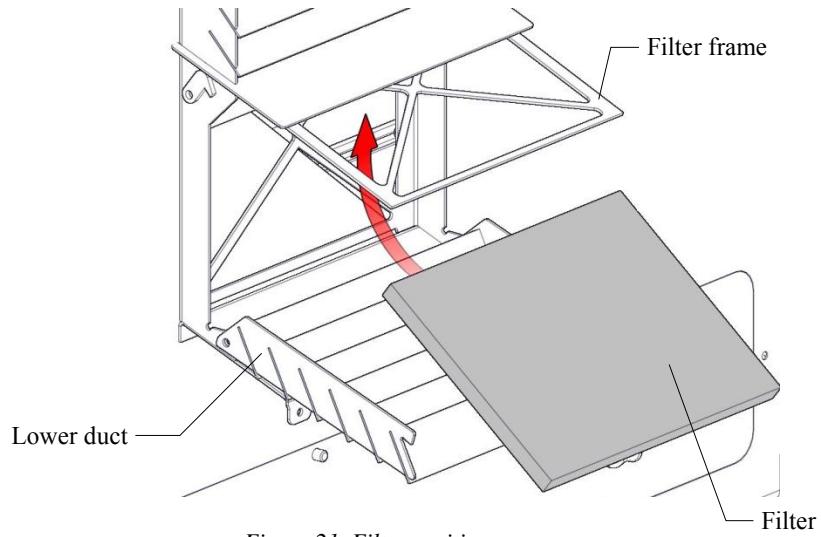


Figure 21 Filter position.

Roller Bushings

Check the bushings every week for normal operation, loose parts and wear.

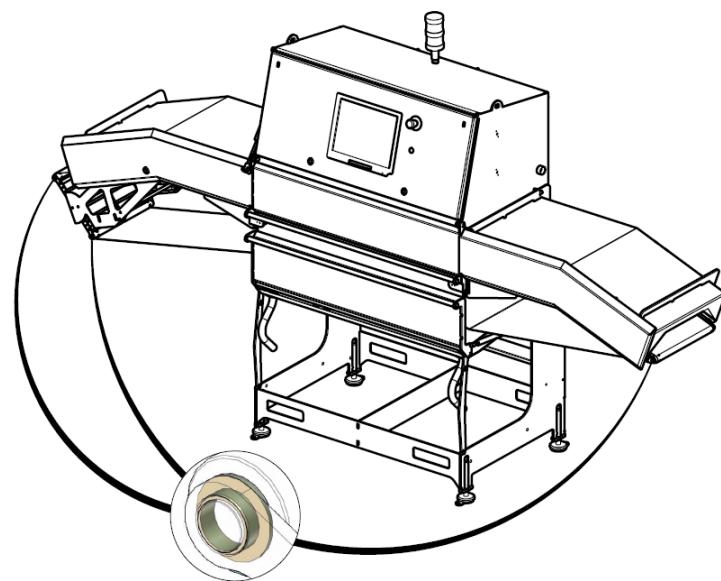


Figure 22 Check for wear on bushings.

Cleaning

Cleaning in General

The following sections contain general instructions for good cleaning practices which Marel considers appropriate for Marel equipment. The instructions are not a proposal for a complete cleaning plan for the user. The best available practices should be used at all times.

We recommend that you request an introduction to recommended cleaning agents and their use from a qualified distributor of cleaning solutions. Selecting a sanitizer depends on the type of equipment to be sanitized, the hardness of the water, the application equipment available, the effectiveness of the sanitizer under site conditions, and cost.

Only approved sanitizers should be used in food processing plants. Lists of approved sanitizers are published by the authorities in most countries, see for example the *Code of Federal Regulations* in USA.

Request technical advice from a reputable sanitizer manufacturer, if you have questions on which sanitizer to use as well as questions on the appropriate solution strength.

- It is very important that SensorX is thoroughly cleaned every day after operation.
- In general, do not use excessively strong solutions of detergent. Chlorine disintegrates belts and strong base solutions ($\text{pH} > 13$) corrode aluminum parts, air cylinders for example. The use of chlorine may cause rust spots to appear on the stainless steel.
- High-pressure water jets can easily damage sensitive mechanisms. Therefore, do not use high-pressure water jets on the M6000 Controller display, the electrical cabinet, or directly into the cooling fan openings on the door of the unit.
Instead, use low water pressure (tap water), or clean these parts by hand and pour tap water over to rinse.

Materials Used in Marel Equipment

The materials listed here are common in Marel equipment. Use the list to determine the chemical tolerance of individual parts of the equipment.

Note: Specific recommendations on types and strength of solutions used for cleaning or sanitization should, at all times, come from a qualified distributor of cleaning solutions.

Table 5 List of Materials

Material	Used in	Resistance to detergents
Metals:		
Stainless steel	Frames, various parts	High (in normal conditions, for example temperatures between -20 to +30°C/-4 to 86°F)
Aluminum	Load cell brackets and spacers, load cells, pneumatic cylinder ends	Low, to strong base solutions
Plastics:		
Polyethylene (PE)	Guides	High
Polycarbonate (PC)	Displays and keyboards	Limited, to strong base solutions
Polypropylene (PP)	Modular conveyor belts	High
Acetyl (POM)	Modular conveyor belts	High, may develop precipitations caused by chlorine
Polyvinylchloride (PVC)	Endless belts of layered PVC and PUR canvas	Low, especially to minimally diluted solutions
Polyurethane (PUR)		

Water and Temperature

- Water can contain a significant number of microorganisms. Therefore, inspection of water used for cleaning should be part of a HACCP plan. All impurities in water can influence the effectiveness of a detergent or sanitizer.
- Water hardness is the most important chemical property which directly effects cleaning and sanitizing efficiency. The pH value for normal water ranges from pH 5 to pH 8.5.
- Soils soluble in water are sugars, some starches and most salts.
- Always use clean water for rinsing and cleaning. Never rinse or clean with seawater.

- Rinse with cold water, except when working with fat products. In that case use 40-55°C (104-131°F) hot water to dissolve the fat. Some fats have a melting point below the recommended 40-55°C, so you should adjust the water temperature accordingly.
- Be careful when using hot water. Some proteins denature in high temperatures and may become difficult to remove.
- Avoid temperatures above 55°C (131°F) because of the corrosive nature of most chemical sanitizers.

Detergents

The pH value of detergents used on Marel equipment should preferably be pH 12-13.

Strong base solutions are the main ingredients in most cleaning agents, for example potassiumhydroxid (KOH) or caustic soda (NaOH). Because of its corrosive effects, caustic soda is not a desirable detergent for Marel equipment. If possible, use detergent solutions with KOH instead.

- Always use detergents according to the detergent manufacturer's instructions.
- **Do not** use a detergent containing sodium hypochlorite for daily cleaning. Sodium hypochlorite is a common ingredient in detergents, but as it contains chlorine it should be used with great care because of chlorine's corrosive effect on stainless steel.

Daily Cleaning

Cleaning is the complete removal of food soils using appropriate detergent chemicals according to instructions. It is important that cleaning personnel have an understanding of the nature of the different types of food soils and the chemistry of their removal.

- Use high alkaline foaming detergent, 1% solution, pH 12-13, for regular daily cleaning. Avoid using a detergent containing a high amount of sodium hypochlorite for daily cleaning. The foaming detergent must be selected carefully and should contain some corrosion inhibitors and preferably potassium hydroxide (KOH) instead of sodium hydroxide (NaOH).
- Spray the detergent on all surface areas and leave to work for a time specified by the cleaning agent's manufacturer. Then rinse the detergent off with clean, cold water.
- To kill any remaining bacteria, you must finish the daily cleaning procedure by spraying the surface with an approved chemical sanitizer.

Note: Quaternary ammonium compounds (QACs) are widely used in the food processing industry. Keep in mind, however, that while these are effective against most bacteria, they act

slowly against some common spoilage bacteria. Many common bacteria may also develop tolerance against QACs, which should therefore not be used for an extended period of time unless they are rotated with compounds of a different type.

- QACs may leave an undesirable film on the surface of the equipment and, as they should not come in contact with food, they should always be rinsed off before processing is resumed with cold and, most importantly, clean water.

Sanitization

When choosing a sanitizing agent, please note that chlorine corrodes the stainless steel and disintegrates PVC and PUR belts, especially at higher temperatures. Chlorine is, however, an effective sanitizer, so occasional use of chlorine may be necessary to control the growth of microorganisms.

Marel recommends the following sanitization procedure:

- Spray the sanitizer on surfaces and leave to work according to manufacturer's instructions. Make sure you spray into all corners and hard-to-reach areas.
- After sanitizing, always rinse the equipment carefully with cold and clean water before resuming processing.
- Use chlorine or a comparable sanitizer on the equipment once a week after performing the regular cleaning procedure with a high alkaline foaming detergent.
- **Make sure the strength of chlorine, if used, does not exceed 200 ppm.**
- On days when chlorine or a comparable sanitizer is not used, use other sanitizers recommended for food processing instead.

Note: Rotating different sanitizers (for example chlorine, peracid or acid-anionic) in your sanitization program may ensure more effective sanitization.

As chlorine evaporates very quickly, its sanitizing effect will fade soon after it is sprayed on the equipment. Letting chlorine stay on the equipment will not improve the sanitizing effect, but only damage the equipment. Quaternary ammonium compounds are considerably more stable than chlorine and are active for a much longer time. Therefore, the benefit of leaving QACs on the equipment for an extended period of time is much greater.

Training Staff

It is important that new cleaning personnel receive the proper training and are made aware of the proper cleaning procedures for this machine.

Demonstrate the cleaning procedures for new personnel using the instructions in the following sections. Make sure the cleaning personnel is familiar with safety rules concerning the use of cleaning agents.

Cleaning Procedures

Before you start cleaning SensorX, follow the instructions below to ensure maximum safety during the cleaning.

Cleaning SensorX is a procedure in 8 steps:

- preparation
- rinsing the nearby environment
- rinsing SensorX
- foaming
- washing
- assembling
- sanitizing
- final inspection

Preparation

- 1 Secure the machine by turning the Motors switch off.
(Optionally, lock the switch with a padlock for additional safety.)
- 2 Remove the X-ray key to prevent unauthorized operation.
- 3 Unlock and open the conveyor cover. Lift the cover all the way up.
- 4 Open the motor cover. Release tension off the conveyor belt by removing the tensioning roller.
- 5 Remove the scraper, and remove the conveyor belt.
- 6 Remove the four wear strip frames from the conveyor compartment.
- 7 Lift up the scraper (1) and the belt roller (2) to remove the conveyor belt.

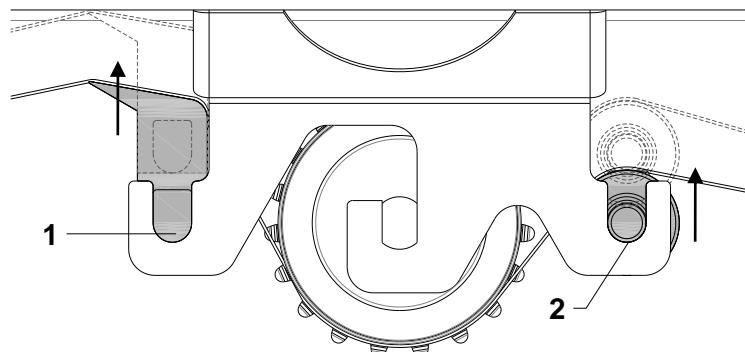


Figure 23 Lifting up the scraper and belt roller .

Rinsing the Environment

- 1 Thoroughly rinse nearby walls and floor to prevent cross-contamination from the environment after SensorX has been cleaned.
- 2 If possible, do not use water temperatures over 55°C (131°F) to avoid heat denatured proteins.

Rinsing the Unit

- 1 Rinse soils off the machine using water jets or a brush. Rinse thoroughly from the top down with clean water.
- 2 Avoid high water pressure in order not to spread the soils all over the machine.
- 3 If possible, do not use water temperatures over 55°C (131°F) to avoid heat denatured proteins.

Foaming

- 1 Spray the machine with detergent foam or other appropriate type of detergent. Make sure the foam reaches all corners and hard-to-reach areas.
- 2 Let the detergent work as specified by the manufacturer.

Washing

Before washing

Make sure you turn the conveyor belt and X-ray radiation off. Leave power on the machine.

- 1 Rinse off dirt dissolved by the foaming, working from the top down using water jets.

- 2** Use a brush on solid dirt and not easily accessible surfaces.
- 3** Wash the belt.
- 4** Clean the electrical cabinet as described on page 32 (once a month).
- 5** Let the machine dry as much as possible before sanitizing.

Sanitizing

- All surfaces in contact with the product should be sanitized every day of operation.
- Make sure the surface is as dry as possible before sanitizing, because water remaining from the washing process will dilute the sanitizing agent.
- For the daily sanitization, use sanitizing agents containing, for example, quaternary ammonium compounds. Once a week, sanitize with chlorine (≤ 200 ppm) or a comparable sanitizing agent.
- After sanitizing, rinse SensorX thoroughly with clean water to eliminate contact between sanitizer and raw material or products in the next production round. This also helps prevent corrosion of the stainless steel by aggressive sanitizers and prevents the forming of an undesirable chemical film.

Assembling After Sanitizing

- Retrace the steps in “Preparation” on page 29 and put SensorX back into operational condition.

Final Inspection

After cleaning, quality control personnel should evaluate the result of the cleaning process:

- By stroke of hands make sure that places where visual control is difficult are clean.
- Regularly measure cleaning results by counting the microorganisms, for example using RODAC cups or ATP measurements.
- After cleaning and sanitizing, make sure that all surfaces dry as well as possible.

Special Cleaning Instructions

Some parts of SensorX require special care during cleaning: the conveyor belt, the M6000 display, and the electrical cabinet.

Cleaning the Conveyor Belt

The conveyor belt needs to be rinsed off at least once every day of operation. More frequent rinsing may be necessary.

Remove the belt and wash thoroughly every day of operation.

- 1 Remove the belt and soak in a detergent bath or spray with detergent. Let the detergent work according to manufacturer's instructions.
- 2 Rinse thoroughly with clean, cold water or soak in clean water.
- 3 Hang the belt up for drying. This is important to prevent bacterial growth which may contaminate food and cause serious infections. In case the belt cannot dry between shifts, we strongly recommend a rotation using a second belt. This will also increase belt life.

Note: Cross-contamination can easily occur if clean surfaces come in contact with other less clean surfaces, for example when you replace belts.

Cleaning the M6000 Display

- Rinse the M6000 display thoroughly every day of operation.
- Do not use high-pressure jets on the display. Instead, use low water pressure, or clean by hand and pour water over to rinse.

WARNING: Before you start cleaning the display, press the emergency stop button to prevent an accidental start of the conveyor.

Cleaning the Electrical Cabinet

Open the electrical cabinet once a month and check for soils.

- Turn the Mains switch to Off.
- Carefully wipe off the dirt with special attention to possible dirt accumulation in door grooves and the bottom of the cabinet.
- Sanitize places where dirt has accumulated by wiping with a sanitizing cloth.
- Secure the cabinet door and make sure the weather strip is intact and properly in place.
- Turn the Mains switch back to On position to maintain constant power and prevent condensation of moisture in the unit.

WARNING: Do not use water for cleaning the electrical cabinet. The electrical components in the cabinet must **never** become wet. If they do, you must make sure they are completely dry before SensorX is powered on again.

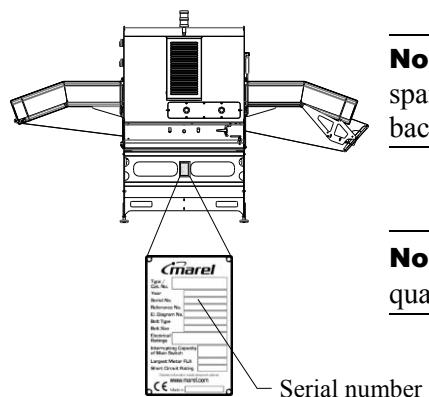
Cleaning Schedule

Table 6 Cleaning schedule.

Frequency	Action	Description	Comments
Daily	Preparation	<ul style="list-style-type: none"> Remove any raw material, products or packing material. Remove the conveyor belt and plastic plates. Make sure you turn the conveyor belt and X-ray radiation off. Leave power on the machine. 	After preparation the machine should be ready for cleaning.
Daily	Rinsing	<ul style="list-style-type: none"> Rinse off loose soils using water jets or brushes. Do not use high water pressure. 	After rinsing, the machine should be free of loose soils.
Daily	Foaming	<ul style="list-style-type: none"> Foam the machine and make sure the foam reaches into all corners and hard-to-reach places. Hang the conveyor belt up and foam. Let the foam work on the machine as specified by the foam manufacturer. 	
Daily	Washing	<ul style="list-style-type: none"> Use a brush to scrub difficult places and wash with a water jet. Put the plastic plates in a detergent bath and scrub. Wash the conveyor. 	Do not use water pressure on the M6000 display.
Daily	Sanitizing	<ul style="list-style-type: none"> Make sure the surface is as dry as possible before sanitizing. Sanitize all parts of the machine after cleaning with approved sanitizers. Pay special attention to surfaces in direct contact with the raw material or products. Rinse the machine with clean, cold water before resuming processing. 	
Daily	Final inspection	<ul style="list-style-type: none"> After cleaning quality control personnel should check and evaluate cleaning results. 	Count micro-organisms regularly.
Weekly	Extra cleaning 1	<ul style="list-style-type: none"> Sanitize with chlorine or a comparable sanitizing agent once a week. If chlorine is used, do not leave it on the machine for long (max. 30 minutes). On the day when chlorine is used, you can leave out sanitizing with other agents. 	
Monthly	Extra cleaning 2	Note: This action is performed by a certified electrician. <ul style="list-style-type: none"> Open the electrical cabinet and check for soils. Wipe off the soils and sanitize. 	Electrical hazard. Turn off the Mains switch.

Parts Lists

Mechanical Parts – version 2.0



Note: Before contacting our service personnel or placing an order for spare parts, please note the serial number on the rating plate located on the back of the electrical cabinet.

Note: The X-ray lamp and the X-ray sensor should only be replaced by qualified Marel service personnel.

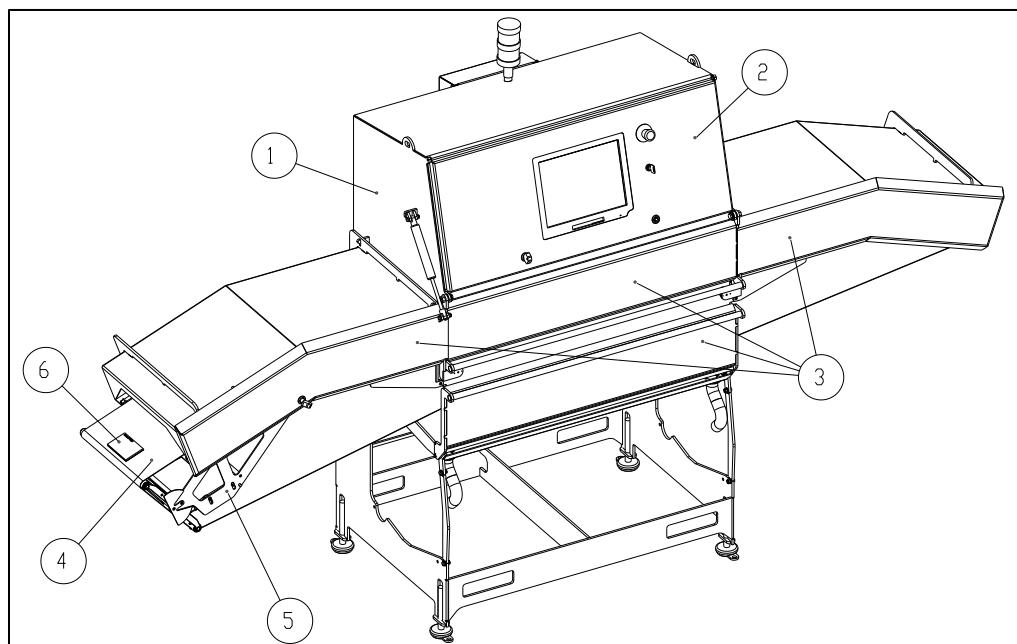


Figure 24 SensorX, item overview.

