

## ABOUT THIS MANUAL

This manual is designed to help you understand, operate and maintain your John Bean Technologies equipment. It is recommended as a part of basic training for production personnel, operators, mechanics, and electricians who work closely with the equipment. This manual should be used in combination with the enclosed Component Information from the manufacturers.

The safety of your personnel is our primary concern at John Bean Technologies. General safety information appears as the first chapter of this manual. Each chapter is introduced with specific safety information and warnings. The safety information contains important safety regulations and instructions for prevention of accidents.

Some illustrations and texts in this manual are represented in general terms. For specific information about your equipment, please refer to the customer drawings which are delivered together with this manual.

The best way to keep the equipment in operation is to care for it as recommended by the manufacturer. Make sure that regular, preventative maintenance is established and followed by responsible personnel. This also helps to ensure a safer working environment for your employees.

Any suggestions for improvement of this publication would be gratefully appreciated. If you have questions or need further information, please contact your local representative.

### To Regain a Copy of this Manual

In the event of loss or damage to this manual, or any part of it, contact John Bean Technologies, who will endeavor to supply replacement documentation.

To identify the documentation required please supply the following information:

- Equipment type
- Unit serial number
- Purchase date
- Information on any subsequent modifications carried out.

**The customer is advised that there may be a charge for this service.**

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This manual is in original language.

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# ***SAFETY***



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## SAFETY INFORMATION

### Machine Usage

The John Bean Technologies equipment is designed to handle food products that either freeze, chill, solidify, proof, bake or cook.

The equipment is not designed for use with none food products and must not be used for any purpose other than in accordance with the processes and procedures described within this user manual.

Incorrect use can result in:

- unfit product
- personal injury
- damage to the equipment
- damage to the environment.

### Safety First

John Bean Technologies equipment is designed and manufactured with due consideration and care for generally accepted safety standards. However, like any mechanical device, the proper and safe performance of this equipment depends upon using sound and prudent operating, maintenance, and servicing procedures under properly trained supervision.

For your protection, and the protection of others, learn and always follow the safety rules outlined in the following paragraphs and this manual. Observe warning signs on machines and exercise safe practices. Form safe working habits by reading the rules and abiding by them. Keep this manual handy and review it from time to time to refresh your understanding of the rules.

### Safety Rules

A number of national, regional and local regulations govern handling, hygiene, storage etc., in the field of industrial food production.

- Always observe current rules and legislation.
- Always observe the safety regulations and instructions that apply to your place of work and are described in the manual.
- Incorrect installation, handling or servicing may cause personal injury or damage to equipment and the environment.
- It is vital to read, understand and comply with the instructions contained in this manual.
- Always use personal protective equipment according to Material Safety Data Sheets - MSDS.

John Bean Technologies cannot be held responsible for any eventuality resulting from:

- Unauthorized modifications and or repairs carried out by personnel who may or may not be suitably qualified to carry out such modifications or repairs.
- The misuse of the equipment (using it for anything not described within this document).

## General safety principles

This manual is designed to provide the operator with information to correctly and safely operate the equipment described herein.

Relevant warnings and cautions (see “Warning Levels” below) are included within the text of this manual and **MUST** be followed to prevent injury to personnel, or damage to the equipment.

Only adequately trained personnel, assessed as competent operators, should operate this equipment.

It is hazardous to linger close to moving parts when the equipment is activated or can be started by other people.

Appropriate covers and interlocks are fitted to protect personnel from heat or rotating/moving equipment hazards. **DO NOT** operate this equipment with any covers or interlocks removed.

Observe local regulations regarding clothing, hair covers, wearing of jewellery etc.

The customer is responsible for collision protection.

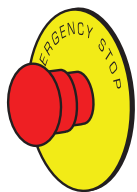
## Personal safety system

All JBT FoodTech equipment have a safety system installed. The personal safety system is integrated in both electrical and mechanical components. The system is designed to protect the operator and other personnel during operation.



### Alarm

Never disregard an alarm, it could cause personal injury or damage to the equipment. Always check and remedy the cause of an alarm before restarting the equipment.



### Emergency stops

These are located on and around at the equipment and are clearly marked.

Make sure that everybody that works with the equipment knows where the emergency stops are located and how to reset them, see chapter “Operation”, section “Emergency stop”.



### **DANGER!**

During maintenance and service work the personal safety system may be disabled. Always make sure to secure the area around the equipment with “Lock out/Tag out” signs and devices when the personal safety system is disabled to ensure safety and minimize the risk of danger.

## Warning for modifying safety equipment

Do not modify safety equipment or any other parts in the equipment. If the conditions are changed, new risks can arise and cause personal injury and damage the equipment.

### Hygiene/cleaning

In order to attain optimum results and avoid bacterial growth, only use detergents and disinfectants that are suitable for the equipment. See chapter “Operation”, section “Cleaning”. Incorrect or careless cleaning or disinfection can cause personal injury.

### Lighting

JBT FoodTech recommends working illuminations of approximately 200 lux around the equipment. Good lighting facilitates checks and work on the equipment while also lowering the risk of accidents.

Incorrect lighting can lead to injury to people or damage to the equipment.

### Maintenance

Maintenance work shall be carried out by authorized and trained personnel only. Always perform a risk assessment before carrying out any maintenance work. E.g. any test run required with removed guards shall be carried out with great care to avoid injuries. Always observe the maintenance intervals recommended in the manual. For access to equipment components that require maintenance or service, use only tools for this purpose i.e. platforms, ladders, and so on. Never walk, stand or climb any parts of the equipment that is not designed for this purpose. Part may not be able to sustain the load, resulting in injury to personnel or damage to equipment.