Item:	Figure / Part number:	Description:
1	See Figure 25 - Figure 26	Main frame
2	See Figure 27	Front panel
3	See Figure 28	Motor and conveyor covers
4	See Figure 29	Conveyor
5	See Figure 30	Reject mechanism
6	0012-900-20004	Test block

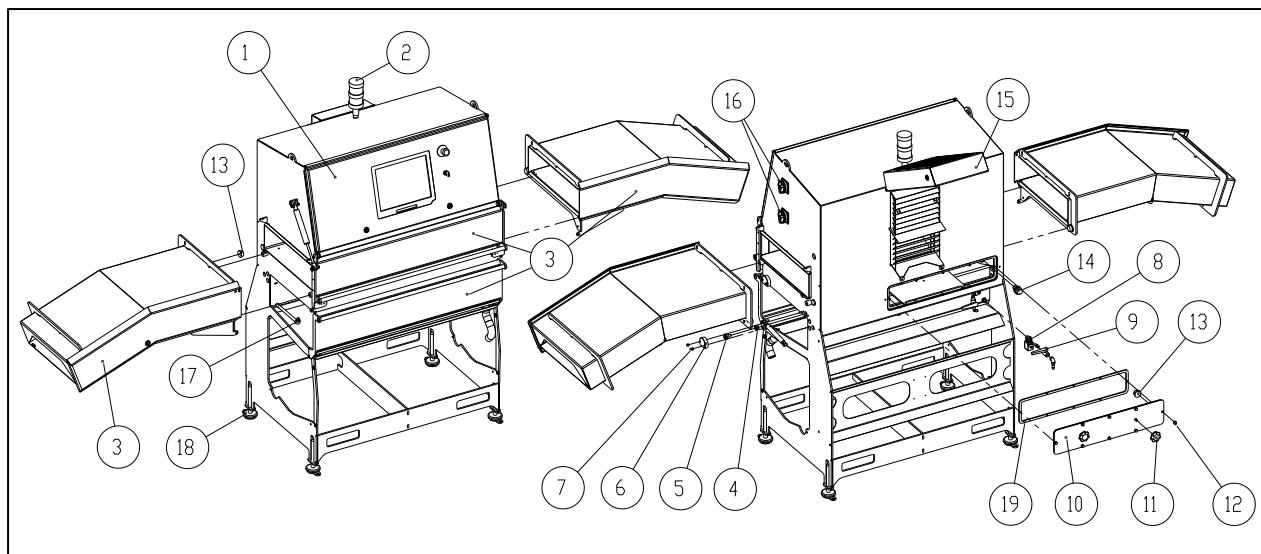


Figure 25 Main frame, doors and covers.

Number:	Stock number:	Qty:	Description:
1	See Figure 27	1	Front panel
2	717-4400-1xvb-c2b4	1	Red LED alarm light
3	See Figure 28	1	Covers
4	732-1850-mfm162212	6	Bushing
5	009-0001-2407	4	Adjustment bolt for sensor
6	009-0001-24260001	2	Cover cap for adjustment screws
7	740-1587-06	2	Hexagon domed cap nut M6, stainless steel
8	717-3406-0043	1	Solenoid valve for water, direct
9	750-6021-12128	1	Ball valve 1/4"
10	009-0001-1116	1	Sensor compartment cover
11	001-0009-2279	1	Handle knob ø60
12	740-1587-08	8	Hexagon domed cap nut M6, stainless steel
13	717-3407-3042000vh	7	Magnet for safety sensor
14	717-3407-171262v06	7	Safety sensor
15	009-0001-A177	1	Cooling unit main cover
16	717-3405-1svb-sw-t0	2	Switch handle, lockable, black
17	755-0060-63236730cc	1	Nozzle
18	744-0ngi-m7620180	4	Foot-base
19	Figure 26	1	Gasket kit

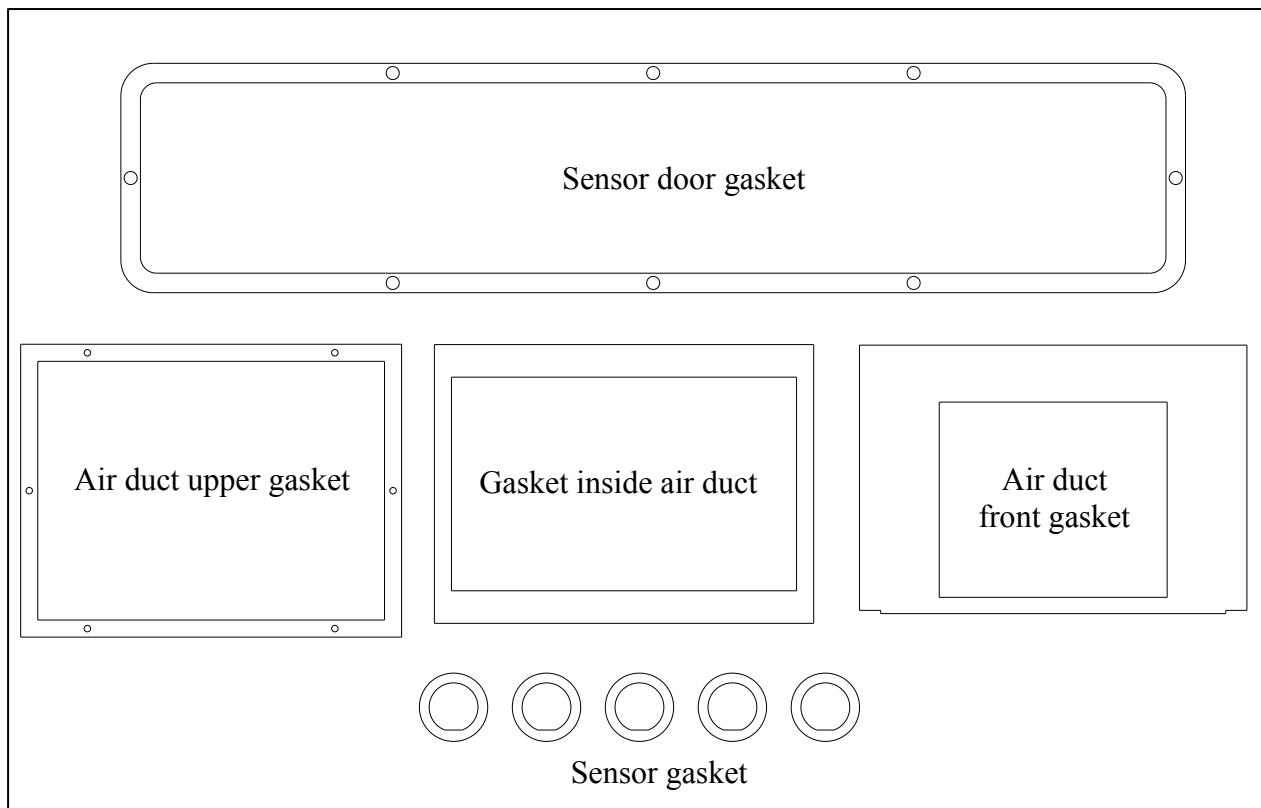


Figure 26 Gasket kit.

Number:	Stock number:	Qty:	Description:
1	732-5802-1023463	1	Gasket kit

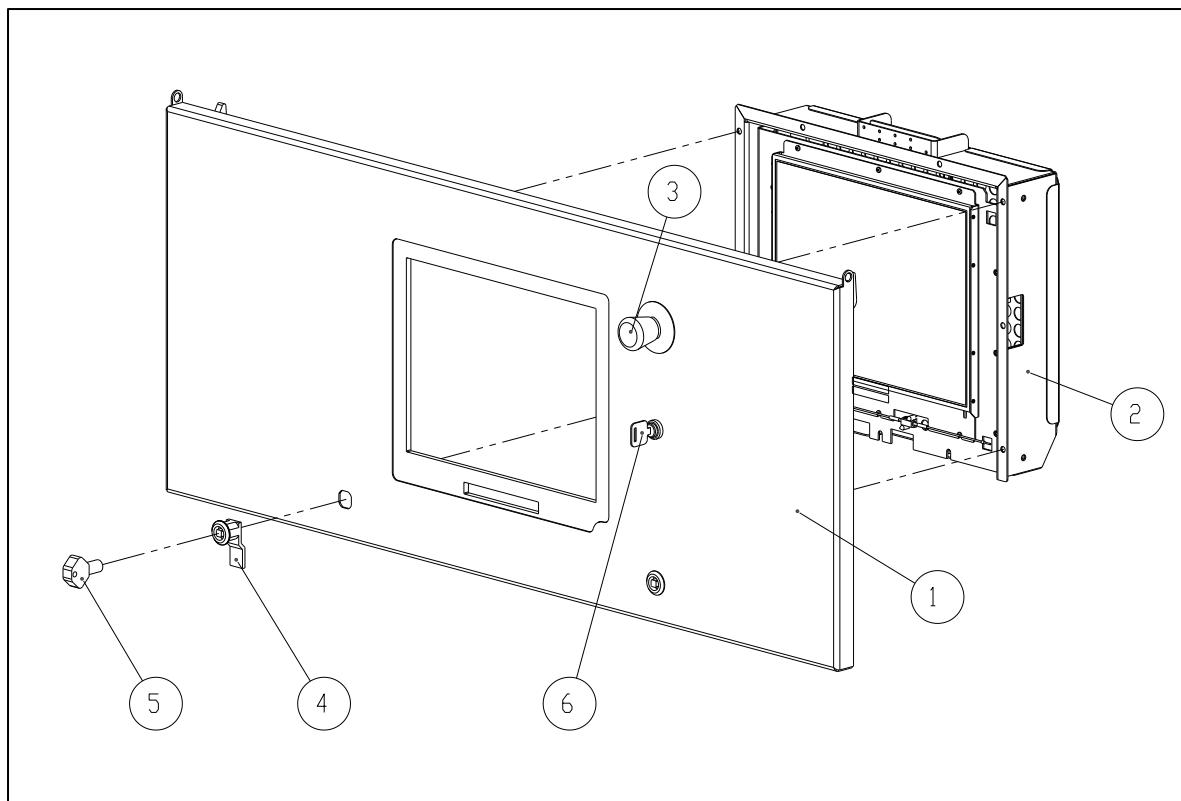


Figure 27 Front panel.

Number:	Stock number:	Qty:	Description:
1	009-0001-1105	1	Door for M6000
2	009-0001-1113	1	M6000 computer with frame and display
3	717-3405-1m22-pv	1	Emergency switch
4	743-5700-0020	2	Lock
5	743-5700-0023	1	Key
6	Key For Key switch	1	X-ray disable/enable key

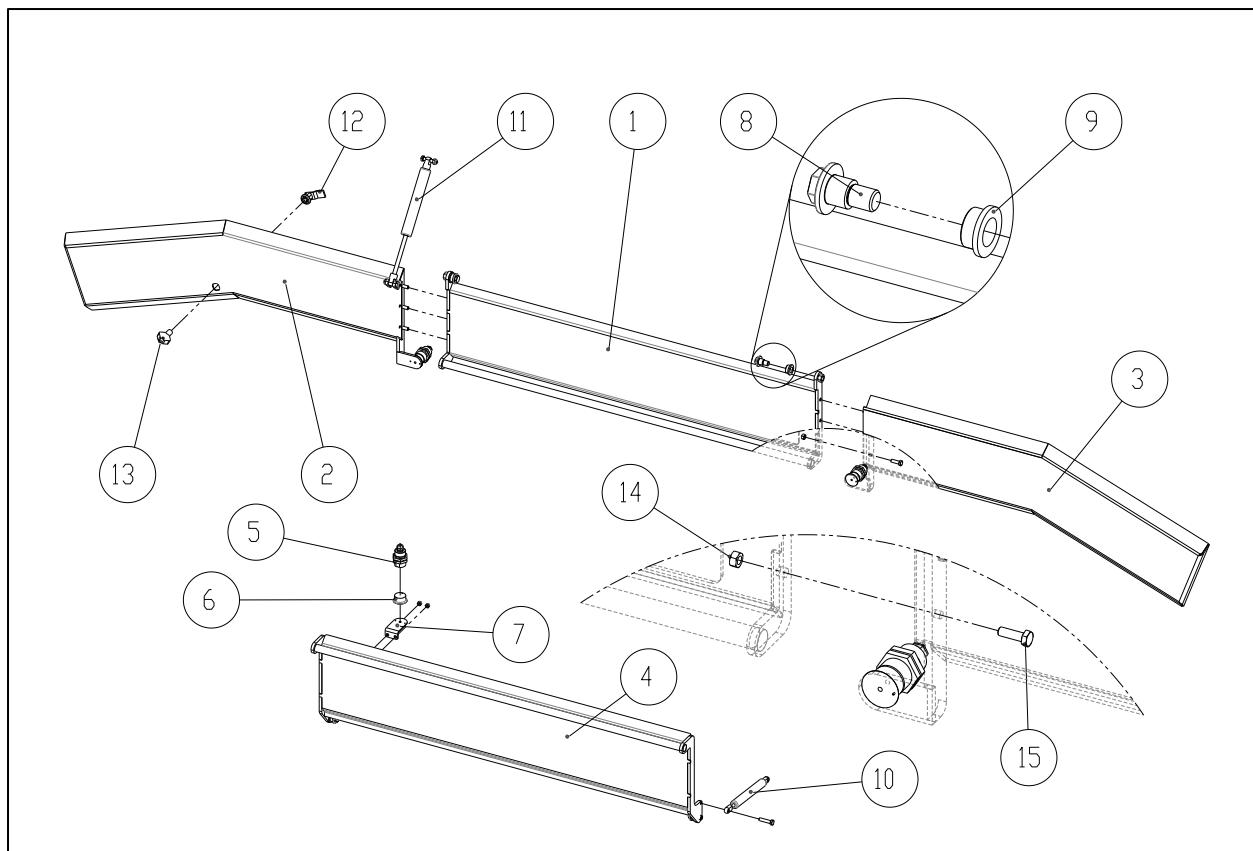


Figure 28 Covers.

Number:	Stock number:	Qty:	Description:
1	009-0001-A150	1	Safety cover
2	009-0001-A186	1	Left cover end
3	009-0001-A181	1	Right end cover plate
4	009-0001-A151	1	Motor cover
5	717-3407-171262v06	3	Safety sensor
6	717-3407-3042000vh	3	Magnet for safety sensor
7	009-0001-2789	1	Bracket for Hygiene magnet
8	009-0001-24070001	4	Adjustment bolt for sensor
9	732-1850-mfm162212	4	Bushing
10	743-4200-060224350	1	Gas spring
11	743-4200-1022568	1	Gas spring
12	743-5700-0020	1	Lock
13	743-5700-0023	1	Key

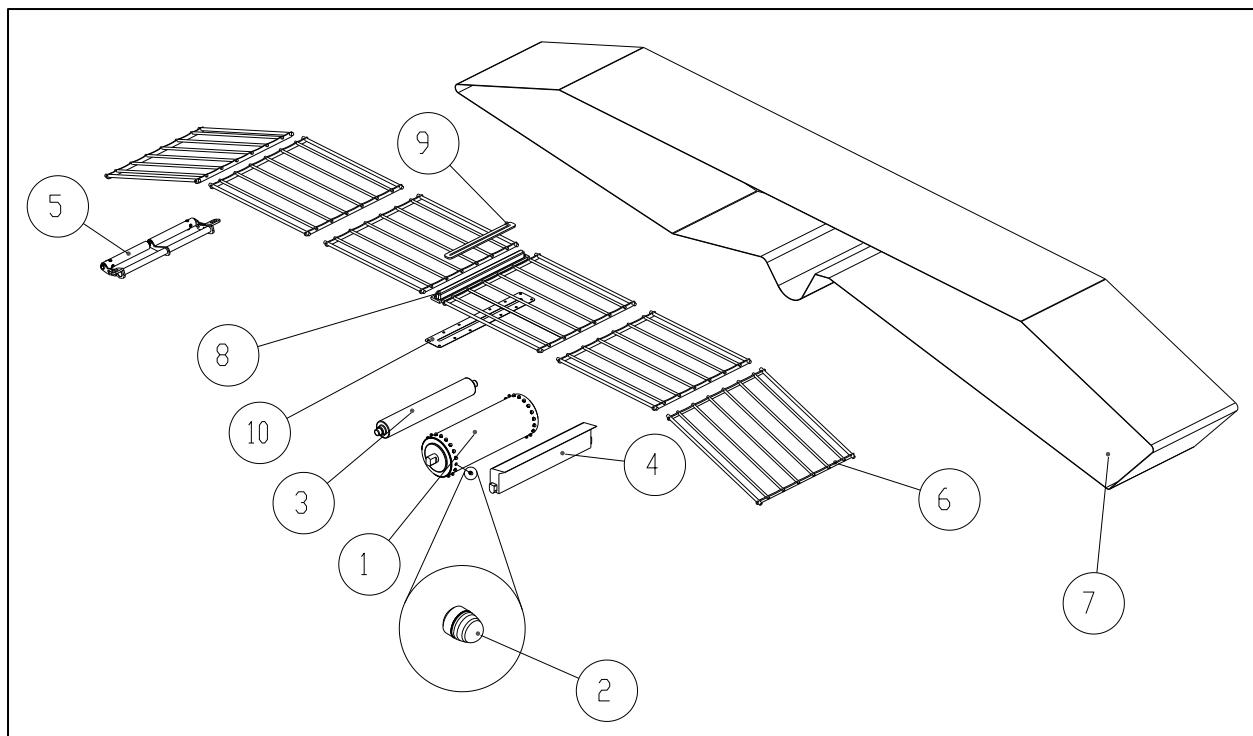


Figure 29 Conveyor.

Number:	Stock number:	Qty:	Description:
1	727-1139-400040	1	Drum motor for pins
2	009-0040-2142	38	Drive pin
3	009-0001-3089	1	Support and tensioning roller for X-ray
4	009-0001-3236	1	Scraper
5	009-0001-3088	8	Belt roller
6	009-0001-A153	5	Skid frame under belt
7	730-k112-3906785	1	Conveyor belt
8	009-0001-2765	1	Lower X-ray lid
9	009-0001-3174	1	Upper X-ray window
10	009-0001-2793	1	Fixing plate for lower X-ray plastic lid

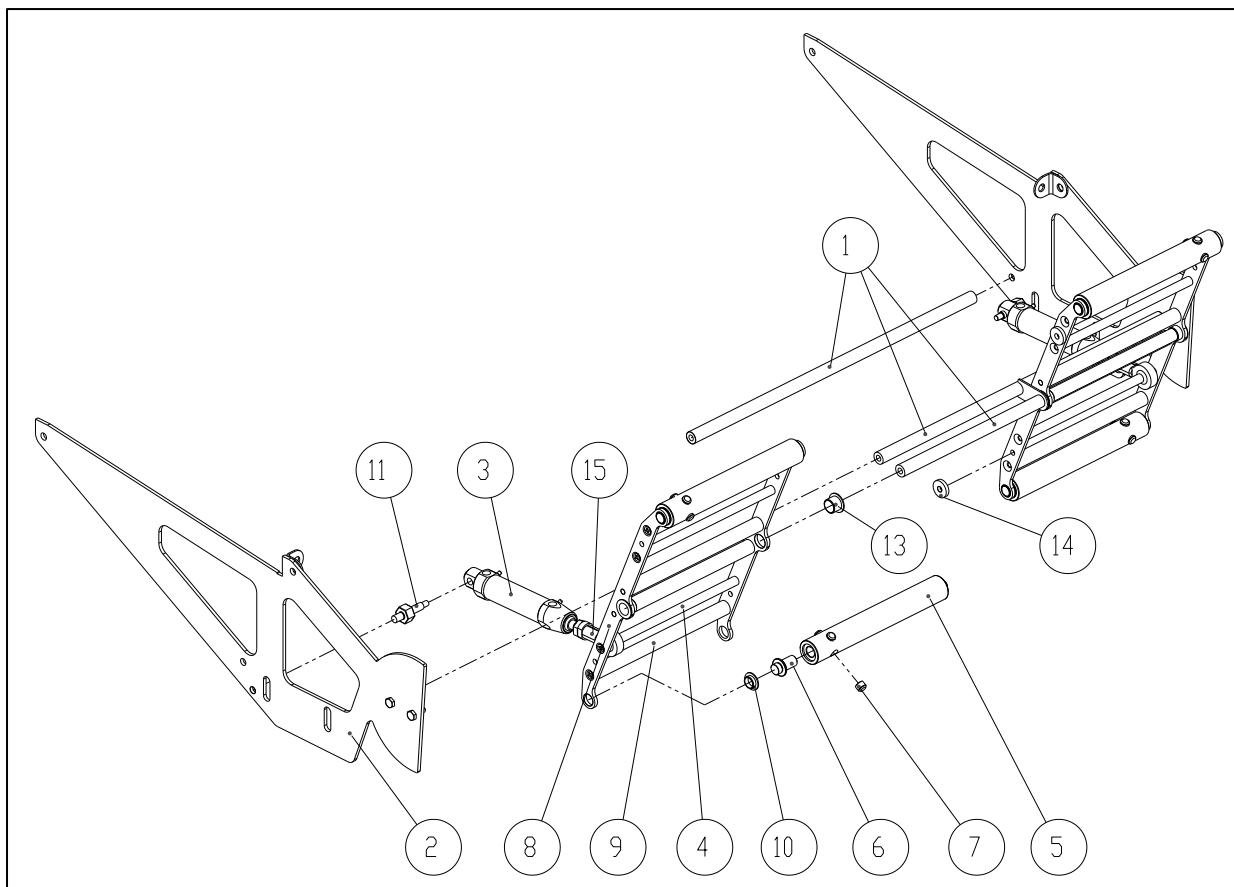


Figure 30 Reject mechanism.

Number:	Stock number:	Qty:	Description:
1	009-0001-3182	3	Support axle for reject mechanism
2	009-0001-3184	2	Jaw for frame
3	751-6432-1008143	2	Cylinder
4	009-0001-3180	4	Axle
5	009-0001-3088	4	Belt roller
6	009-0001-3127	8	Bearing pin for roller
7	009-0001-3112	16	Tooth for idler roller
8	009-0001-a209	2	Frame
9	009-0001-3240	4	Axle
10	732-1494-1022566	8	Bushing
11	004-0040-2282	2	Cylinder bolt
12	751-8139-802532	2	Rod eye
13	732-1494-xfm141612	4	Bushing
14	009-0001-3235	2	Spacer

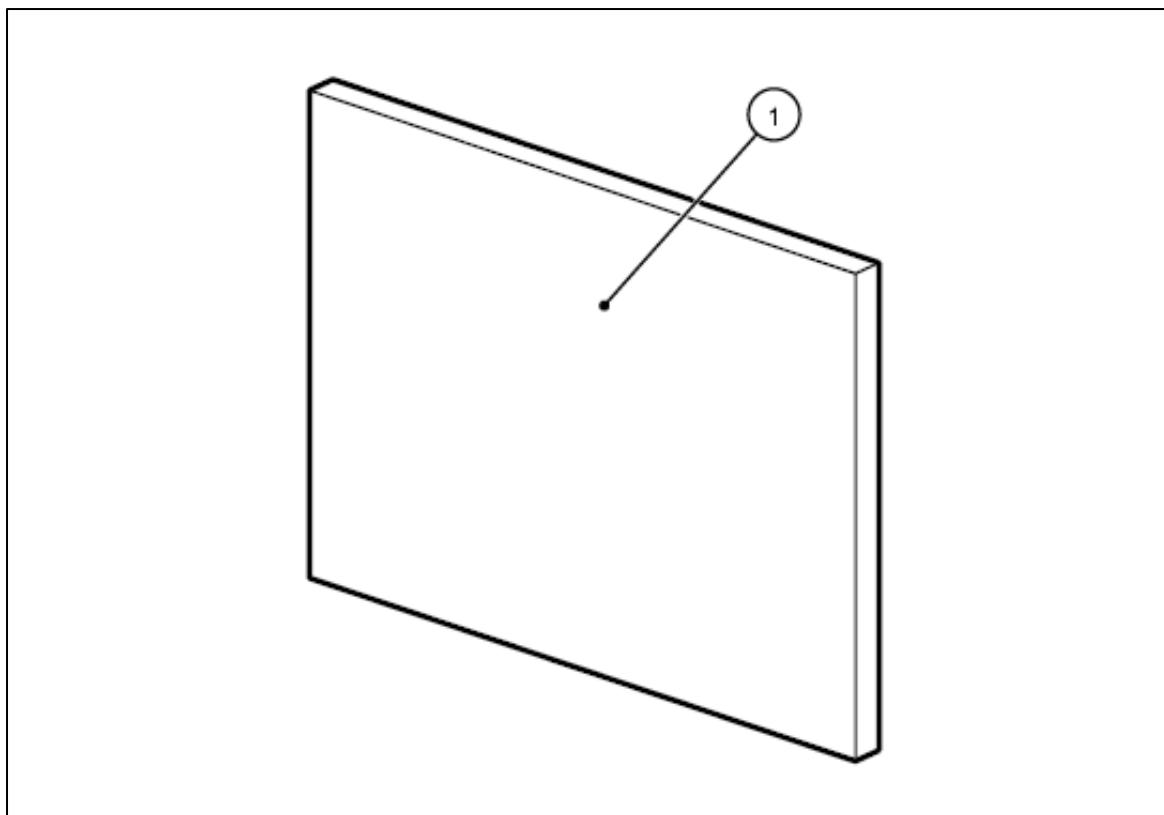


Figure 31 Filter for air duct.

Number:	Stock number:	Qty:	Description:
1	754-1113-1026542	10	Filter for air duct, 10 pcs in the pack

Electrical Diagrams and Parts List

Electrical Diagrams

Customer: Standard
Project Description: X-ray Machine
Project No: pdxgr0302
Item No: 2021-001-00001
File & BOM No: 2012-001-00001-04
Project Release Date: 07.04.2010
Last revision Date: 14.06.2011
Top Reference (Plant area): +A0
El-Ratings: 3x230/400VAC+N+PE/50-60Hz
El-Design engineer BJFR
Design Approved By: BJFR
Desinger Address: Austurhraun 9-IS-210-Gardabaer-Iceland
Tel./Fax +354-563-8000 / +354-563-8001
Homepage: www.marel.com



0	1	2	3	4	5	6	7	8	9
Divider	Chapter	Page type	Page title	Page ref	Page Last change	Page No			
A	Project	List	General Descriptions		23.4.2010	2			A
	Project	List	Reference & Revisions		14.6.2011	3			
	System	Layout	Cables	=XGR110	6.5.2010 16.11.2011	4 5			
B	Networks								B
	Networks	Circuit	CAN single line	=XGR110	2.1.2012	7			
	Networks	Circuit	Ethernet single line	=XGR110	19.12.2011	8			
	Networks	Circuit	RS232	=XGR110	2.1.2012	9			
C	Main Cabinet								C
	Main Cabinet	Layout	Backplate	=XGR110.AQ10	3.1.2012	10			
	Main Cabinet	Layout	Terminals	=XGR110.AQ10	2.1.2012	11			
	Main Cabinet	Power Circuit	Mains	=XGR110.AQ10	2.1.2012	12			
	Main Cabinet	Power Circuit	X-ray lamp	=XGR110.AQ10	2.1.2012	13			
	Main Cabinet	Control Circuit	Inverters	=XGR110.AQ10	2.1.2012	14			
	Main Cabinet	Control Circuit	Safety circuit	=XGR110.AQ10	3.1.2012	15			
	Main Cabinet	Control Circuit	Safety circuit	=XGR110.AQ10	3.1.2012	16			
	Main Cabinet	Control Circuit	X-ray generator	=XGR110.AQ10	2.1.2012	17			
	Main Cabinet	Control Circuit	Stepper motors	=XGR110.AQ11	19.12.2011	18			
	Main Cabinet	Control Circuit	Digital I/O's	=XGR110.AQ11	22.12.2011	19			
D	Cables								D
	Cables	List	Cable list		3.1.2012	20			
E	Components								E
	Components	List	Components list		4.1.2012	24			
F									F
G		Customer / Project Description: Standard X-ray Machine	Project No / Project release date pdxgr0302 07.04.2010	Item No / File & BOM No 2021-001-00001 2012-001-00001-04	Chapter / Page type Project data List	Page Title / Page Last Changed Table of content 4.1.2012	System Top Ref / Page Ref: +A0		G
	www.marel.com	Design: BJFR At: Austurhraun 9-IS-210-Gardabaer-Iceland			+354-563-8000 / +354-563-8001 (Tel/Fax)	Appr: BJFR	Scale: 1:1	Page No: 1 / 25	
0	1	2	3	4	5	6	7	8	9

General

Standard	EN60204-1
Isolation Voltage	660V
Protection rating	IP65
Ambient Temperature	-5° ... +35°

Control cable wire colour/Number comparison table

This table is a reference between colour and Numbers if shown cable in document is unavailable

Colour Code	Numbers
Blue (0V)	BU
Red (24Vdc)	RD
Green	GN
Yellow	YE
White	WH
Black	BK
Brown	BN
Violet	VI
Orange	OR
Pink	PK
Cyan	CY
Grey	GY
Red/Blue	RD/BU
Green/Red	GN/RD
Yellow/Red	YE/RD
White/Red	WH/RD
Red/Black	RD/BK
Red/Brown	RD/BN
Yellow/Blue	YE/BU
White/Blue	WH/BU
Blue/Black	BU/BK
Orange/Blue	OR/BU
Yellow/Green	YE/GN
White/Green	WH/GN
Orange/Green	OR/GN
Green/Blue	GN/BU
Grey/Blue	GY/BU
Green/Black	GN/BK
Grey/Green	GY/GN
Yellow/Brown	YE/BN
White/Brown	WH/BN
Brown/Black	BN/BK
Grey/Brown	GY/BN
Yellow/Violet	YE/VI
Violet/Black	VI/BK
White/Violet	WH/VI

Wire colour code

Power circuit >50V	Black
AC neutral (N) :	Light Blue*
Protective earth (PE):	Green/Yellow
Control circuit <50V	Dark Blue

*Black in selectivity voltage circuits

**Standard Signal Names/
Terminal Numbers**

Signal name	Terminal No.
Power circuit >50V	1-30
0V	31
24Vdc	32
Em-Stop circuit	33-40
Em-Stop Ok	41
Enable	42
Overload	43
Run	44
Run 2 (Optional)	45
Run 3 (Optional)	46
Washing	47

Other wire colour codes

Green/Yellow (PE)	GN/YE	
Screen	SH	
Transparent	TP	
Beige	BE	

**Ethernet Cable
Modular RJ-45 plug 8 pin**

Pin	Signal	Wire Colour
1	Tx + (Transmit)	WH/OR
2	Tx - (Transmit)	OR
3	Rx + (Receive)	WH/GN
4	Not used	BU
5	Not used	WH/BU
6	Rx - (Receive)	GN
7	Not used	WH/BR
8	Not used	BR

Can cable (Combicon Plug)

Pin	Signal	Wire Colour
1	V+ (24Vdc)	RD
2	Can+ (Can Hi)	WH
3	Screen	SH
4	Can- (Can low)	BU
5	V- (0V)	BK

Can cable (9pin Plug)

Pin	Signal	Wire Colour
2	Can- (Can low)	BU
3	V- (0V)	BK
7	Can+ (Can Hi)	WH

Serial Bus

Pin	Signal	Wire Colour
2	RX/TX	YE
3	TX/RX	GN
5	0V	BU



Customer / Project Description:
**Standard
X-ray Machine**

Project No / Project release date
**pdxgr0302
07.04.2010**

Item No / File & BOM No
**2021-001-00001
2012-001-00001-04**

Chapter / Page type
**Project
List**

Page Title / Page Last Changed
**General Descriptions
23.4.2010**

System Top Ref / Page Ref:
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Scale: 1:1

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Customer / Project Description:
Standard
X-ray Machine

Project No / Project release date
pdxgr0302
07.04.2010

Item No / File & BOM No
2021-001-00001
2012-001-00001-04

Chapter / Page type

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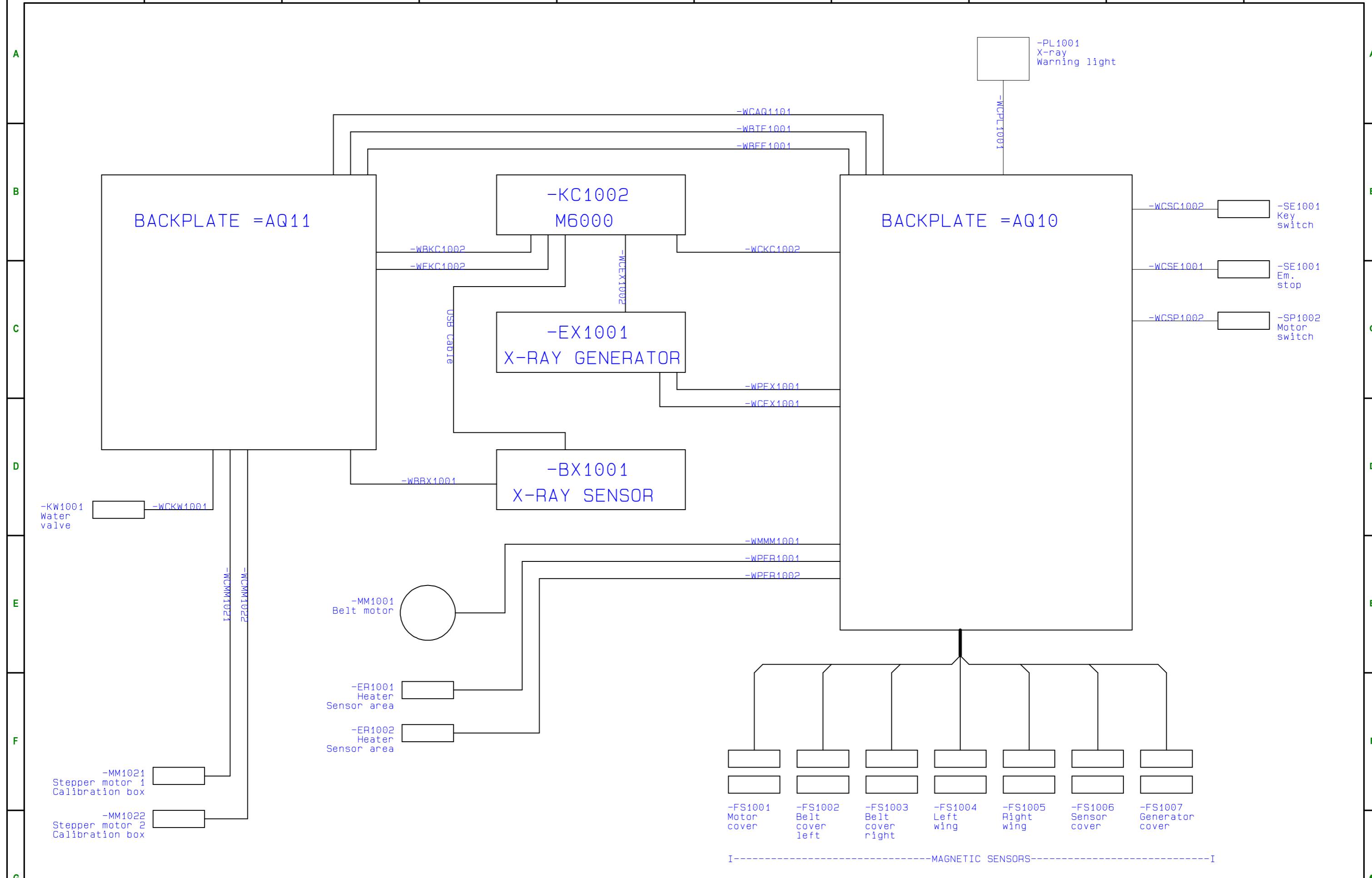
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Customer / Project Description:
Standard
X-ray Machine

Project No / Project release date
pdxgr0302
07.04.2010

Item No / File & BOM No
2021-001-00001
2012-001-00001-04

Chapter / Page type
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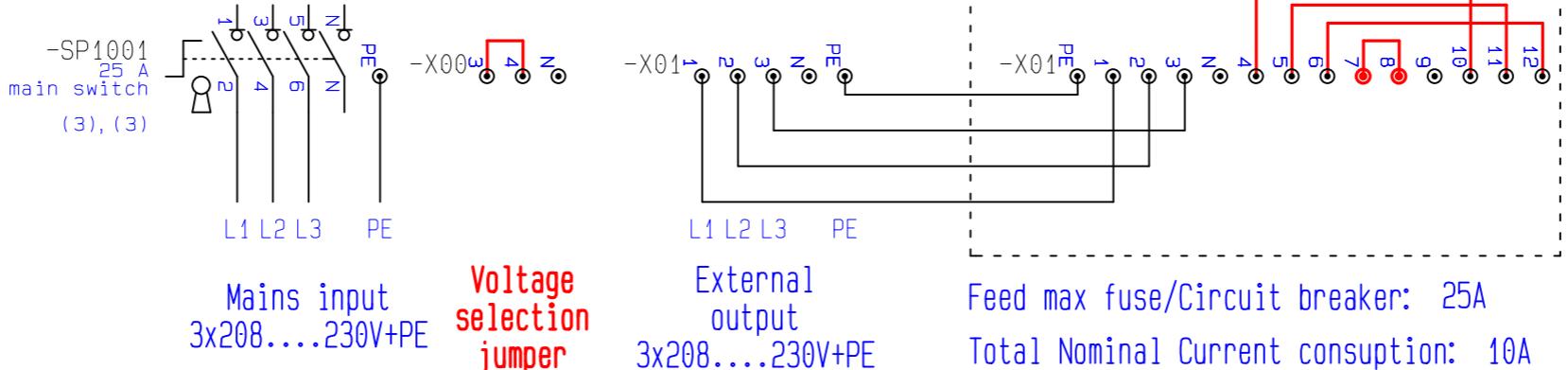
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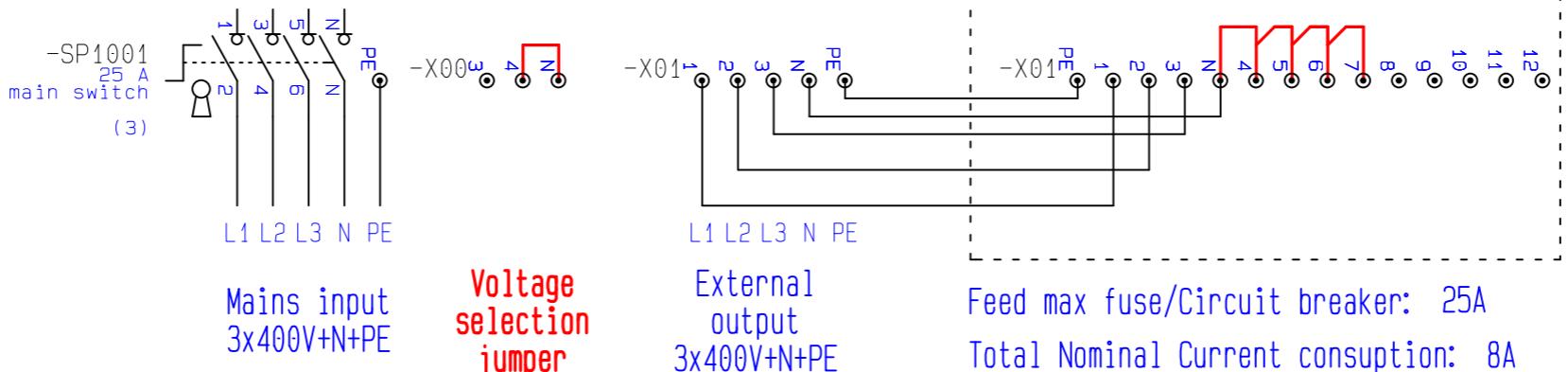
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CONNECTION / JUMPER DIAGRAMS

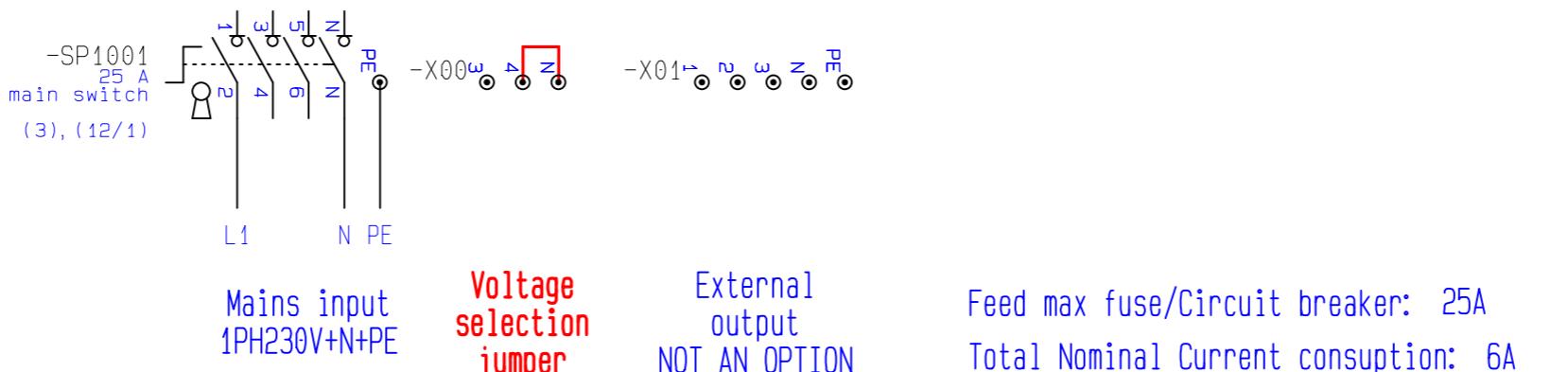
EXAMPLE 3



EXAMPLE 2



EXAMPLE 1



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Customer / Project Description:
Standard
X-ray Machine