### Electricity

This equipment incorporates electrical hazards. All fault finding and maintenance should only be carried out by appropriate qualified personnel.

### Temperature

The equipment may incorporate a high temperature hazard. Wear suitable and recommended protective clothing when working at high temperatures or with hot components to prevent burn injuries.

Steam<sup>1</sup> is extremely hot and can be dangerous if it leaks. Make sure the steam valves are shut off before performing work on the equipment. Always observe current regulations!

The oil in the thermo fluid system<sup>1</sup> is the warmest part of the equipment. Make sure all pipes are insulated or out of reach.

### Natural gas<sup>1</sup> hazard

The equipment may incorporate a natural gas hazard. All fault finding and maintenance should only be carried out by personnel with an appropriate recognised qualification.

### Note!

Work on burner systems is subject to local legislative requirements and can only be carried out by competent personnel.

<sup>1)</sup> Optional or not on all equipment.

### Hydraulics<sup>1</sup> / Pneumatics<sup>1</sup>

Work on the hydraulic/pneumatic system may be done only by trained personnel. Always ensure that the system is depressurized before starting work.

Follow the manufacturer's directions with regard to service.

### Risk of slipping

The floors in and around the equipment can be very slippery due to water, frost, oil, product residues or other spills.

Slipping can cause injury to people and damage to the equipment.

### Fire risk

The equipment may contain inflammable gas<sup>1</sup>, oil, and man made materials, e.g. plastics. Consequently, always take safety measures to avoid fire or explosion in operations involving heat generation and/or a naked flame.

Do not leave any combustible materials or sealed containers unattended in potentially hot areas of the equipment. This could result in an explosion or fire within the equipment, which could cause severe damage to the equipment.

### General precautions

Depending on equipment, the following precautions could be applicable.



Make sure to use protective hearing equipment when working nearby the equipment.



Make sure to use eye protection when working nearby the equipment.



Make sure to use protective gloves and clothing when working nearby the equipment.

<sup>1)</sup> Optional or not on all equipment.



## Warning levels

There are three different warning levels in this manual. These warnings are placed right next to the text that describes the particular hazardous operation. It is important to pay attention to these warnings and act on them in accordance with the text that describes them.



### **DANGER!**

This means that a serious accident will occur if this provision is not observed. This accident will result in death, serious injury and/or damage to property, equipment and/or environment.

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### **Warning**

This means that a serious accident may occur if this provision is not observed. This accident will result in injury and/or damage to property, equipment and/or environment.

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### **Caution**

This means that an accident may occur if this provision is not observed. This accident may result in injury and/or damage to property, equipment and/or environment.

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## Other warnings

In addition, the remark **Note!** occurs in a number of instances in the text. This mark means that no immediate hazard is present but calls for attention in order to avoid future problems.

## Warning symbols

**Note!**

Symbols are applicable depending on installed equipment.

**Note!**

The colour of a warning sign can be different than the colour of the illustration in the manual.

**Note!**

Never remove warning signs displayed on the machine. Torn or worn signs should be replaced.



### High voltage

Located on the electrical cabinet door, connection boxes, and heat exchangers, if fitted.

Work on the electrical system is the sole province of authorized personnel. Always follow the local safety regulations. The main switch can be locked in “off” position with a pad lock to enhance a “Lock out/Tag out” routine.

Incorrect handling of the electric system can cause injury or death to persons or damage to the equipment.



### Overpressure/Hot air<sup>1</sup>

Located on doors containing hot air or steam.

Hot air and steam could be extremely hot and dangerous if it leaks. Make sure the steam valves are shut off before performing work on the equipment. Always observe current regulations!



### Hot surfaces<sup>1</sup>

Located near potentially hot metal surfaces on the machine.

The equipment contains hot details and surfaces.

Watch your hands and wear suitable and recommended protective clothing when working with the equipment.



### Crush risk

Located near areas with increased risk of injury, e.g. drive units.

The equipment contains moving parts. Never undertake any kind of work on parts that are moving.

Watch your fingers and wear suitable and recommended protective clothing when working with the equipment.

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<sup>1)</sup> Optional or not on all equipment.

## LOCATION OF WARNING SYMBOLS

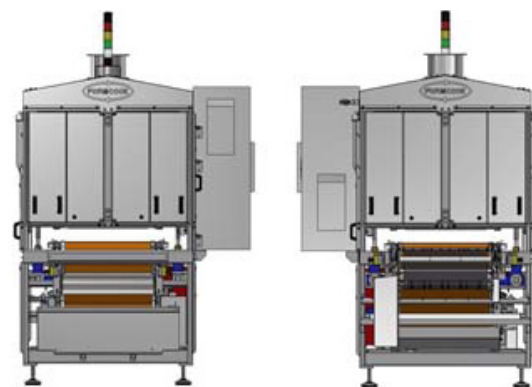
The illustrations show the normal location of warning symbols on the equipment:



*Right hand side*



*Left hand side*



*Infeed / Outfeed*

~ ~ ~



## NOISE

Airborne noise can cause hearing damage and many countries have specific legislation in this area. In conformity with the Machinery Directive 2006/42/EC we inform about the standards setting the maximum noise for Formcook PProGRILL™ equipment.

In this chapter, we leave the details of the airborne noise emitted from the equipment in various operating conditions and the methods used for sound measurements.