Project No / Project release date
pdxgr0302
07.04.2010

Item No / File & BOM No
2021-001-00001
2012-001-00001-04

Chapter / Page type

Page Title / Page Last Changed
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System Top Ref / Page Ref:
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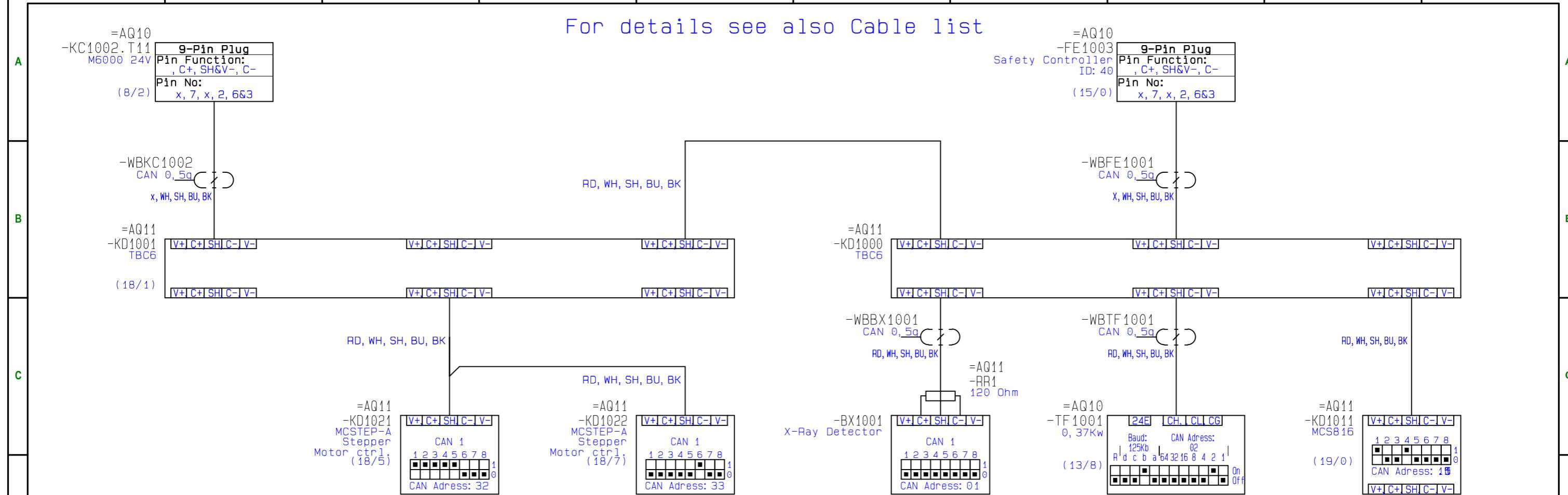
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Networks

0 1 2 3 4 5 6 7 8 9

For details see also Cable list



Customer / Project Description:
Standard
X-ray Machine

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Project No / Project release date
pdxgr0302
07.04.2010

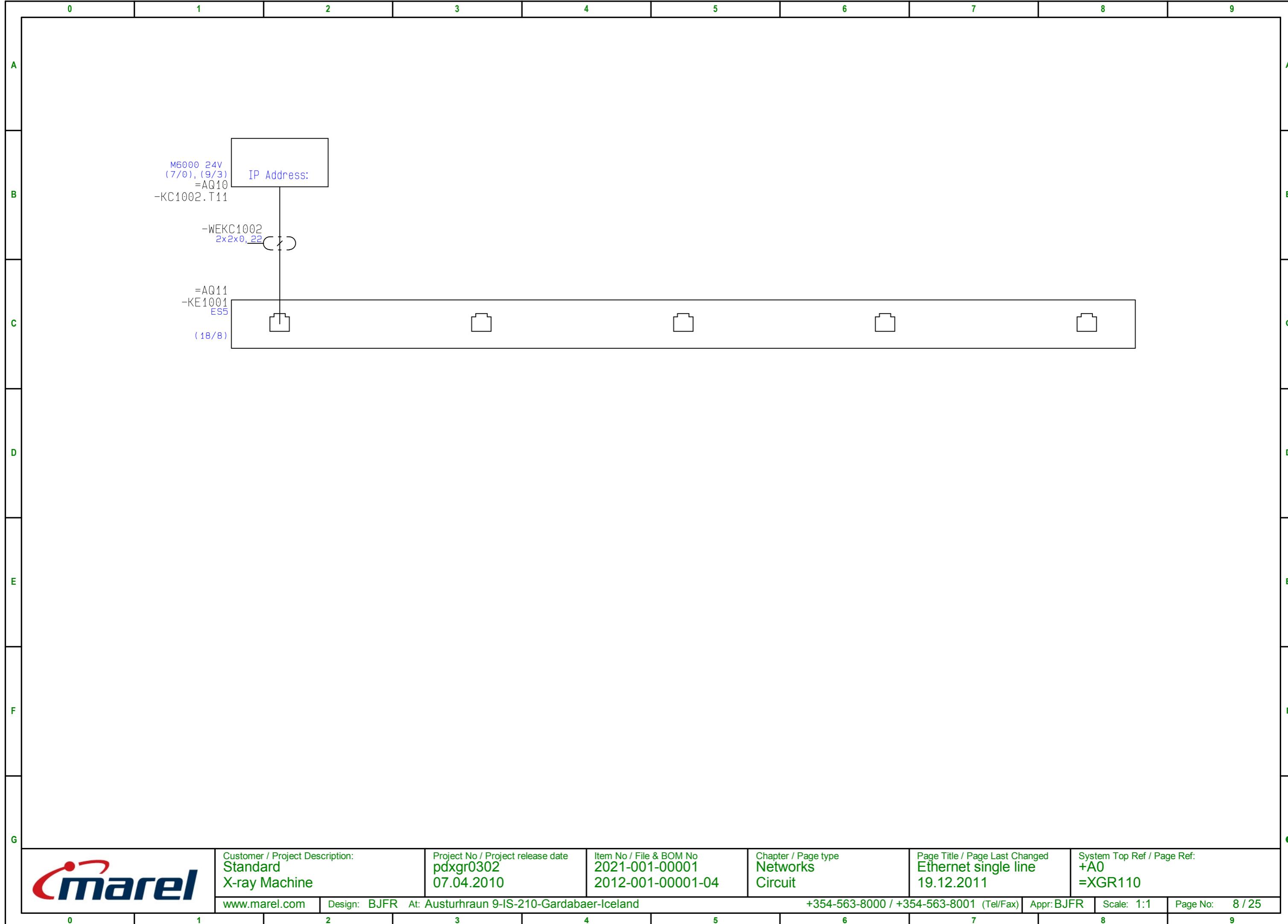
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2012-001-00001-04

Chapter / Page type
Networks
Circuit

Page Title / Page Last Changed
CAN single line
2.1.2012

System Top Ref / Page Ref:
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**Standard
X-ray Machine**

Project No / Project release date
**pdxgr0302
07.04.2010**

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**2021-001-00001
2012-001-00001-04**

Chapter / Page type
**Networks
Circuit**

Page Title / Page Last Changed
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19.12.2011**

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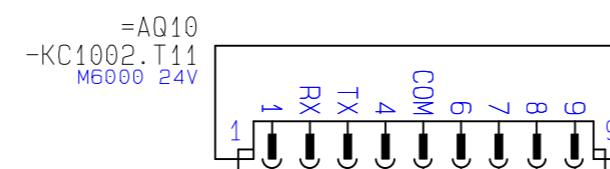
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Scale: 1:1

Page No: 8 / 25

A



B

-WCEX1002
4x0.5g
RS-232

GND TX RX GND

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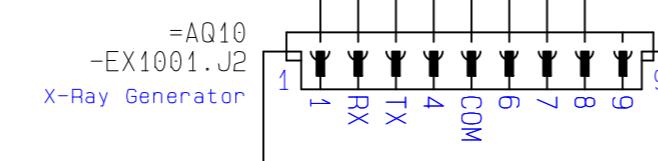
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Customer / Project Description:
**Standard
X-ray Machine**

Project No / Project release date
**pdxgr0302
07.04.2010**

Item No / File & BOM No
**2021-001-00001
2012-001-00001-04**

Chapter / Page type
**Networks
Circuit**

Page Title / Page Last Changed
**RS232
2.1.2012**

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**Standard
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**pdxgr0302
07.04.2010**

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**2021-001-00001
2012-001-00001-04**

Chapter / Page type

Page Title / Page Last Changed
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System Top Ref / Page Ref:
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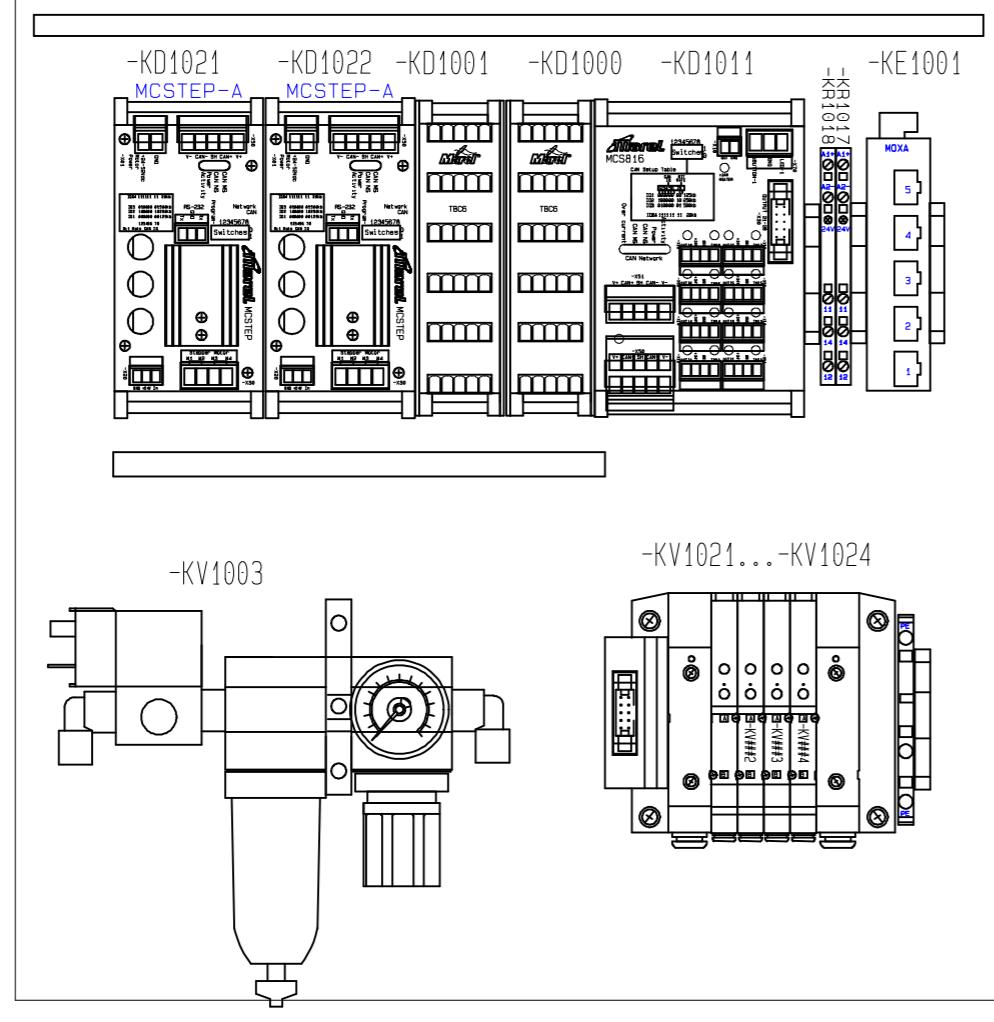
Page No: Mai / 25

Main Cabinet

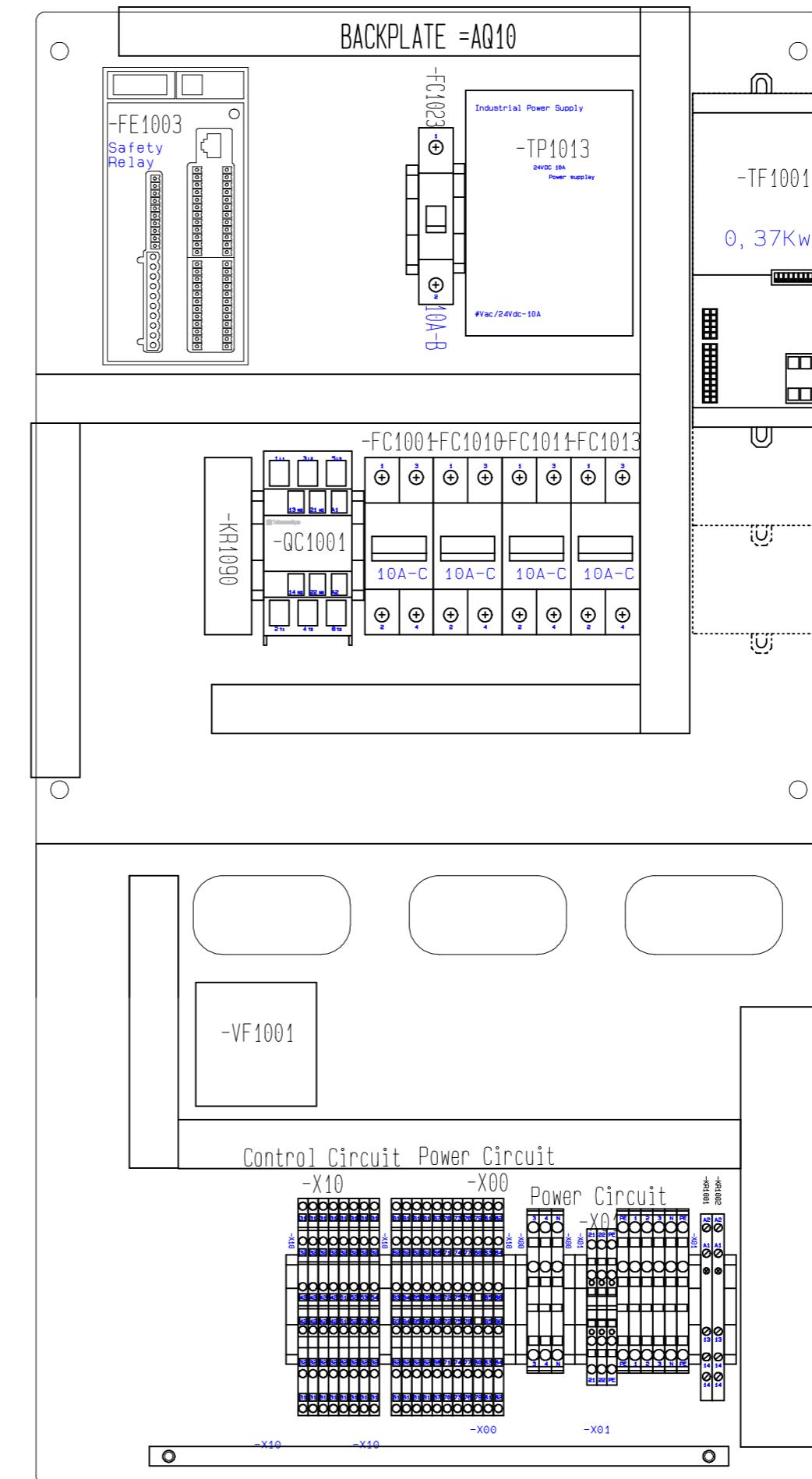
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=XGR110.AQ11

BACKPLATE =AQ11



BACKPLATE =AQ10



Customer / Project Description:
Standard
X-ray Machine

Project No / Project release date
pdxgr0302
07.04.2010

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2021-001-00001
2012-001-00001-04

Chapter / Page type
Main Cabinet
Layout

Page Title / Page Last Changed
Backplate
20.1.2012

System Top Ref / Page Ref:
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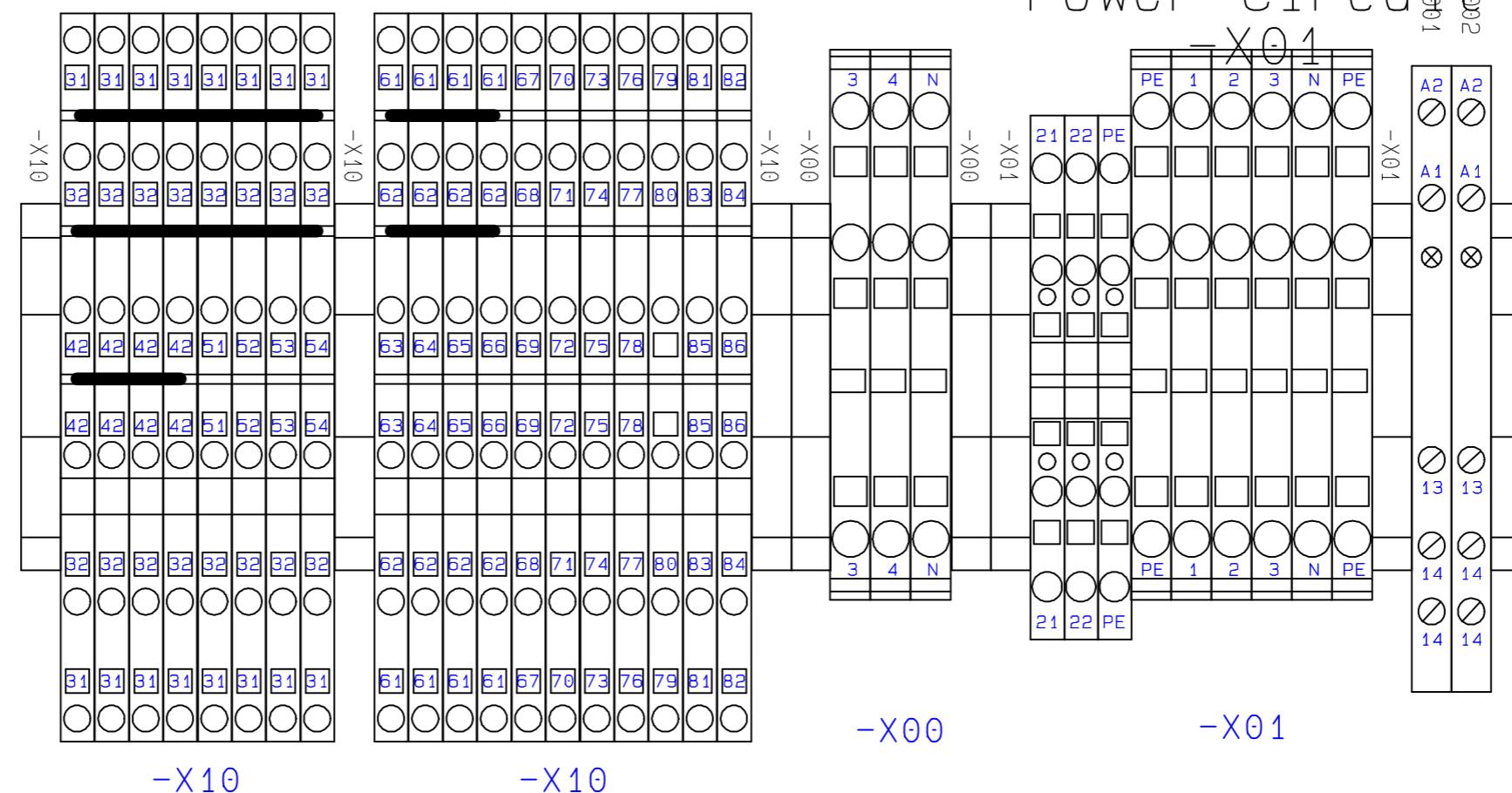
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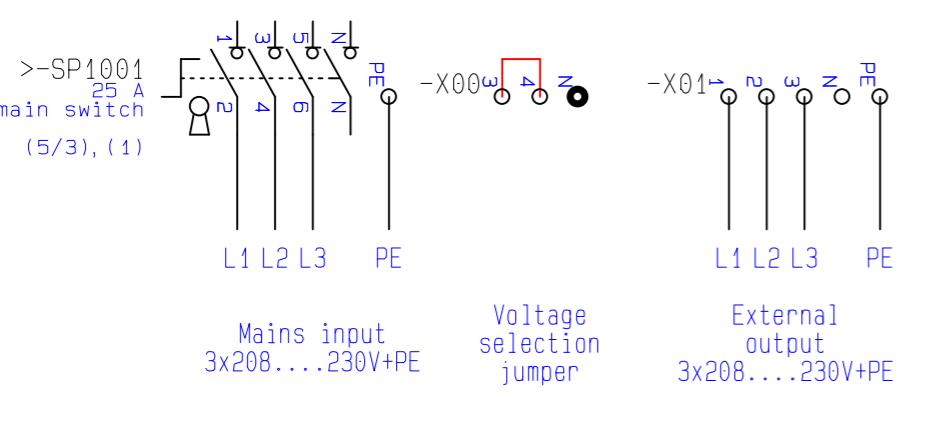
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-X10 -X00