### Measurement method

Noise measurements is performed with an instrument called integrator and used to determine the weighted continuous equivalent sound pressure value in the workplace. A hearing damage extent depends on three factors: volume, frequency and duration. The equivalent noise level *Leq* summarizes these three parameters into one simple value. *Leq* value is based on the principle of equivalent amount of energy and indicates the continuous steady sound level that contains the same sound energy, expressed in dBA, as the real fluctuating noise level during the same period.

### Noise values

The measured noise for:

- Formcook PProGRILL™ Contact Cooker is **70** dBA.
- Formcook PProGRILL™ Combi Cooker is **75-90** dBA.

It is recommended to wear ear protection if the noise exceeds 75 dB.



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## HYGIENE AND CLEANING

A number of national, regional and local regulations govern the handling, hygiene, storage, etc, in the field of industrial food production.

In order to attain optimum results, and avoid bacterial growth, cleaning should be carried out at the recommended cleaning intervals.

John Bean Technologies makes no recommendations with regards to the compounds or chemicals (e.g. cleaning agents) used in conjunction with the operation and maintenance of the equipment described here in.

John Bean Technologies strenuously advises that operators familiarise themselves with all aspects of the Material Safety Data Sheet (MSDS) associated with the handling and storage of such compounds and chemicals, and that all manufacturer's guidelines and precautions are complied with to reduce the risk of injury to personnel.

- Always observe current rules and legislation.
- Always observe the local regulations and instructions that apply to your place of work, as well as the instructions in the manual.
- Always follow the detergent manufacturer's recommendations
- In order to obtain optimum results and avoid bacterial growth, only recommended cleaning intervals, methods and chemicals are to be used in cleaning and disinfecting the equipment.
- Only use detergents and disinfectants that are suitable for the materials listed for the equipment. See chapter "Operation, Material in equipment"<sup>1)</sup>.
- Treat the equipment with care and follow the supplier's directions for use.
- After cleaning and longer standstill always dry out the unit and leave it with doors/hatches open for ventilation.
- Be careful when using toxic and/or flammable solvents to clean equipment.
- Always clean up spills around equipment as soon as possible.



### Warning

Only authorised personnel may undertake cleaning and disinfection operations. Incorrect or badly implemented cleaning or disinfection may cause personal injury or damage to the equipment.

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John Bean Technologies cannot be held responsible for any injury, howsoever caused, resulting directly or indirectly from the use of any compounds and chemicals.

<sup>1)</sup> This chapter may not be included in all manuals.

**Caution**

In order to avoid burn injury, we recommend the use of hot water at maximum 60 C°/140 F° as a safety limit.

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We recommend:

- That cleaning is done only when equipment and production have been shut down in accordance with the local regulations.  
If cleaning is program-controlled, the instructions in the manual must be followed.

~ ~ ~



## ELECTRICAL SYSTEM

Work on the electrical system may only be carried out by authorized personnel and must be undertaken in accordance with current laws and regulations.



### **DANGER!**

A current of 100 mA, passing through the human body, can be fatal. This can occur at low voltages as well. Before carrying out any potentially dangerous work on equipment it must be made electrically safe.

- Always observe both the safety regulations and instructions applying to the work site and those stated in the manual.
- Always switch off the main power supply before starting any work on the equipment.
- Assume at all times that POWER is “ON” and treat all conditions as live. This practice assures a cautious approach which may prevent an accident or injury.
- To remove power from a circuit or equipment, open the switch or breaker and lock in the open position.
- Make certain that the circuit is OPEN by using the proper test equipment.

### **Note!**

Test equipment must be checked at regular intervals.

- Capacitors must be given time to discharge, otherwise it should be done manually with care.
- There may be circumstances where trouble-shooting on live equipment may be required. Under such conditions a risk assessment must be carried out and special precautions must be taken as follows:
  - a) Make certain your tools and body are clear of power sources.
  - b) Extra safety measures should be taken in damp areas.
  - c) Be alert and avoid any outside distractions.
- Before applying power to any equipment, make certain that all personnel are clear of the machine.
- Electrical cabinet doors should only be opened when checking the electrical equipment or wiring. After closing the cabinet doors, make certain that (on those panels where applicable) the switch or breaker handle mechanism is operating properly.
- All covers on junction panels should be closed before leaving any job.
- Insulated tools must be used at all times when working on electrical systems.

## *SAFETY*

We recommend:

- That the equipment is continuously checked and maintained by authorized personnel.
- That the “Lock out/Tag out” procedure is followed when working on the equipment. This prevents the possibility of starting the equipment by mistake and display signs indicating that work on the electrical system is in progress.

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# APPLICATION DATA



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## CAPACITY GUIDELINES

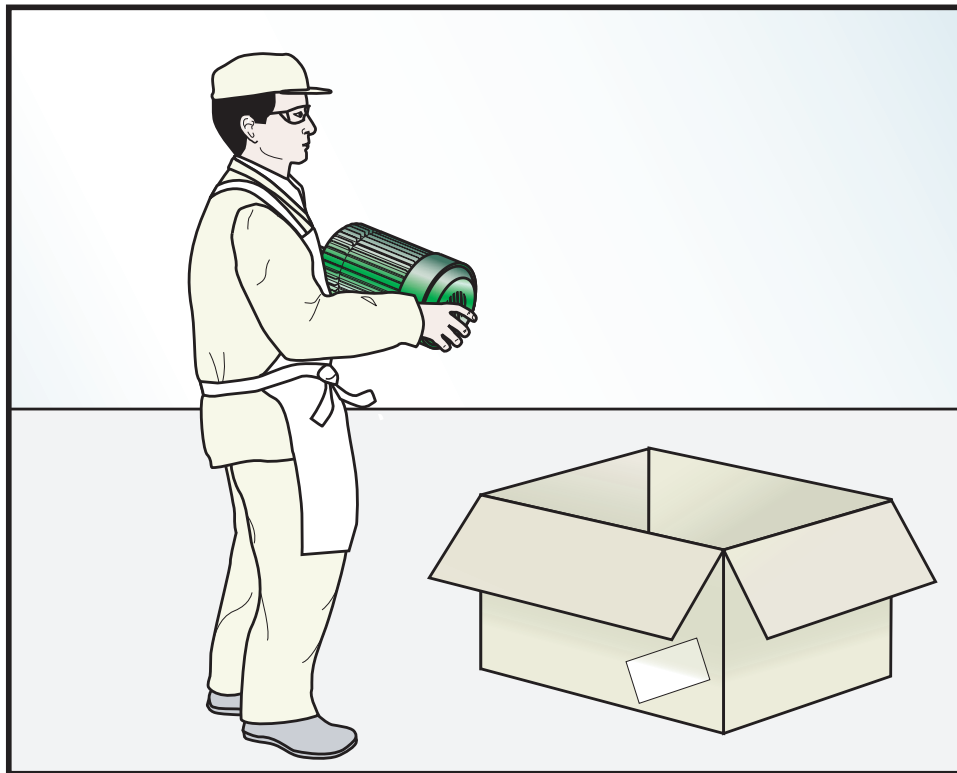
The table below comprises cooking information for several common dishes. The examples are estimates and may vary depending on product, quality, size, marinade, fat, cooking height, cleanliness level for the machine etcetera.

Food	Time	Temp	Weight	Size
Aubergine	1 min 50 sec	250°C (482°F)	20 g	50x140x10 mm
Bacon crispy	1 min 15 sec	255°C (491°F)	22 g	220x45x2 mm
Bacon streaky	50 sec	255°C (491°F)	22 g	220x45x2 mm
Breaded chicken nuggets	2 min 30 sec	220°C (428°F)	22 g	35x40x14 mm
Breaded herring	2 min	235°C (455°F)	140 g	55x120x17 mm
Cabbage rolls	5 min 30 sec	220°C (428°F)	70 g	Ø28x95 mm
Chicken fillet	4 min 30 sec	245°C (473°F)	200 g	60x145x22 mm
Cordon bleu	4 min 50 sec	210°C (410°F)	175 g	70x100x24 mm
Curd / thick pancakes	3 min 45 sec	225°C (437°F)	60 g	Ø 65x18 mm
De-boned chicken thigh	4 min 10 sec	245°C (473°F)	220 g	80x150x18 mm
Falafel	1 min 55 sec	235°C (455°F)	24 g	40x50x14 mm
Fish cake	3 min 50 sec	215°C (419°F)	60 g	Ø 75x18 mm
Hamburger	1 min 10 sec	240°C (464°F)	100 g	Ø 100x12 mm
	1 min 30 sec	235°C (455°F)	130 g	Ø 100x15 mm
	1 min 40 sec	230°C (446°F)	160 g	Ø 110x16 mm
Hash browns	2 min 10 sec	240°C (464°F)	90 g	Ø 70x18 mm
Kebab flakes	35 sec	260°C (500°F)	1,25 g	20x30x2 mm
Meatballs	4 min 30 sec	210°C (410°F)	10 g	Ø 18 mm
	5 min 30 sec	200°C (392°F)	16 g	Ø 26 mm
Sweet pepper	2 min 20 sec	255°C (491°F)	5 g	25x45x3 mm
Sausages	2 min 55 sec	230°C (446°F)	90 g	Ø 22x110 mm
Schnitzel	2 min 10 sec	230°C (446°F)	150 g	90x120x15 mm
Skewers	2 min 45 sec	235°C (455°F)	110 g	22x25x140 mm

~ ~ ~



# ***DELIVERY INFORMATION***



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*DELIVERY INFORMATION*



**CONDITIONS FOR GUARANTEE**

It is a condition for the (JBT FoodTech) guarantee that the equipment is carefully operated as instructed and that service and lubrication are performed at recommended intervals.

**Intervals between service and lubrication**

The recommended intervals between service and lubrication are valid for one-shift operation. For two- or three-shift operation the intervals should be shortened by half. If very hot water is used during the cleaning down, the lubricating intervals should be shortened by half.

**Shut down for a longer period**

If the equipment should be out of operation for a longer period the following should be done:

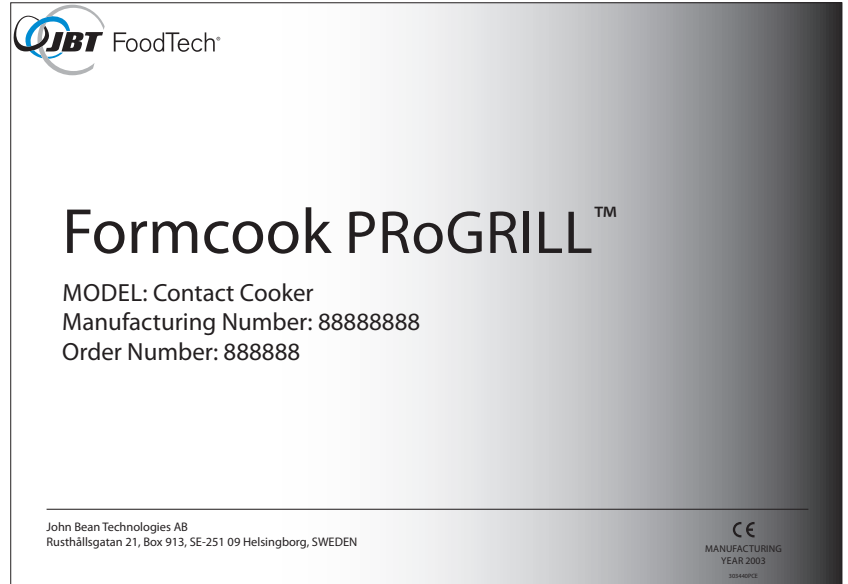
1. The equipment should be cleaned down with extra care.
2. All bearings should be lubricated.
3. Always dry out the unit and leave it with doors/hatches open for ventilation.
4. The room where the equipment is located should, if possible, be heated.
5. It is of course advisable to carry out the essential service and maintenance work during this time.

~ ~ ~

*DELIVERY INFORMATION*

**IDENTIFICATION PLATE**

An identification plate in stainless steel is attached to the electrical cabinet.



*Example of an identification plate*

The identification plate comprises data for manufacturer, model, serial number, order number, and year of manufacture. The specifications are also included in the Declaration of Conformity, see Appendix.

In contacts with the service organization, always refer to the data available on the identification plate.

~ ~ ~

*DELIVERY INFORMATION*

### INSTALLATION

#### Transport and storage

JBT FoodTech uses crates and packaging materials appropriate to preserve the machine during transport and short term storage. The type of packaging material used depends on customer requirements, machine mass, dimensions, and destination.

Mass, lifting points and centre of gravity should be clearly stated on the outside of the crate. For uncrated equipment, mass, lifting points and centre of gravity is stated in the Layout drawing(s), see Appendix.



#### **DANGER!**

For the weight to be balanced correctly, the machine should be handled with forklift or crane with appropriate lifting equipment. Never stand or pass under the elevated portion of a forklift or crane.



#### **Warning**

Before moving the machine, make sure that the machine mass do not exceed the maximum capacity of the forklift, crane, or lifting equipment.



If the machine is not installed promptly:

- Store indoors at an ambient temperature of 10–30 °C (50–86 °F).
- Retain all packaging to prevent the machine from damage.
- Store with feet down on a even, horizontal surface.
- Do not place any objects on top of the machine!
- Protect the machine in the most appropriate way from dust, sand, and other impurities, as well as from bumps, crashes, sharp objects, etc.

#### Unpacking

Considerations must be taken to ensure enough working space around the machine for the operator. He/she must not be exposed to any risks. See appendix for machine drawings.

Remove the packaging gently using appropriate tools, avoiding damage to the machine.

When applicable:

1. remove the protective film.
2. remove the transport locking devices fitted on the lift, belt tension, grease gutters, and cross gutters.
3. detach equipment secured on the infeed plate.
4. detach the welding board secured to the upper frame or in the collection tray.

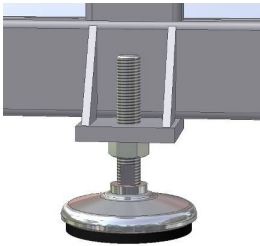
Dispose of the crates and other materials according to local regulations.

## DELIVERY INFORMATION

### Delivery check

Before starting the installation, check that:

- all standard and optional equipment are included. See spare parts list in appendix.
- there is no visible damage to the machine or to the optional equipment.



### Levelling

Once the machine is put in position, the frame must be levelled. Use laser or a spirit level to ensure the unit stands true, plumb and level. Secure the frame with the adjustable feet and tighten their locking nuts.

#### Note!

To ensure production, it is important that all the machine feet have firm floor contact, are countered, and that the machine is horizontal.

### Utility

Always follow the technical demands to establish proper function. When applicable, ensure:

- Voltage / Power frequency: the machine is protected against voltage fluctuations, but for optimal operation the voltage should be stable within  $\pm 10\%$ .
- Operating pressure air: not less than 6 bar and not exceeding 8 bar, no pressure drop.
- Water supply: 4–6 bar 55–60 °C (131–140 °F), no pressure drop.
- Steam: stable, 3.5 bar.
- Exhaust power: according to the technical specification.
- Ambient temperature: 10–30 °C (50–86 °F).
- Relative humidity: not above 90%.
- Ambient illuminance: not below 200 lux.



#### **DANGER!**

All installations must be performed by qualified personnel, following the local safety regulations.

### Electricity

Customer is responsible for providing proper voltage, installation, and connection, in accordance to the local regulations.

### Water

Customer is responsible for providing proper water quality, filter, pressure, temperature, installation, and connection, in accordance to the local regulations.

**Thermo fluid supply<sup>1</sup>**

Customer is responsible for providing proper volume, temperature, installation, and connection, in accordance to the local regulations.

**Steam supply<sup>1</sup>**

Customer is responsible for providing proper steam pressure, volume, installation, and connection, in accordance to the local regulations.

We recommend that the supply line has a slope to obtain condensate to drain down into a steam trap mounted on the lowest point. The connections should be positioned on the top of the supply line.

**Air Supply<sup>1</sup>**

Customer is responsible for providing proper air pressure, air-flow, filtered air, installation, and connection, in accordance to the local regulations.

**Exhaust connections<sup>1</sup>**

Customer is responsible for providing proper extraction, quantity, installation, and connection, in accordance to the local regulations.