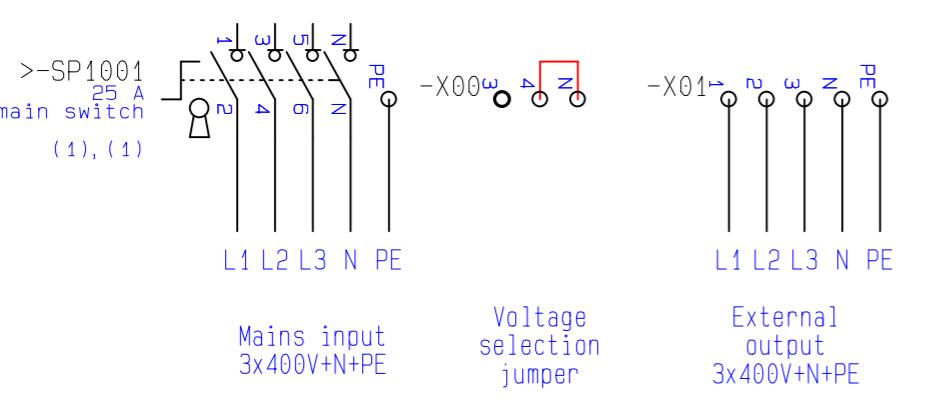
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CONNECTION DIAGRAMS

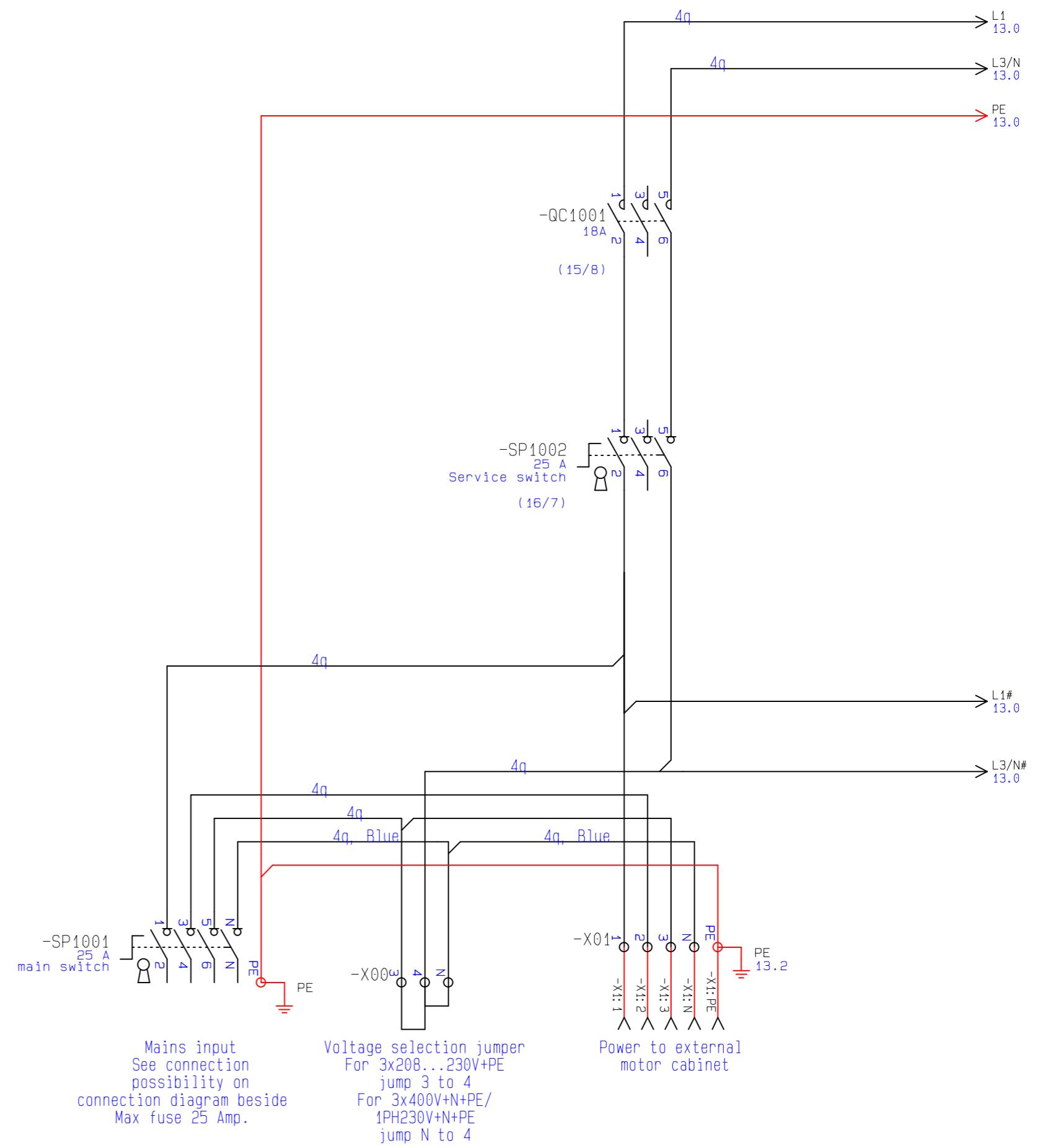
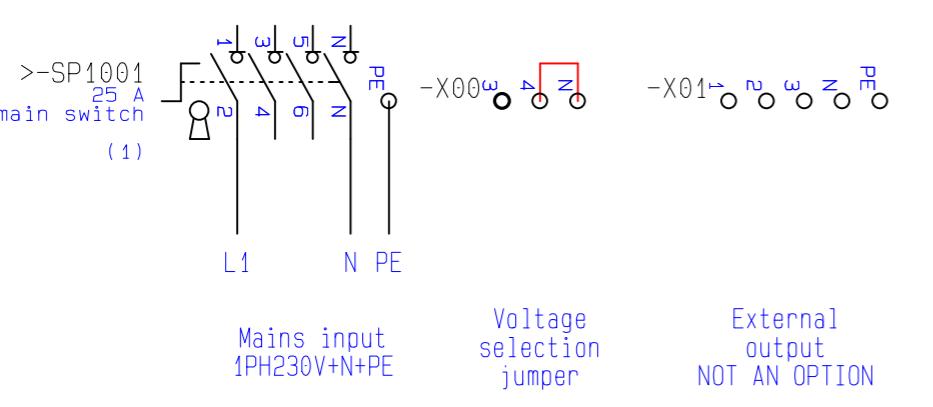
EXAMPLE 3

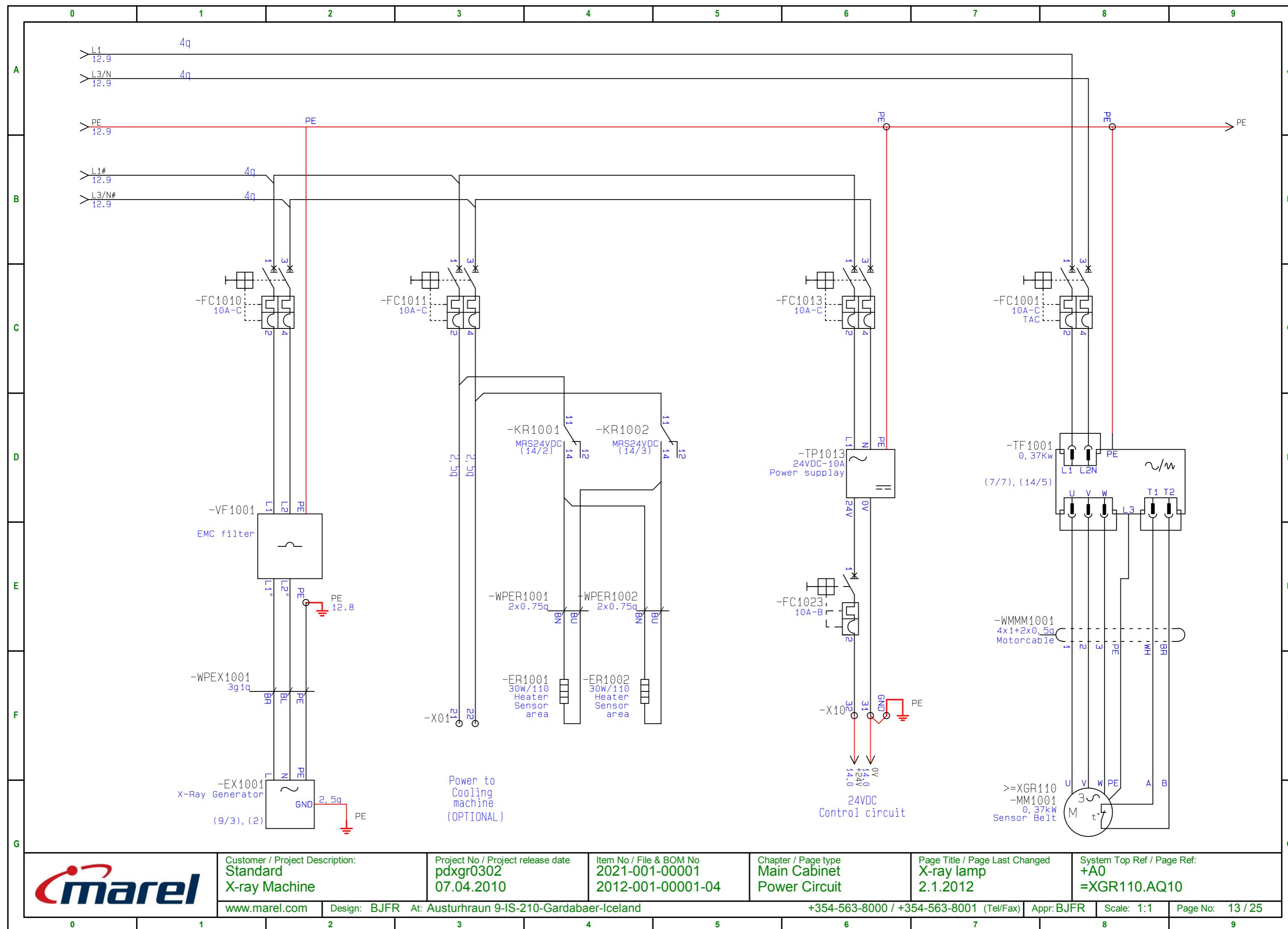


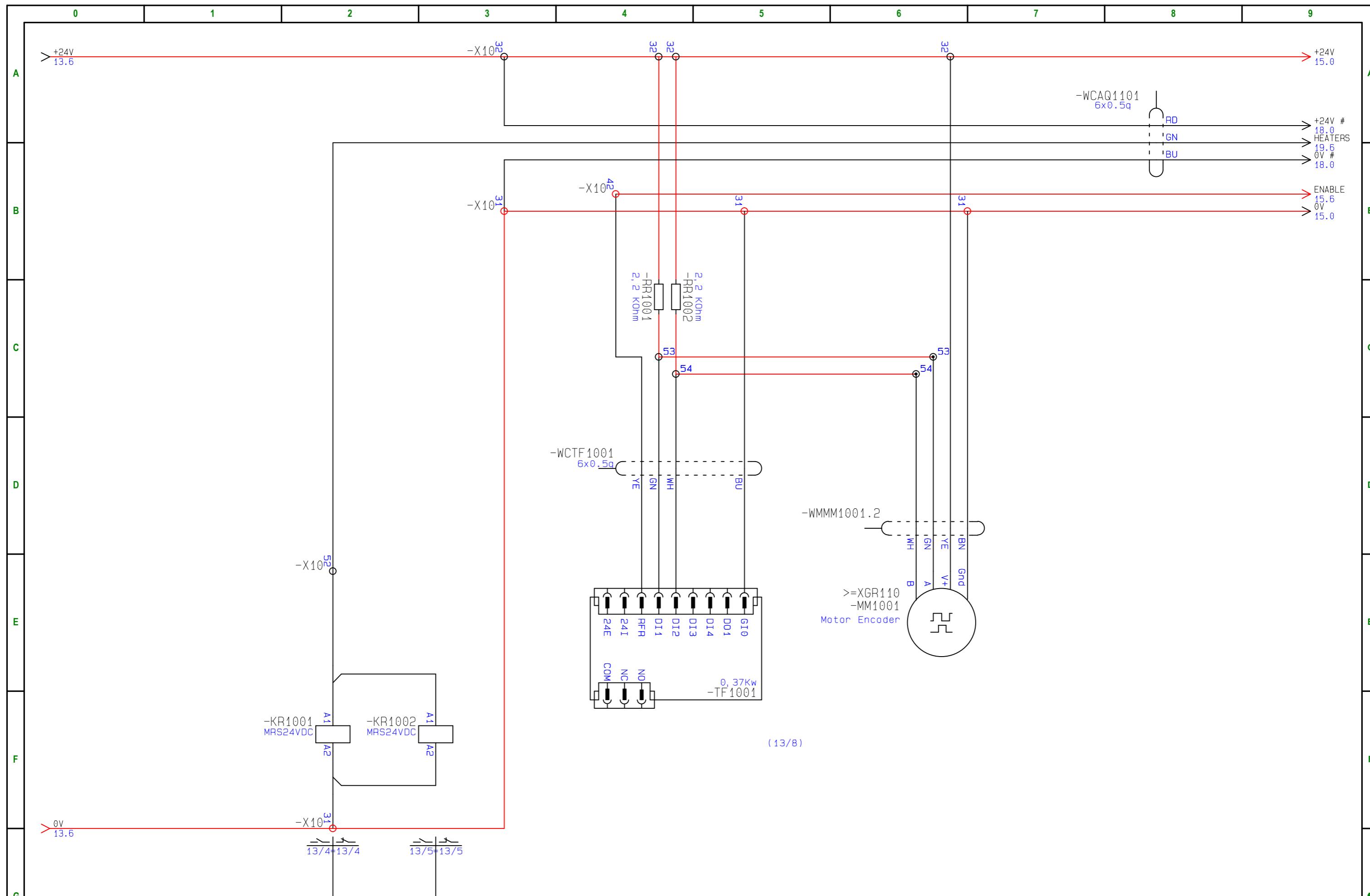
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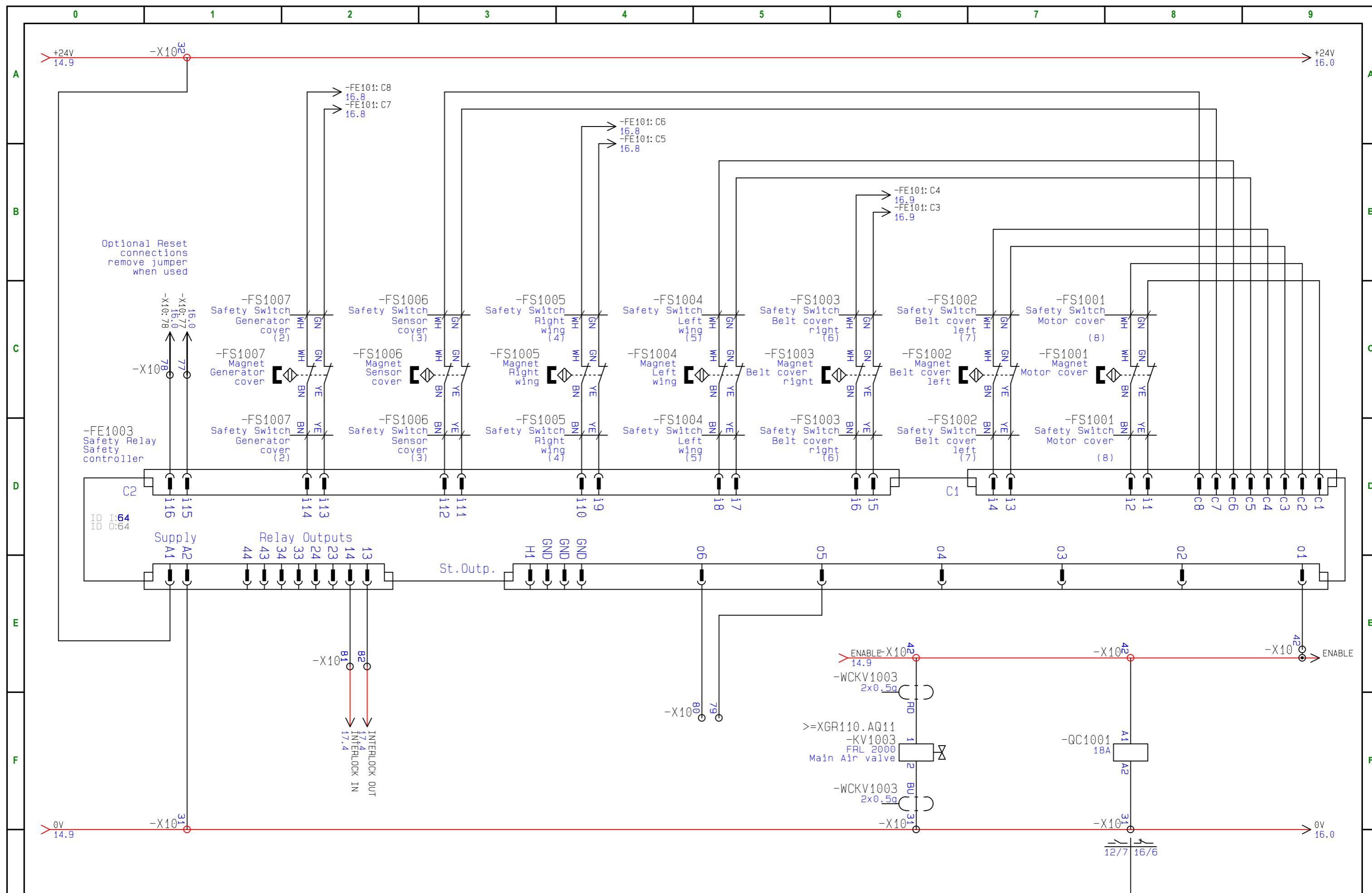