**Commissioning****Basic heating plate<sup>1</sup> settings**

Machines equipped with heating plates have the heating beds factory-installed to be parallel and correctly positioned relative to the frame. Also the drive and end rollers should be correctly positioned and parallel to the frame. Make sure the settings have not been disturbed during transport. Check that the upper and lower plates are parallel. Check both left and right sides. Adjust if necessary.

**Initial cleaning**

The equipment must be thoroughly washed and cleaned prior to being commissioned for use in food production. Dust, dirt and particulates from the manufacturing process, transportation, and construction in the premises, will be present. Clean the machine as described in chapter "Operation", section "Cleaning".

<sup>1)</sup> *Optional or not on all equipment.*

## *DELIVERY INFORMATION*

### **Test run**

1. Switch on the power to the machine by turning the main switch.
2. Make a machine check. Follow the procedure described in chapter “Operation”, section “Start”, subsection “Precautions before starting”.
3. Start the machine. Follow the procedure described in chapter “Operation”, section “Start”, subsection “Start-up procedure”.
4. Run the motors separately to check that the rotation direction is correct.
5. Run the frame lift<sup>1</sup> to check that the lift works in the right direction.
6. Run the flip lift<sup>1</sup> to check that the lift works in the right direction.

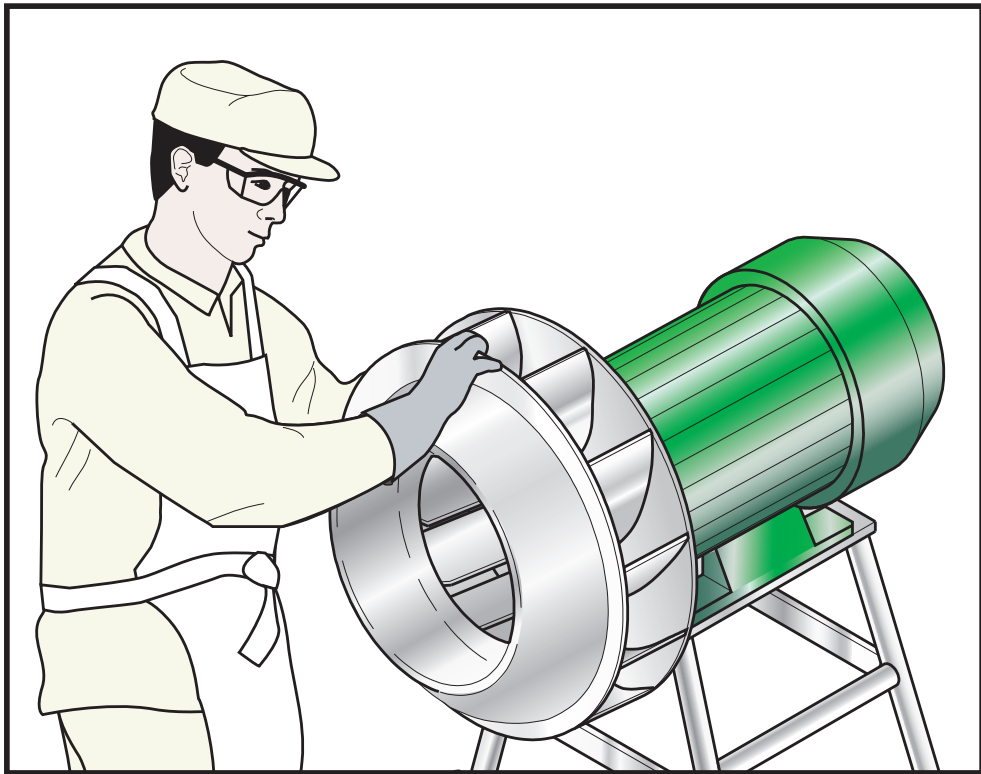
The equipment is hereby ready for use.

~~~

<sup>1)</sup> *Optional or not on all equipment.*



# ***FUNCTION***



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## SAFETY FEATURES

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### Warning

The equipment contains moving parts that may crush or cut. Never operate with bypassed safety switches.

---

### Automatic door safety switches<sup>1</sup>

Doors and hatches on equipment containing hot air or steam are automatically locked during production. Doors can be opened approximately one minute after the machine have stopped. The safety switch unlocks immediately if an emergency stop is activated.

### Magnetic door safety switches<sup>1</sup>

Magnetic proximity switches are fitted to the flip hatch. If opened, an alarm is triggered and the flip cannot be raised or lowered.

### Note!

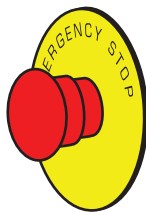
When the flip hatch is closed, the equipment will go through a normal startup sequence.

### Emergency Stop buttons

Emergency Stop buttons are fitted on the cabinet door close to the control panel, on the flip section<sup>1</sup>, and at the infeed and outfeed ends. Long machines may have additional Emergency Stop buttons fitted.

When depressed the equipment is fully shut down (i.e. the cooking belts are stopped, the heating is terminated and the fans are stopped).

The Emergency Stop button complies with the standards in force, such as it is easily accessible during emergencies and clearly visible, with the button being red against a yellow background.



### Caution

DO NOT use the Emergency Stop buttons to switch off the equipment, except in an emergency, as this could cause damage to the cooking belt.

---

<sup>1)</sup> Optional or not on all equipment.

## Restarting the Equipment

---



### Warning

Ensure the cause of the emergency has been rectified before resetting the Emergency Stop button.

---

Assuming no other actions have been taken:

1. Pull out the Emergency Stop button or, depending on equipment, turn it clockwise.
2. Press the RESET menu button on the “Alarm” page on the control panel, or press the “Reset” button on the cabinet door.
3. Press the “Start” button on the cabinet door.

## Over temperature protection system<sup>1</sup>

Equipment with a hot air system is fitted with an over temperature protection system. The system is initiated when a temperature sensor measures a high temperature. There is one thermal overheat protection switch placed inside each heating element box. The switch is set to trip at 450 °C (842 °F).

- At a temperature of 360 °C (680 °F) or more, a warning is triggered on the control panel and the yellow warning lamp is flashing. The machine will continue to run but the air heater will not start before the operator acknowledged the warning.
- At a temperature of 380 °C (716 °F) or more, an alarm is triggered to the control panel and the red warning lamp is flashing. The machine is set in cooling down mode.
- At a temperature of 450 °C (842 °F) or more, the thermal overheat protection switch will trip and must be manually reset once the air heater elements cooled down.



### Warning

DO NOT attempt to restart the equipment while a high temperature warning or alarm exists.

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~ ~ ~

<sup>1)</sup> Optional or not on all equipment.

## INDICATOR LIGHT TOWER

The indicator light tower is located at a high point on the machine to be easily visible. It delivers audible alarms and shows the machine's current operating cycle/state



*Buzzer for audible signal*

*Red lamp*

*Yellow lamp*

*Green lamp*

*White lamp <sup>1</sup>*

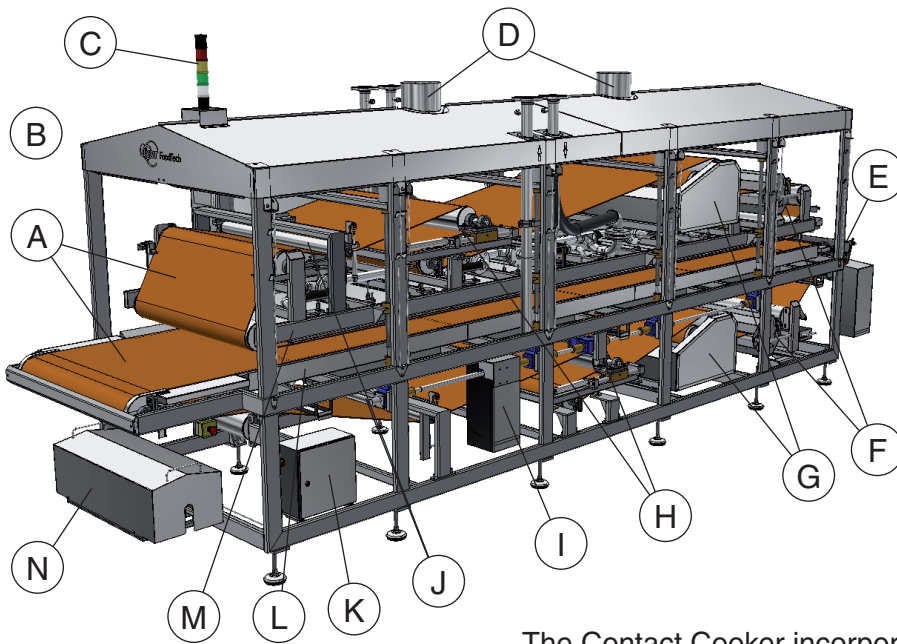
- Green, steady light:** Machine in operation. All temperatures and pressures are normal.
- Green, flashing light:** Machine in Start-up / Shut-down cycle.
- Yellow, flashing light:** Warning/Alert! Operations can continue.
- Red, flashing light:** Alarm! Machine operation impossible.
- White, flashing light <sup>1</sup>:** Lift in movement.
- Audible signal - low frequency:** Alerts operative to alarm/alert condition.