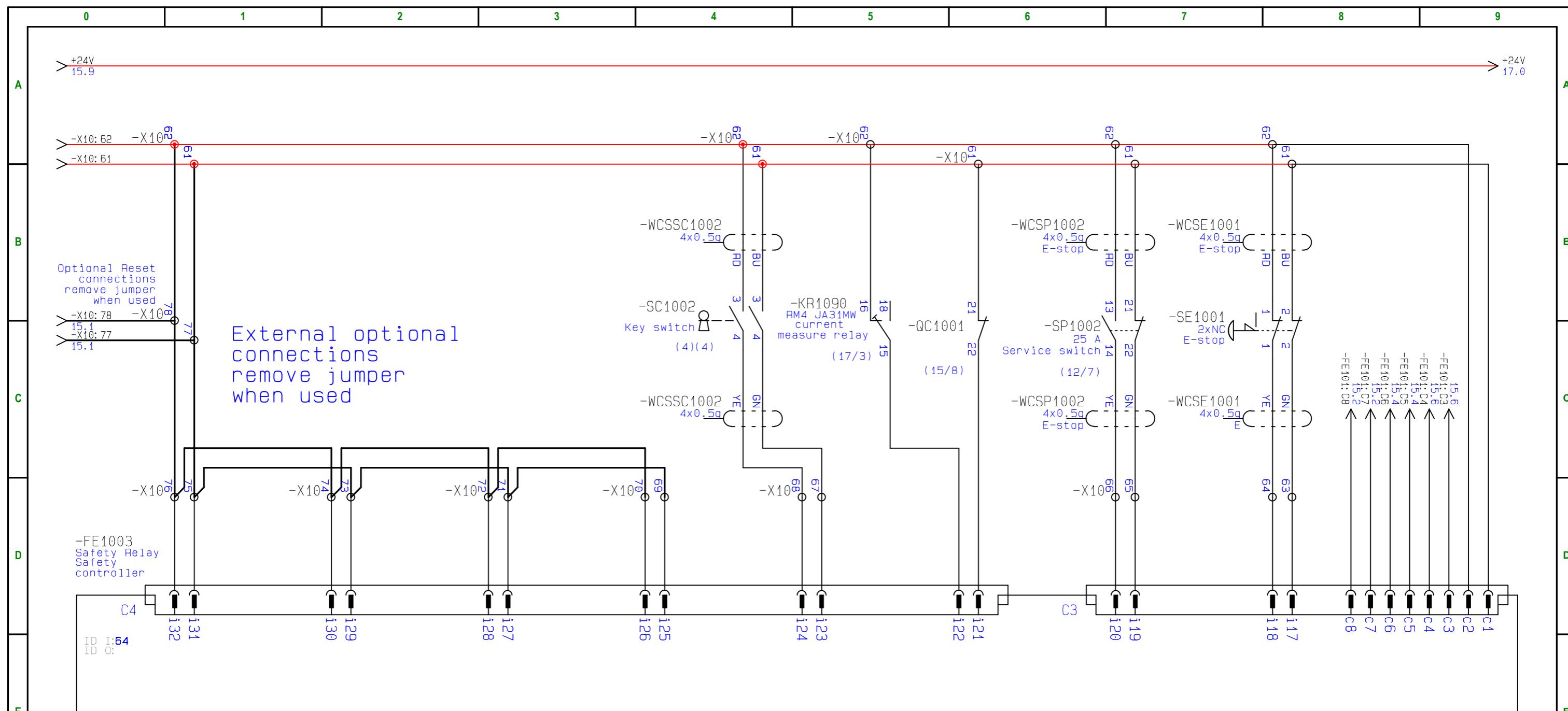
EXAMPLE 1











Customer / Project Description
Standard
X-ray Machine

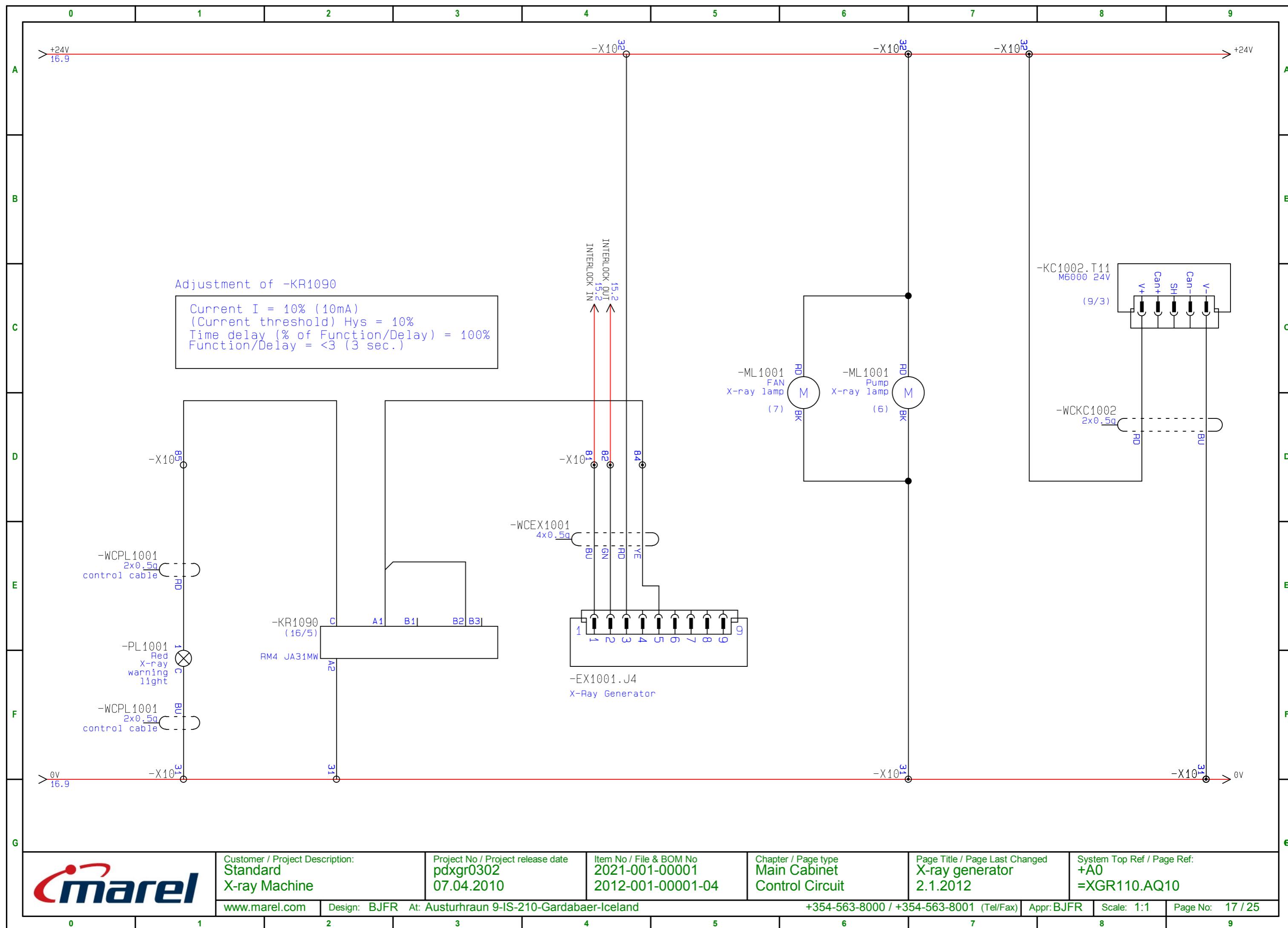
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pdxgr0302
07.04.2010

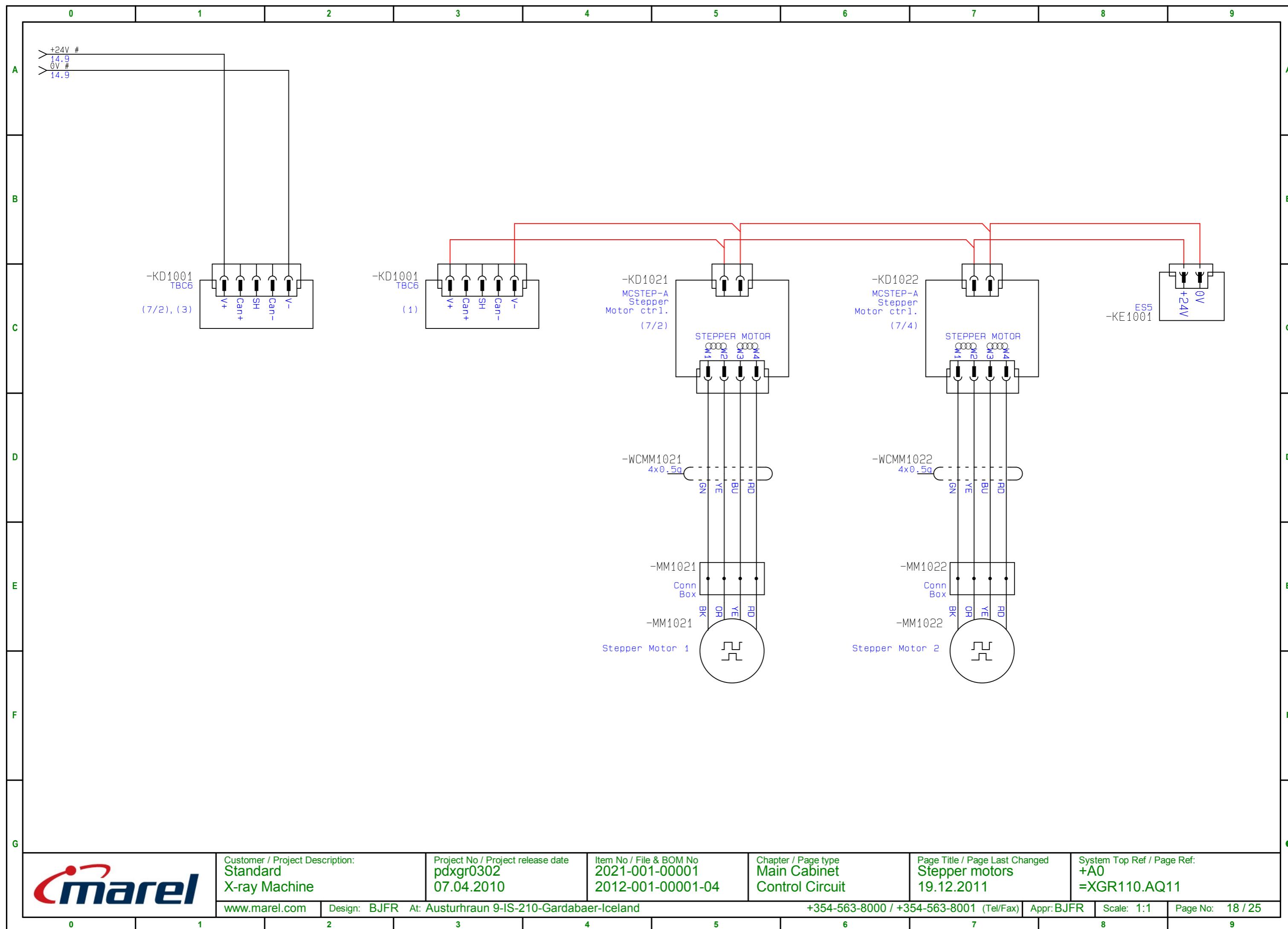
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2012-001-00001-04

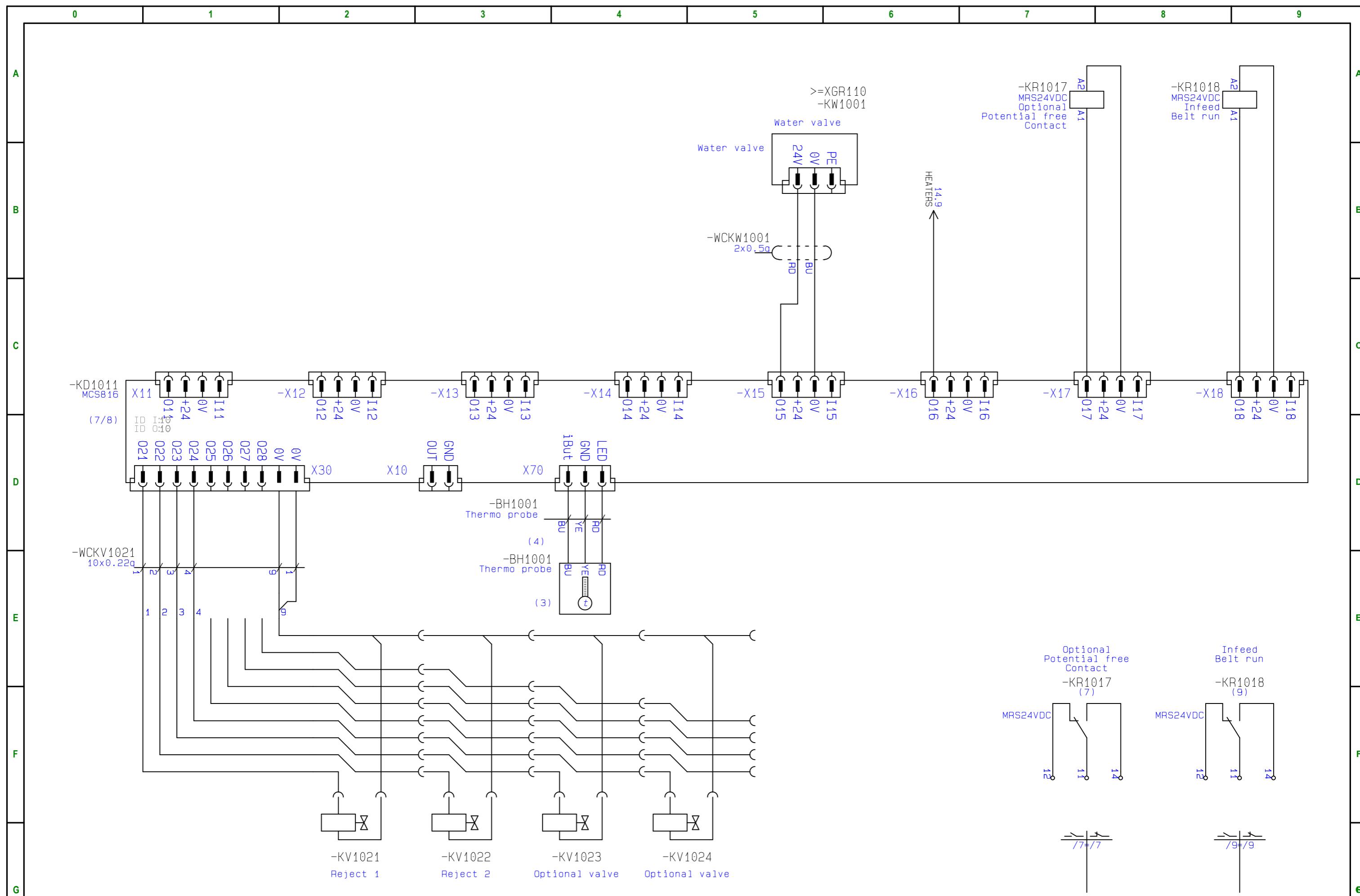
Chapter / Page type
Main Cabinet
Control Circuit

Page Title / Page Last Changed
Safety circuit
3.1.2012

System Top Ref / Page Ref:
+A0
=XGR110.AQ10







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Customer / Project Description:
Standard
X-ray Machine

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pdxgr0302
07.04.2010

Item No / File & BOM No
2021-001-00001
2012-001-00001-04

Chapter / Page type

Page Title / Page Last Changed
23.4.2010

Cables

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+A0

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0	1	2	3	4	5	6	7	8	9				
CABLE			Connection point A			Connection point B							
Cable Name	Type/Dimention	Wire	Designation	Connection	Plug	Page	Designation	Connection	Plug	Page	Comment		
A	-WBBX1001	CAN 0,5q	WH	=XGR110.AQ11-KD1000	C+	CAN	7/5	=XGR110-BX1001	C+	-X51	7/5		
	-WBBX1001	CAN 0,5q	BU	=XGR110.AQ11-KD1000	C-	CAN	7/5	=XGR110-BX1001	C-	-X51	7/5		
	-WBBX1001	CAN 0,5q	SH	=XGR110.AQ11-KD1000	SH	CAN	7/5	=XGR110-BX1001	SH	-X51	7/5		
	-WBBX1001	CAN 0,5q	RD	=XGR110.AQ11-KD1000	V+	CAN	7/5	=XGR110-BX1001	V+	-X51	7/5		
	-WBBX1001	CAN 0,5q	BK	=XGR110.AQ11-KD1000	V-	CAN	7/5	=XGR110-BX1001	V-	-X51	7/5		
B	-WBFE1001	CAN 0,5q	BU	=XGR110.AQ10-FE1003	2		7/7	=XGR110.AQ11-KD1000	C-	CAN	7/7		
	-WBFE1001	CAN 0,5q	BK	=XGR110.AQ10-FE1003	6&3		7/7	=XGR110.AQ11-KD1000	V-	CAN	7/7		
	-WBFE1001	CAN 0,5q	WH	=XGR110.AQ10-FE1003	7		7/7	=XGR110.AQ11-KD1000	C+	CAN	7/7		
	-WBFE1001	CAN 0,5q	X	=XGR110.AQ10-FE1003	x		7/7	=XGR110.AQ11-KD1000	V+	CAN	7/7		
	-WBFE1001	CAN 0,5q	SH	=XGR110.AQ10-FE1003	x		7/7	=XGR110.AQ11-KD1000	SH	CAN	7/7		
C	-WBKC1002	CAN 0,5q	BU	=XGR110.AQ10-KC1002.T11	2		7/1	=XGR110.AQ11-KD1001	C-	CAN	7/1		
	-WBKC1002	CAN 0,5q	BK	=XGR110.AQ10-KC1002.T11	6&3		7/1	=XGR110.AQ11-KD1001	V-	CAN	7/1		
	-WBKC1002	CAN 0,5q	WH	=XGR110.AQ10-KC1002.T11	7		7/1	=XGR110.AQ11-KD1001	C+	CAN	7/1		
	-WBKC1002	CAN 0,5q	SH	=XGR110.AQ10-KC1002.T11	x		7/1	=XGR110.AQ11-KD1001	SH	CAN	7/1		
	-WBKC1002	CAN 0,5q	x	=XGR110.AQ10-KC1002.T11	x		7/1	=XGR110.AQ11-KD1001	V+	CAN	7/1		
D	-WBTF1001	CAN 0,5q	WH	=XGR110.AQ11-KD1000	C+	CAN	7/7	=XGR110.AQ10-TF1001	CH	CAN	7/7		
	-WBTF1001	CAN 0,5q	BU	=XGR110.AQ11-KD1000	C-	CAN	7/7	=XGR110.AQ10-TF1001	CL	CAN	7/7		
	-WBTF1001	CAN 0,5q	SH	=XGR110.AQ11-KD1000	SH	CAN	7/7						
	-WBTF1001	CAN 0,5q	RD	=XGR110.AQ11-KD1000	V+	CAN	7/7	=XGR110.AQ10-TF1001	24E	CAN	7/7		
	-WBTF1001	CAN 0,5q	BK	=XGR110.AQ11-KD1000	V-	CAN	7/7	=XGR110.AQ10-TF1001	CG	CAN	7/7		
E	-WCEX1002	4x0,5q	BU	=XGR110.AQ10-KC1002.T11	COM		9/4	=XGR110.AQ10-EX1001.J2	COM		9/4 RS-232		
	-WCEX1002	4x0,5q	YE	=XGR110.AQ10-KC1002.T11	RX		9/4	=XGR110.AQ10-EX1001.J2	TX		9/4 RS-232		
	-WCEX1002	4x0,5q	GN	=XGR110.AQ10-KC1002.T11	TX		9/4	=XGR110.AQ10-EX1001.J2	RX		9/4 RS-232		
	-WEKC1002	2x2x0,22	WH/OR	=XGR110.AQ10-KC1002.T11	1		8/2	=XGR110.AQ11-KE1001	1	Port 1	8/2		
	-WEKC1002	2x2x0,22	OR	=XGR110.AQ10-KC1002.T11	2		8/2	=XGR110.AQ11-KE1001	2	Port 1	8/2		
F	-WEKC1002	2x2x0,22	WH/GN	=XGR110.AQ10-KC1002.T11	3		8/2	=XGR110.AQ11-KE1001	3	Port 1	8/2		
	-WEKC1002	2x2x0,22	GN	=XGR110.AQ10-KC1002.T11	6		8/2	=XGR110.AQ11-KE1001	6	Port 1	8/2		
	-FS1001	Safety Switch	GN	=XGR110.AQ10-FE1003	c1		15/9	=XGR110.AQ10-FS1001	GN		15/8 Motor cover		
	-FS1001	Safety Switch	WH	=XGR110.AQ10-FE1003	c2		15/9	=XGR110.AQ10-FS1001	WH		15/8 Motor cover		
	-FS1001	Safety Switch	YE	=XGR110.AQ10-FE1003	i1		15/8	=XGR110.AQ10-FS1001	YE		15/8 Motor cover		
G	-FS1001	Safety Switch	BN	=XGR110.AQ10-FE1003	i2		15/8	=XGR110.AQ10-FS1001	BN		15/8 Motor cover		
	-FS1002	Safety Switch	GN	=XGR110.AQ10-FE1003	c3		15/9	=XGR110.AQ10-FS1002	GN		15/7 Belt cover left		
	-FS1002	Safety Switch	WH	=XGR110.AQ10-FE1003	c4		15/9	=XGR110.AQ10-FS1002	WH		15/7 Belt cover left		
	-FS1002	Safety Switch	YE	=XGR110.AQ10-FE1003	i3		15/7	=XGR110.AQ10-FS1002	YE		15/7 Belt cover left		
	-FS1002	Safety Switch	BN	=XGR110.AQ10-FE1003	i4		15/7	=XGR110.AQ10-FS1002	BN		15/7 Belt cover left		
H	-FS1003	Safety Switch	GN	=XGR110.AQ10-FE1003	c3		16/9	=XGR110.AQ10-FS1003	GN		15/6 Belt cover right		
	-FS1003	Safety Switch	WH	=XGR110.AQ10-FE1003	c4		16/9	=XGR110.AQ10-FS1003	WH		15/6 Belt cover right		
	-FS1003	Safety Switch	YE	=XGR110.AQ10-FE1003	i5		15/6	=XGR110.AQ10-FS1003	YE		15/6 Belt cover right		
	-FS1003	Safety Switch	BN	=XGR110.AQ10-FE1003	i6		15/6	=XGR110.AQ10-FS1003	BN		15/6 Belt cover right		
			Customer / Project Description: Standard X-ray Machine		Project No / Project release date pdxgr0302 07.04.2010		Item No / File & BOM No 2021-001-00001 2012-001-00001-04		Chapter / Page type Cables List		Page Title / Page Last Changed Cable list 3.1.2012		System Top Ref / Page Ref: +A0
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0	1	2	3	4	5	6	7	8	9				
CABLE			Connection point A			Connection point B							
Cable Name	Type/Dimention	Wire	Designation	Connection	Plug	Page	Designation	Connection	Plug	Page	Comment		
A	-FS1004	Safety Switch	GN	=XGR110.AQ10-FE1003	c5	15/9	=XGR110.AQ10-FS1004	GN		15/5	Left wing		
	-FS1004	Safety Switch	WH	=XGR110.AQ10-FE1003	c6	15/8	=XGR110.AQ10-FS1004	WH		15/5	Left wing		
	-FS1004	Safety Switch	YE	=XGR110.AQ10-FE1003	i7	15/5	=XGR110.AQ10-FS1004	YE		15/5	Left wing		
	-FS1004	Safety Switch	BN	=XGR110.AQ10-FE1003	i8	15/5	=XGR110.AQ10-FS1004	BN		15/5	Left wing		
B	-FS1005	Safety Switch	GN	=XGR110.AQ10-FE1003	c5	16/8	=XGR110.AQ10-FS1005	GN		15/4	Right wing		
	-FS1005	Safety Switch	WH	=XGR110.AQ10-FE1003	c6	16/8	=XGR110.AQ10-FS1005	WH		15/4	Right wing		
	-FS1005	Safety Switch	YE	=XGR110.AQ10-FE1003	i9	15/4	=XGR110.AQ10-FS1005	YE		15/4	Right wing		
	-FS1005	Safety Switch	BN	=XGR110.AQ10-FE1003	i10	15/4	=XGR110.AQ10-FS1005	BN		15/4	Right wing		
C	-FS1006	Safety Switch	GN	=XGR110.AQ10-FE1003	c7	15/8	=XGR110.AQ10-FS1006	GN		15/3	Sensor cover		
	-FS1006	Safety Switch	WH	=XGR110.AQ10-FE1003	c8	15/8	=XGR110.AQ10-FS1006	WH		15/3	Sensor cover		
	-FS1006	Safety Switch	YE	=XGR110.AQ10-FE1003	i11	15/3	=XGR110.AQ10-FS1006	YE		15/3	Sensor cover		
	-FS1006	Safety Switch	BN	=XGR110.AQ10-FE1003	i12	15/3	=XGR110.AQ10-FS1006	BN		15/3	Sensor cover		
D	-FS1007	Safety Switch	GN	=XGR110.AQ10-FE1003	c7	16/8	=XGR110.AQ10-FS1007	GN		15/2	Generator cover		
	-FS1007	Safety Switch	WH	=XGR110.AQ10-FE1003	c8	16/8	=XGR110.AQ10-FS1007	WH		15/2	Generator cover		
	-FS1007	Safety Switch	YE	=XGR110.AQ10-FE1003	i13	15/2	=XGR110.AQ10-FS1007	YE		15/2	Generator cover		
	-FS1007	Safety Switch	BN	=XGR110.AQ10-FE1003	i14	15/2	=XGR110.AQ10-FS1007	BN		15/2	Generator cover		
E	-WCAQ1101	6x0.5q	RD	=XGR110.AQ10-X10	32	14/3	=XGR110.AQ11-KD1001	V+		18/1			
	-WCAQ1101	6x0.5q	BU	=XGR110.AQ10-X10	31	14/3	=XGR110.AQ11-KD1001	V-		18/2			
	-WCAQ1101	6x0.5q	GN	=XGR110.AQ10-X10	52	14/2	=XGR110.AQ11-KD1011	O16:-X16		19/6			
	-WCEX1001	4x0.5q	YE	=XGR110.AQ10-X10	84	17/4	=XGR110.AQ10-EX1001.J4	5		17/5			
F	-WCEX1001	4x0.5q	BU	=XGR110.AQ10-X10	81	17/4	=XGR110.AQ10-EX1001.J4	1		17/4			
	-WCEX1001	4x0.5q	GN	=XGR110.AQ10-X10	82	17/4	=XGR110.AQ10-EX1001.J4	2		17/4			
	-WCEX1001	4x0.5q	RD	=XGR110.AQ10-X10	32	17/4	=XGR110.AQ10-EX1001.J4	3		17/4			
	-WCKC1002	2x0.5q	RD	=XGR110.AQ10-KC1002.T11	V+	17/8	=XGR110.AQ10-X10	32		17/7			
G	-WCKC1002	2x0.5q	BU	=XGR110.AQ10-KC1002.T11	V-	17/9	=XGR110.AQ10-X10	31		17/9			
	-WCKV1003	2x0.5q	RD	=XGR110.AQ10-X10	42	15/6	=XGR110.AQ11-KV1003	1		15/6			
	-WCKV1003	2x0.5q	BU	=XGR110.AQ10-X10	31	15/6	=XGR110.AQ11-KV1003	2		15/6			
	-WCPL1001	2x0.5q	RD	=XGR110.AQ10-X10	85	17/1	=XGR110.AQ10-PL1001	1		17/1	control cable		
H	-WCPL1001	2x0.5q	BU	=XGR110.AQ10-X10	31	17/1	=XGR110.AQ10-PL1001	C		17/1	control cable		
	-WCSE1001	4x0.5q	BU	=XGR110.AQ10-X10	61	16/8	=XGR110.AQ10-SE1001	2		16/8	E-stop		
	-WCSE1001	4x0.5q	RD	=XGR110.AQ10-X10	62	16/8	=XGR110.AQ10-SE1001	1		16/8	E-stop		
	-WCSE1001	4x0.5q	GN	=XGR110.AQ10-X10	63	16/8	=XGR110.AQ10-SE1001	2		16/8	E		
I	-WCSE1001	4x0.5q	YE	=XGR110.AQ10-X10	64	16/8	=XGR110.AQ10-SE1001	1		16/8	E		
	-WCSP1002	4x0.5q	BU	=XGR110.AQ10-X10	61	16/7	=XGR110.AQ10-SP1002	21		16/7	E-stop		
	-WCSP1002	4x0.5q	RD	=XGR110.AQ10-X10	62	16/7	=XGR110.AQ10-SP1002	13		16/7	E-stop		
	-WCSP1002	4x0.5q	GN	=XGR110.AQ10-X10	65	16/7	=XGR110.AQ10-SP1002	22		16/7	E-stop		
J	-WCSP1002	4x0.5q	YE	=XGR110.AQ10-X10	66	16/7	=XGR110.AQ10-SP1002	14		16/7	E-stop		
			Customer / Project Description: Standard X-ray Machine		Project No / Project release date pdxgr0302 07.04.2010		Item No / File & BOM No 2021-001-00001 2012-001-00001-04		Chapter / Page type Cables List		Page Title / Page Last Changed Cable list 3.1.2012		System Top Ref / Page Ref: +A0
www.marel.com			Design: BJFR At: Austurhraun 9-IS-210-Gardabaer-Iceland			+354-563-8000 / +354-563-8001 (Tel/Fax)			Appr: BJFR		Scale: 1:1	Page No: 21 / 25	
0	1	2	3	4	5	6	7	8	9				

0	1	2	3	4	5	6	7	8	9				
CABLE			Connection point A			Connection point B							
A	Cable Name	Type/Dimention	Wire	Designation	Connection	Plug	Page	Designation	Connection	Plug	Page	Comment	
A	-WCSSC1002	4x0.5q	BU	=XGR110.AQ10-X10	61		16/4	=XGR110.AQ10-SC1002	3		16/4		
	-WCSSC1002	4x0.5q	RD	=XGR110.AQ10-X10	62		16/4	=XGR110.AQ10-SC1002	3		16/4		
	-WCSSC1002	4x0.5q	GN	=XGR110.AQ10-X10	67		16/5	=XGR110.AQ10-SC1002	4		16/4		
	-WCSSC1002	4x0.5q	YE	=XGR110.AQ10-X10	68		16/5	=XGR110.AQ10-SC1002	4		16/4		
B	-WCTF1001	6x0.5q	GN	=XGR110.AQ10-X10	53		14/4	=XGR110.AQ10-TF1001	DI1		14/4		
	-WCTF1001	6x0.5q	WH	=XGR110.AQ10-X10	54		14/4	=XGR110.AQ10-TF1001	DI2		14/4		
	-WCTF1001	6x0.5q	YE	=XGR110.AQ10-X10	42		14/4	=XGR110.AQ10-TF1001	RFR		14/4		
	-WCTF1001	6x0.5q	BU	=XGR110.AQ10-X10	31		14/5	=XGR110.AQ10-TF1001	GI0		14/5		
C	-WMMM1001	4x1+2x0,5q	PE	=XGR110.AQ10-TF1001	L3		13/8	=XGR110-MM1001	PE		13/8	Motorcable	
	-WMMM1001	4x1+2x0,5q	WH	=XGR110.AQ10-TF1001	T1		13/8	=XGR110-MM1001	A		13/8	Motorcable	
	-WMMM1001	4x1+2x0,5q	BR	=XGR110.AQ10-TF1001	T2		13/9	=XGR110-MM1001	B		13/9	Motorcable	
	-WMMM1001	4x1+2x0,5q	1	=XGR110.AQ10-TF1001	U		13/8	=XGR110-MM1001	U		13/8	Motorcable	
D	-WMMM1001	4x1+2x0,5q	2	=XGR110.AQ10-TF1001	V		13/8	=XGR110-MM1001	V		13/8	Motorcable	
	-WMMM1001	4x1+2x0,5q	3	=XGR110.AQ10-TF1001	W		13/8	=XGR110-MM1001	W		13/8	Motorcable	
	-WMMM1001		GN	=XGR110.AQ10-X10	53		14/6	=XGR110-MM1001	A		14/6		
	-WMMM1001		WH	=XGR110.AQ10-X10	54		14/6	=XGR110-MM1001	B		14/6		
E	-WMMM1001		YE	=XGR110.AQ10-X10	32		14/6	=XGR110-MM1001	V+		14/6		
	-WMMM1001		BN	=XGR110.AQ10-X10	31		14/7	=XGR110-MM1001	Gnd		14/7		
	-WPER1001	2x0.75q	BN	=XGR110.AQ10-KR1001	14		13/4	=XGR110.AQ10-ER1001			13/4		
	-WPER1001	2x0.75q	BU	=XGR110.AQ10-KR1002	14		13/5	=XGR110.AQ10-ER1001			13/4		
F	-WPER1002	2x0.75q	BN	=XGR110.AQ10-KR1001	14		13/4	=XGR110.AQ10-ER1002			13/4		
	-WPER1002	2x0.75q	BU	=XGR110.AQ10-KR1002	14		13/5	=XGR110.AQ10-ER1002			13/4		
	-WPEX1001	3g1q	BR	=XGR110.AQ10-VF1001	L1"		13/2	=XGR110.AQ10-EX1001	L		13/2		
	-WPEX1001	3g1q	BL	=XGR110.AQ10-VF1001	L2"		13/2	=XGR110.AQ10-EX1001	N		13/2		
G	-WPEX1001	3g1q	PE	=XGR110.AQ10-X01	PE		13/2	=XGR110.AQ10-EX1001	PE		13/2		
	-BH1001	Thermo probe	YE	=XGR110.AQ11-KD1011	GND:-X70		19/4	=XGR110.AQ11-BH1001	YE		19/4		
	-BH1001	Thermo probe	RD	=XGR110.AQ11-KD1011	LED:-X70		19/4	=XGR110.AQ11-BH1001	RD		19/4		
	-BH1001	Thermo probe	BU	=XGR110.AQ11-KD1011	iBut:-X70		19/4	=XGR110.AQ11-BH1001	BU		19/4		
H	-WCKV1021	10x0.22q	9	=XGR110.AQ11-KD1011	0V:-X30		19/2	=XGR110.AQ11-KV1021	9	Pin 9	19/2		
	-WCKV1021	10x0.22q	1	=XGR110.AQ11-KD1011	0V:-X30		19/2	=XGR110.AQ11-KV1021	9	Pin 9	19/2		
	-WCKV1021	10x0.22q	1	=XGR110.AQ11-KD1011	O21:-X30		19/1	=XGR110.AQ11-KV1021	1	Pin 1	19/1		
	-WCKV1021	10x0.22q	2	=XGR110.AQ11-KD1011	O22:-X30		19/1	=XGR110.AQ11-KV1022	2	Pin 2	19/1		
I	-WCKV1021	10x0.22q	3	=XGR110.AQ11-KD1011	O23:-X30		19/1	=XGR110.AQ11-KV1023	3	Pin 3	19/1		
	-WCKV1021	10x0.22q	4	=XGR110.AQ11-KD1011	O24:-X30		19/1	=XGR110.AQ11-KV1024	4	Pin 4	19/1		
	-WCKW1001	2x0.5q	BU	=XGR110-KW1001	0V		19/5	=XGR110.AQ11-KD1011	0V:-X15		19/5		
	-WCKW1001	2x0.5q	RD	=XGR110-KW1001	24V		19/5	=XGR110.AQ11-KD1011	O15:-X15		19/5		
J	-WCMM1021	4x0.5q	GN	=XGR110.AQ11-KD1021	W1		18/5	=XGR110.AQ11-MM1021	BK		18/5		
	-WCMM1021	4x0.5q	YE	=XGR110.AQ11-KD1021	W2		18/5	=XGR110.AQ11-MM1021	OR		18/5		
	-WCMM1021	4x0.5q	BU	=XGR110.AQ11-KD1021	W3		18/5	=XGR110.AQ11-MM1021	YE		18/5		
	-WCMM1021	4x0.5q	RD	=XGR110.AQ11-KD1021	W4		18/5	=XGR110.AQ11-MM1021	RD		18/5		
			Customer / Project Description: Standard X-ray Machine		Project No / Project release date pdxgr0302 07.04.2010		Item No / File & BOM No 2021-001-00001 2012-001-00001-04		Chapter / Page type Cables List		Page Title / Page Last Changed Cable list 3.1.2012		System Top Ref / Page Ref: +A0
0	1	2	3	4	5	6	7	8	9				

0	1	2	3	4	5	6	7	8	9			
CABLE			Connection point A			Connection point B						
A	Cable Name	Type/Dimention	Wire	Designation	Connection	Plug	Page	Designation	Connection	Plug	Page	Comment
-WCMM1022	4x0.5q	GN	=XGR110.AQ11-KD1022	W1		18/7	=XGR110.AQ11-MM1022	BK		18/7		
-WCMM1022	4x0.5q	YE	=XGR110.AQ11-KD1022	W2		18/7	=XGR110.AQ11-MM1022	OR		18/7		
-WCMM1022	4x0.5q	BU	=XGR110.AQ11-KD1022	W3		18/7	=XGR110.AQ11-MM1022	YE		18/7		
-WCMM1022	4x0.5q	RD	=XGR110.AQ11-KD1022	W4		18/7	=XGR110.AQ11-MM1022	RD		18/7		
B												
C												
D												
E												
F												
G												
		Customer / Project Description: Standard X-ray Machine		Project No / Project release date pdxgr0302 07.04.2010		Item No / File & BOM No 2021-001-00001 2012-001-00001-04		Chapter / Page type Cables List		Page Title / Page Last Changed Cable list 3.1.2012		System Top Ref / Page Ref: +A0
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0	1	2	3	4	5	6	7	8	9			

0	1	2	3	4	5	6	7	8	9
Description		Item No.	Comment		Description		Item No.	Comment	
A	Terminal Feed through 2,5qx4	715-3303-11608570000	Conrol Circuit		Cable ctrl 0,5q 02x scr pur	718-3702-00105	Conrol Circuit		A
	Terminal Feed through 2,5qx4 PE	715-3302-11608660000	Conrol Circuit		Cable ctrl 0,5q 04x scr pur	718-3702-0011	Conrol Circuit		
	Terminal Feed through 2,5qx4 Endplate	715-3303-11608800000			Cable ctrl 0,5q 06x scr pur	718-3702-0013	Conrol Circuit		
	Terminal mini Feed through 2,5qx2	715-3302-11720920000	Conrol Circuit		Cable ctrl 0,5q 08x scr pur	718-3702-0014	Conrol Circuit		
	Terminal mini Feed through 2,5qx2 Endplate	715-3303-11720960000			Cable ctrl 0,5q 12x scr pur	718-3702-0009	Conrol Circuit		
	Terminal Feed through 2,5q three level (LLL)	715-3302-11782300000	Conrol Circuit		Cable ctrl 0,5q 18x scr	718-3702-0010	Conrol Circuit		
	Terminal Feed through 2,5q three level Endplate	715-3303-11782340000			Cable CAN 2x2x0,5q pur	718-3702-y2422pur	CAN bus		
B	Terminal Diode	715-3302-11650350000	Conrol Circuit		Cable CAN 2x2x1,5q TRUNK	718-3702-y1815pvc	CAN bus		B
	Terminal Feed through 4qx3	715-3302-17904180000	Power Circuit		Cable ethernet pur Netbus F5P2	718-3702-f5p2pur	Ethernet		
	Terminal Feed through 4qx3 BL	715-3302-17904190000	Power Circuit		Cable motor 4x1q+2x0,5q pur gray	718-3701-0042	Motors on Inverters		
	Terminal Feed through 4qx3 PE	715-3302-17904170000	Power Circuit		Cable power 3g1,5q	718-3701-0032	Power Circuit		
	Terminal Feed through 4qx3 Endplate	715-3302-17904100000			Cable power 5g1,5q	718-3701-0033	Power Circuit		
	Terminal block stop 15mm	715-3303-17920340000							
	Terminal block stop 35mm	715-3303-1954000000							
C	Terminal block stop 35mm Screw	715-3303-11062000000							C
	Terminal cross-connections 2,5qx1	715-3302-11720700000							
	Terminal cross-connections 2,5qx2	715-3302-11608860000							
	Terminal cross-connections 2,5qx50	715-3302-11697540000							
	Terminal cross-connections 4qx2	715-3302-11608860000							
	Terminal cross-connections 4qx10	715-3302-11609030000							
	Terminal jumper 2,5qx2	715-3302-11677120000							
D	Plug to I/O unit 2pin	715-3002-1000							D
	Plug to I/O unit 2pin mini	715-3002-1001							
	Plug to I/O unit 3pin	715-3002-1002							
	Plug to I/O unit 3pin mini	715-3002-1003							
	Plug to I/O unit 4pin	715-3002-1004							
	Plug to I/O unit 4pin mini	715-3002-1005							
	Plug to I/O unit 5pin	715-3002-1007	(CAN)						
E	Plug to I/O unit 5pin mini	715-3002-1008							E
	Plug to I/O unit 5pin x2	715-3002-1105	(CAN dual)						
	Plug to I/O unit 6pin	715-3002-1010							
	Plug to I/O unit 6pin mini	715-3002-1011							
	Plug to I/O unit 8pin	715-3002-1013							
	Plug to I/O unit 8pin mini	715-3002-1014							
	Plug to I/O unit 10pin	715-3002-1015							
F	Plug to I/O unit 12pin	715-3002-1016							F
G									G

Components



Customer / Project Description:
Standard
X-ray Machine

Project No / Project release date
pdxgr0302
07.04.2010

Item No / File & BOM No
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2012-001-00001-04