~~~

<sup>1)</sup> *Optional or not on all equipment.*



**WORKING PRINCIPLE**



- A. Cooking belt
- B. Control panel (not in picture)
- C. Light tower
- D. Exhaust fan
- E. Outfeed conveyor
- F. Wash
- G. Belt drive unit
- H. Belt tension device
- I. Lift motor
- J. Belt tracking device
- K. Air cabinet
- L. Lower plate bed
- M. Upper plate bed
- N. Water pump

The Contact Cooker incorporates upper and lower cooking zones. Products are loaded onto the belt infeed and the motor driven cooking belt carries the products through the machine. The upper cooking zone can be adjusted horizontally and the belt speed can be varied. Electricity or thermo fluid is used to heat the plate beds on which the cooking belt travels. The belts are automatically tensioned, tracked and cleaned.

The outer casing is fitted with a number of hinged doors, which provide easy access to the internal components.



**DANGER!**

During production the plate beds hold a very high temperature that may cause injury at touch. Use appropriate personal protective equipment.



The equipment is instantly stopped when any of the Emergency Stop buttons are pressed; located at the electrical cabinet, infeed unit, and outfeed unit.



**Warning**

Certain components may continue to move several minutes after being switched off. Keep clear of the equipment until all components have come to a complete stop.

**Control panel**

The operation is controlled and monitored from the control panel located at the electrical cabinet door or at a separate cabinet. Cooking time/belt speed, temperatures and a number of other variables are displayed on the control panel.

### **Cooking belt**

The nonstick cooking belt has a PTFE coating. The belt speed is set from the control panel and determines the cooking time.