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0	1	2	3	4	5	6	7	8	9	
Reference		Name	Quantity	Description		Electrical data	Item No.	Ref.	Index	Comment
A	=XGR110	-BX1001	1	X-Ray Detector 400		X-Ray Detector	elm-evis-xd400	/7/5	BX0001	
	=XGR110	-WBBX1001	-	Cable CAN 2x2x0,5q pur		CAN 0,5q	718-3702-y2422pur	/7/5	WB0001	
	=XGR110	-WBFE1001	-	Cable CAN 2x2x0,5q pur		CAN 0,5q	718-3702-y2422pur	/7/7	WB0001	
	=XGR110	-WBC1002	-	Cable CAN 2x2x0,5q pur		CAN 0,5q	718-3702-y2422pur	/7/1	WB0001	
	=XGR110	-WBTF1001	-	Cable CAN 2x2x0,5q pur		CAN 0,5q	718-3702-y2422pur	/7/7	WB0001	
	=XGR110	-WCEX1002	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/9/3	WC0008	RS-232
	=XGR110	-WEKC1002	-	Cable ethernet pur Netbus F5P2		2x2x0,22	718-3702-f5p2pur	/8/2	WE0001	
B	=XGR110.AQ10	-ER1001	1	Cabinet heater		30W/110	717-3406-0033	/13/4	ER0005	Heater Sensor area
	=XGR110.AQ10	-ER1002	1	Cabinet heater		30W/110	717-3406-0033	/13/4	ER0005	Heater Sensor area
	=XGR110.AQ10	-EX1001	1	X-Ray Generator		X-Ray Generator	717-3407-00583910	/9/3,13/3,17	EX0001	
	=XGR110.AQ10	-EX1001	1	CONNECTOR D-SUB 9P MALE		Metal Hood: XL0010	715-3105-0004		XL0003	
	=XGR110.AQ10	-FC1001	1	Circuit-breaker 2pol. 10A-C IEC/UL		10A-C	717-4402-1023414	/13/8,10/2	FC0035	TAC
	=XGR110.AQ10	-FC1010	1	Circuit-breaker 2pol. 10A-C IEC/UL		10A-C	717-4402-1023414	/13/2,10/0	FC0035	
	=XGR110.AQ10	-FC1011	1	Circuit-breaker 2pol. 10A-C IEC/UL		10A-C	717-4402-1023414	/13/3,10/0	FC0035	
C	=XGR110.AQ10	-FC1013	1	Circuit-breaker 2pol. 10A-C IEC/UL		10A-C	717-4402-1023414	/13/6,10/1	FC0035	
	=XGR110.AQ10	-FC1023	1	Circuit-breaker 1pol. 10A-B		10A-B	717-4402-101106	/13/6,10/1	FC0002	
	=XGR110.AQ10	-FE1003	1	CONNECTOR D-SUB 9P FEMALE SREW		EMC-adapted cover, scr	715-3005-00010		XL0011	
	=XGR110.AQ10	-FE1003	1	Safety Conroller plugs		Safety Relay	717-3400-1023402		FE0005	
	=XGR110.AQ10	-FE1003	1	Safety Conroller		Safety Relay	717-3400-1022409	/10/4	FE0002	
	=XGR110.AQ10	-FE1003	1	Safety Conroller plugs		Safety Relay	717-3400-1023402		FE0005	
	=XGR110.AQ10	-FE1003	1	CONNECTOR D-SUB 9P FEMALE SREW		EMC-adapted cover, scr	715-3005-00010		XL0011	
D	=XGR110.AQ10	-FE1003	1	Safety Conroller		Safety Relay	717-3400-1022409	/7/7,15/7,16	FE0002	ID:40
	=XGR110.AQ10	-FS1001	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/8	FS0001	Motor cover
	=XGR110.AQ10	-FS1001	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-FS1002	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-FS1002	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/7	FS0001	Belt cover left
	=XGR110.AQ10	-FS1003	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-FS1003	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/6	FS0001	Belt cover right
E	=XGR110.AQ10	-FS1004	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-FS1004	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/5	FS0001	Left wing
	=XGR110.AQ10	-FS1005	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-FS1005	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/4	FS0001	Right wing
	=XGR110.AQ10	-FS1006	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-FS1006	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/3	FS0001	Sensor cover
	=XGR110.AQ10	-FS1007	1	Safety Switch 2nc 4 wire Steel		Safety Switch	717-3407-171v62v01	/15/2	FS0001	Generator cover
F	=XGR110.AQ10	-FS1007	1	Safety Switch Magnet Steel		Magnet	717-3407-3042000vh		FS0003	
	=XGR110.AQ10	-KC1002.T11	1	M6000 24V w/HDD+WXP		M6000 24V	ctr-p60t-dhwv2	/7/0,8/0,9/0	KC0011	
	=XGR110.AQ10	-KR1001	1	Terminal Relay 24 VDC 1p		MRS24VDC	717-3406-1mrz24vdc	/13/2,14/2,1	KR0001	
	=XGR110.AQ10	-KR1002	1	Terminal Relay 24 VDC 1p		MRS24VDC	717-3406-1mrz24vdc	/13/3,14/3,1	KR0001	
	=XGR110.AQ10	-KR1090	1	Current measure relay		RM4 JA31MW	717-3406-rm4ja31mw	/16/5	KR0004	current measure relay
	=XGR110.AQ10	-KR1090	1	Current measure relay		RM4 JA31MW	717-3406-rm4ja31mw	/17/3	KR0004	
	=XGR110.AQ10	-ML1001	1	Fan+Pump X-ray lamp		FAN	713-2900-1029114	/17/6	ML0005	X-ray lamp
G	=XGR110.AQ10	-PL1001	1	Indicator light (LED) Beacon red		Red	717-4400-1xvb-c2b4	/17/1	PL0030	X-ray warning light
	=XGR110.AQ10	-PL1001	1	Indicator light Beacon Base top & bottom			717-4400-1xvb-c21	/17/1	PL0033	
	=XGR110.AQ10	-QC1001	1	Contactor 18A 3P+1NO+1NC, Uc 24V DC 7,5kW		18A	717-3406-1lc1d183bl	/12/8,15/8,1	QC0001	
	=XGR110.AQ10	-RR1001	1	Resistor,2,2 KOhm, 0.25W		2,2 KOhm	711-2000-32205	/14/4	RR0004	
	=XGR110.AQ10	-RR1002	1	Resistor,2,2 KOhm, 0.25W		2,2 KOhm	711-2000-32205	/14/4	RR0004	
	=XGR110.AQ10	-SC1002	1	Contact NO Cage Clamp box			717-3404-1m22s-ckc10	/16/4	SC0012	Key switch
	=XGR110.AQ10	-SC1002	1	Key-oper button 2 pos			717-3405-1m22s-wrs	/16/4	SC0011	
H	=XGR110.AQ10	-SE1001	1	Contact NC Cage Clamp panel			717-3404-1m22s-ck01		SC0002	
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		www.marel.com		Design: BJFR At: Austurhraun 9-IS-210-Gardabaer-Iceland		+354-563-8000 / +354-563-8001 (Tel/Fax)		Appr: BJFR	Scale: 1:1	Page No: 24 / 25
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Reference		Name	Quantity	Description		Electrical data	Item No.	Ref.	Index	Comment
A	=XGR110.AQ10	-SE1001	1	Contact panel adapter			717-3404-1m22-a		SC0004	
	=XGR110.AQ10	-SE1001	1	Contact NC Cage Clamp panel			717-3404-1m22s-ck01		SC0002	
	=XGR110.AQ10	-SE1001	1	Em.stop switch panel 2xNC		2xNC	717-3405-1m22-pv	/16/8	SE0005	E-stop
	=XGR110.AQ10	-SP1001	1	Main switch handle Black P1			717-3405-1svb-sw-t0		SP0003	
	=XGR110.AQ10	-SP1001	1	Main switch 25A+handle+N-Contact		25 A	717-3406-0001	/12/5	SP0004	main switch
	=XGR110.AQ10	-SP1001	1	Main switch N-contact P1			717-3404-1n-p1-e		SP0005	
	=XGR110.AQ10	-SP1002	1	Main switch 25A+handle+NO/NC		25 A	717-3406-0001	/12/7,16/7	SP0008	Service switch
B	=XGR110.AQ10	-SP1002	1	Main switch handle Black P1			717-3405-1svb-sw-t0		SP0003	
	=XGR110.AQ10	-SP1002	1	Main switch extra-contact NO/NC			717-3404-0011		SP0007	
	=XGR110.AQ10	-TF1001	1	Inverter Stateline; 0,37 kW; 2,4 A; 1ph 100-230V; CANOpen		0,37Kw	725-8400-1020401	/7/7,13/7,14	TF0026	
	=XGR110.AQ10	-TP1013	1	Power supply 115-230VAC/24VDC-10 Amp		24VDC 10A	719-3600-DRA24024A	/13/6,10/1	TP0001	Power supplay
	=XGR110.AQ10	-VF1001	1	EMC filter		EMC filter	713-2900-1023406	/13/2	VF0008	
	=XGR110.AQ10	-WCAQ1101	-	Cable ctrl 0.5q 06x scr pur		6x0.5q	718-3702-0013	/14/8	WC0009	
	=XGR110.AQ10	-WCEX1001	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/17/4	WC0008	
C	=XGR110.AQ10	-WCKC1002	1	Cable ctrl 0.5q 02x scr pur		2x0.5q	718-3702-00105	/17/8	WC0007	
	=XGR110.AQ10	-WCKV1003	1	Cable ctrl 0.5q 02x scr pur		2x0.5q	718-3702-00105	/15/6	WC0007	
	=XGR110.AQ10	-WCPL1001	1	Cable ctrl 0.5q 02x scr pur		2x0.5q	718-3702-00105	/17/1	WC0007	control cable
	=XGR110.AQ10	-WCSE1001	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/16/7	WC0008	E-stop
	=XGR110.AQ10	-WCSP1002	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/16/6	WC0008	E-stop
	=XGR110.AQ10	-WCSSC1002	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/16/4	WC0008	
	=XGR110.AQ10	-WCTF1001	-	Cable ctrl 0.5q 06x scr pur		6x0.5q	718-3702-0013	/14/4	WC0009	
D	=XGR110.AQ10	-WMMM1001	1	Cable motor 4x1q+2x0,5q UL/CSA orange		4x1+2x0,5q	718-3701-0040	/13/8,14/8	WM0006	Motorcable
	=XGR110.AQ10	-WPER1001	1	Cable power 2x0.75q		2x0.75q	718-3701-0001	/13/4	WP0001	
	=XGR110.AQ10	-WPER1002	1	Cable power 2x0.75q		2x0.75q	718-3701-0001	/13/4	WP0001	
	=XGR110.AQ10	-WPEX1001	1	Cable power 3g1q +3pin plug		3g1q	718-3703-0006	/13/1	WP0018	
	=XGR110.AQ11	-BH1001	1	Heat Sensor 1m		Thermo probe	elm-esen-mt1820-1m	/19/4	BH0002	
	=XGR110.AQ11	-KD1000	1	I/O TBC6 multiport tab		TBC6	elm-ecan-tbc6	/7/7,10/2	KD0011	
	=XGR110.AQ11	-KD1001	1	I/O TBC6 multiport tab		TBC6	elm-ecan-tbc6	/7/2,18/2,10	KD0011	
E	=XGR110.AQ11	-KD1011	1	I/O MCS816		MCS816	elm-ecan-mcs816	/7/8,19/8	KD0006	
	=XGR110.AQ11	-KD1021	1	Stepper motor controller		MCSTEP-A	elm-ecan-mcstep	/7/2,18/2	KD0026	Stepper Motor ctrl.
	=XGR110.AQ11	-KD1022	1	Stepper motor controller		MCSTEP-A	elm-ecan-mcstep	/7/4,18/4	KD0026	Stepper Motor ctrl.
	=XGR110.AQ11	-KE1001	1	EI mod ethernet switch 5 port		ES5	elm-enet-es5	/8/2,18/2,10	KE0001	
	=XGR110.AQ11	-KR1017	1	Terminal Relay 24 VDC 1p		MRS24VDC	717-3406-1mrz24vdc	/19/7,10/2	KR0001	Optional Potential free Contact
	=XGR110.AQ11	-KR1018	1	Terminal Relay 24 VDC 1p		MRS24VDC	717-3406-1mrz24vdc	/19/9,10/2	KR0001	Infeed Belt run
	=XGR110.AQ11	-KV1003	1	Filterregulator & Valve		FRL 2000	752-9000-3062232	/15/6	KV0053	Main Air valve
F	=XGR110.AQ11	-KV1015	1	Valve SV10 Block x4		SV11 x4	750-sv10-00100410	/10/2	KV0002	
	=XGR110.AQ11	-KV1021	1	Valve SV10 base		SV10	750-sv10-503ac6		KV0026	
	=XGR110.AQ11	-KV1021	1	Valve SV10		SV10	750-sv10-11005fu	/19/2	KV0025	Reject 1
	=XGR110.AQ11	-KV1022	1	Valve SV10		SV10	750-sv10-11005fu	/19/3	KV0025	Reject 2
	=XGR110.AQ11	-KV1022	1	Valve SV10 base		SV10	750-sv10-503ac6		KV0026	
	=XGR110.AQ11	-KV1023	1	Valve SV10		SV10	750-sv10-11005fu	/19/3	KV0025	Optional valve
	=XGR110.AQ11	-KV1023	1	Valve SV10 base		SV10	750-sv10-503ac6		KV0026	
G	=XGR110.AQ11	-KV1024	1	Valve SV10		SV10	750-sv10-503ac6		KV0026	
	=XGR110.AQ11	-KV1024	1	Valve SV10		SV10	750-sv10-11005fu	/19/4	KV0025	Optional valve
	=XGR110.AQ11	-RR1	1	Resistor,120 Ohm, 0.25W		120 Ohm	711-2000-21205	/7/5	RR0001	
	=XGR110.AQ11	-WCKV1021	-	Cable flat ribbon 10x0,22q 360mm		10x0.22q	508-0002-058	/19/0	WC0015	
	=XGR110.AQ11	-WCKW1001	1	Cable ctrl 0.5q 02x scr pur		2x0.5q	718-3702-00105	/19/5	WC0007	
	=XGR110.AQ11	-WCMM1021	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/18/5	WC0008	
	=XGR110.AQ11	-WCMM1022	1	Cable ctrl 0.5q 04x scr pur		4x0.5q	718-3702-0011	/18/7	WC0008	
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Appendix A

Regulations and Licenses

SensorX uses low-energy X-rays to scan the product. During the design and construction of SensorX great care has been taken to ensure safe operation. Radiation regulations guiding the design and the construction of the equipment include:

Denmark:

Sundhedsstyrelsens bekendtgørelse nr. 307 af 24. maj
1984 om industrielle røntgenanlæg m.v.

Germany:

DIN 54 113, Teil 1, 1992 Strahlenschutzregeln f. die technische Anwendung von Röntgeneinrichtungen bis 500 kV.
DIN 54 113, Teil 2, 1992 Strahlenschutzregeln f. die technische Anwendung von Röntgeneinrichtungen bis 500 kV.
DIN 54113-3, 1995 Strahlenschutzregeln f. die technische Anwendung von Röntgeneinrichtungen bis 500 kV.

Iceland:

Law nr. 117/1985 on radiological protection, §10.

USA:

PART 1020 -- PERFORMANCE STANDARDS FOR IONIZING RADIATION EMITTING PRODUCTS
Sec. 1020.40 Cabinet X-ray systems.

Note: Generally, a license is needed from the local authorities for the operation of an X-ray machine. In some countries a license is granted from a federal institution but sometimes by a local institution, for example from the county or state. This institution can also provide information regarding X-ray radiation, if needed.

Your local Marel representative can help you locate the appropriate institution.

Appendix B

Material Safety Data Sheet (MSDS) for Insulating Oil in X-Ray Units

Material Safety Data SheetAccording to OSHA Hazard Communication Standard, 29 CFR
1910.1200

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : Diala® Oil AX
Uses : Insulating oil.

Manufacturer/Supplier : SOPUS Products
PO Box 4427
Houston, TX 77210-4427
USA

MSDS Request : 877-276-7285

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-504-9351

2. COMPOSITION/INFORMATION ON INGREDIENTS

The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.
Highly refined mineral oils and additives.

3. HAZARDS IDENTIFICATION

Emergency Overview	
Appearance and Odour	: Brown. Liquid. Slight hydrocarbon.
Health Hazards	: Not classified as dangerous for supply or conveyance.
Safety Hazards	: Not classified as flammable but will burn.
Environmental Hazards	: Not classified as dangerous for the environment.

Health Hazards	: Not expected to be a health hazard when used under normal conditions.
Health Hazards Inhalation	: Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact	: Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Contact	: May cause slight irritation to eyes.
Ingestion	: Low toxicity if swallowed.
Other Information	: Used oil may contain harmful impurities.
Signs and Symptoms	: Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.
Aggravated Medical Condition	: Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.
Environmental Hazards	: Not classified as dangerous for the environment.
Additional Information	: Under normal conditions of use or in a foreseeable emergency,

Material Safety Data Sheet

this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST AID MEASURES

- | | | |
|----------------------------|---|--|
| General Information | : | Not expected to be a health hazard when used under normal conditions. |
| Inhalation | : | No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice. |
| Skin Contact | : | Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention. |
| Eye Contact | : | Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention. |
| Ingestion | : | In general no treatment is necessary unless large quantities are swallowed, however, get medical advice. |
| Advice to Physician | : | Treat symptomatically. |

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

- | | | |
|--|---|--|
| Flash point | : | > 200 °C / 392 °F (COC) |
| Upper / lower | : | Typical 1 - 10 %(V)(based on mineral oil) |
| Flammability or
Explosion limits | : | |
| Auto ignition temperature | : | > 320 °C / 608 °F |
| Specific Hazards | : | Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds. |
| Suitable Extinguishing
Media | : | Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only. |
| Unsuitable Extinguishing
Media | : | Do not use water in a jet. |
| Protective Equipment for
Firefighters | : | Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space. |

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

- | | | |
|----------------------------|---|---|
| Protective measures | : | Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. |
| Clean Up Methods | : | Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an |

Material Safety Data Sheet

absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

- Additional Advice** : Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

- General Precautions** : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
- Handling** : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
- Storage** : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50 °C / 32 - 122 °F
- Recommended Materials** : For containers or container linings, use mild steel or high density polyethylene.
- Unsuitable Materials** : PVC.
- Additional Information** : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	ACGIH	STEL(Mist.)		10 mg/m3	

- Exposure Controls** : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
- Personal Protective Equipment** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Respiratory Protection** : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne

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concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)].

Hand Protection

- : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Eye Protection

- : Wear safety glasses or full face shield if splashes are likely to occur.

Protective Clothing

- : Skin protection not ordinarily required beyond standard issue work clothes.

Monitoring Methods

- : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.

Environmental Exposure Controls

- : Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Brown. Liquid.
Odour	: Slight hydrocarbon.
pH	: Not applicable.
Initial Boiling Point and Boiling Range	: > 280 °C / 536 °F estimated value(s)
Dropping point	: Typical 190 °C / 374 °F
Flash point	: > 200 °C / 392 °F (COC)
Upper / lower Flammability or Explosion limits	: Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	: > 320 °C / 608 °F
Vapour pressure	: < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Density	: Typical 900 g/cm3 at 15 °C / 59 °F
Water solubility	: Negligible.
n-octanol/water partition coefficient (log Pow)	: > 6 (based on information on similar products)
Kinematic viscosity	: Data not available
Vapour density (air=1)	: > 1 (estimated value(s))

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Evaporation rate (nBuAc=1) : Data not available

10. STABILITY AND REACTIVITY

Stability	: Stable.
Conditions to Avoid	: Extremes of temperature and direct sunlight.
Materials to Avoid	: Strong oxidising agents.
Hazardous Decomposition Products	: Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	: Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity	: Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity	: Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
Acute Inhalation Toxicity	: Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	: Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	: Expected to be slightly irritating.
Respiratory Irritation	: Inhalation of vapours or mists may cause irritation.
Sensitisation	: Not expected to be a skin sensitiser.
Repeated Dose Toxicity	: Not expected to be a hazard.
Mutagenicity	: Not considered a mutagenic hazard.
Carcinogenicity	: Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic effects.
Reproductive and Developmental Toxicity	: Not expected to be a hazard.
Additional Information	: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	: Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
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Material Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR
1910.1200

Mobility	: Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability	: Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation	: Contains components with the potential to bioaccumulate.
Other Adverse Effects	: Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

Material Disposal	: Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	: Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	: Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)

This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG

This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)

This material is not classified as dangerous under IATA regulations.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

EINECS	All components listed or polymer exempt.
TSCA	All components listed.

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DSL

All components listed.

SARA Hazard Categories (311/312)

No SARA 311/312 Hazards.

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	:	0, 1, 0
MSDS Version Number	:	16.0
MSDS Effective Date	:	07/08/2008
MSDS Revisions	:	A vertical bar () in the left margin indicates an amendment from the previous version.
MSDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
MSDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

Glossary of Terms

Emergency stop button

When activated, the button immediately stops SensorX. Located on the front panel.

Front panel

An operator panel with indicators to start/stop SensorX.

Hz

Hertz, frequency measure unit.

kV

Kilovolts, thousands of volts.

kW

Kilowatts.

l/min

Capacity measure—liters per minute.

M6000 Controller

A computer with a display unit that controls Marel equipment.

mA

Milliampere, one thousand of an Ampere.

Safety circuit

The safety circuit is an electronic circuit that prevents the operation of the machine if the machine is in an unsafe state

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