### **Upper / Lower plate bed**

The plate bed supports and heats up the cooking belt. If electrical heated, the plates could be individually temperature adjusted. Plates heated with thermo fluid are temperature adjustable in the secondary loop. The temperature is set from the control panel.

### **Infeed<sup>1</sup> / Outfeed<sup>1</sup> conveyor**

When products enter or exit the equipment they are transferred from/to a conveyor.

### **Wash**

The cooking belt passes through a wash which cleans both sides of the belt. The cleaning frequency is set from the control panel.

### **Frame lift**

The upper cooking area can be adjusted horizontally to achieve good contact with the product during cooking. This also restrict excessive height expansion of products. The lift is controlled from the control panel.

### **Belt drive unit**

The belt drive is provided by a motor located inside the drive unit. The cooking belt is driven by a roll with a high-friction coating. The speed can be adjusted at the control panel. On some equipment, this unit is combined with the belt tensioning.

### **Belt tension device**

The belt tension is secured by a take up roller. On some equipment, this device is combined with the belt drive unit.

### **Belt tracking device**

The belt tracking device guides the cooking belt sideways. Unexpected belt movements are detected and rectified.

### **Exhaust fan**

Sufficient exhaust is important to avoid damages and to maintain proper use of the machine. Normally provided by the customer.

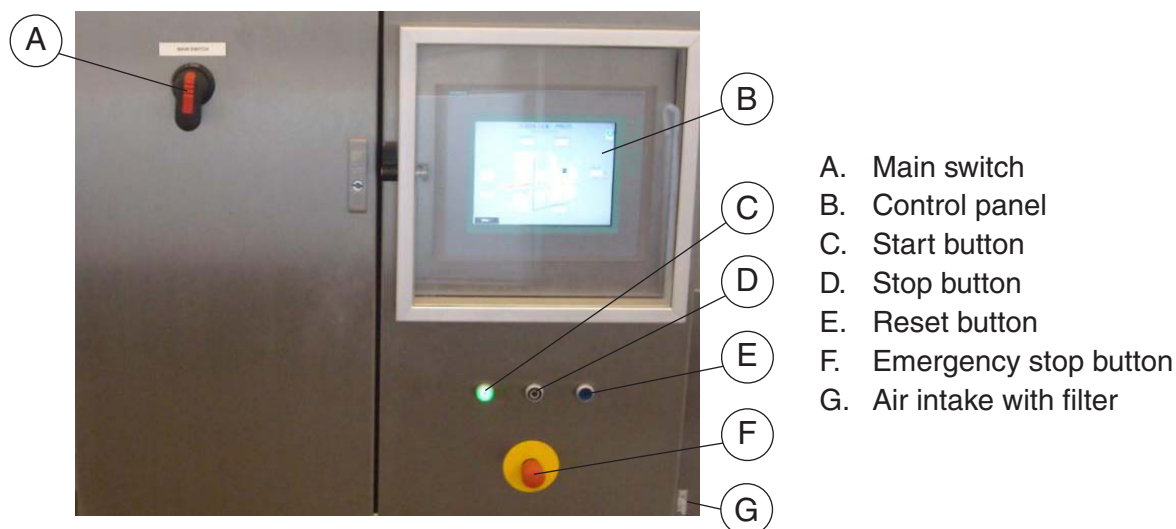
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<sup>1)</sup> *Optional or not on all equipment.*



## ELECTRICAL CABINET

On most machines, the control units are located at the electrical cabinet door. Some equipment have a separate control panel cabinet with the same functionality. The cabinet door comprises:



- A. Main switch
- B. Control panel
- C. Start button
- D. Stop button
- E. Reset button
- F. Emergency stop button
- G. Air intake with filter

The inside of the electrical cabinet contains the electrical components as described in the electrical layouts, see appendix.

Generally replace:

- contactors for the heating elements every third year.
- contactors for motors every sixth year.

The lifetime of the electrical cabinet components affects adversely by moist, fat, overheating, poor contact etc. Make sure to:

- Close the cabinet doors before production and cleaning.
- Protect the cabinet from mechanical abrasion during cleaning.
- Protect the cabinet's air intake / outlet from mechanical abrasion during cleaning.
- Do not flush high pressure water directly onto the buttons, panel, air intake / outlet or architraves.
- Replace the air filter in accordance with the maintenance recommendations.
- Tighten the terminals/contacts in accordance with the maintenance recommendations.

### Note!

The electrical socket inside the cabinet should only be used to connect a computer.

### **Main switch**

Electricity is provided to the machine when the main switch is in position ON. The switch has a locking function.

When in the ON position, a safety function will prevent accidental opening of the cabinet door.

During start-up of the control panel, the audible signal will sound. Press the “Reset” button (blue) and wait for the main menu to appear.

### **Control panel**

The control panel displays the main menu, recipes, alarms and other functions for operating the equipment. For further information, see chapter “Operation” section “Control panel”.

### **Start, Stop and Reset buttons**

The Start button starts the machine.

The Stop button stops the machine if the machine is either in auto or manual mode.

The Reset button deactivates alarm.



#### **Caution**

To avoid damage to the machine, all alarms must be checked and measures taken before resetting the alarm!

---

### **Emergency Stop button**

Pressing this button will immediately and completely stop the machine.

To reset the emergency stop, either turn the button 45° clockwise or pull it out, depending on equipment. All Emergency Stop buttons on the machine have the same function.

### **Air intake with filter**

It is important to ensure that the filter is in good condition. A saturated filter can cause the cabinet components to overheat, resulting in damage and production interrupt.

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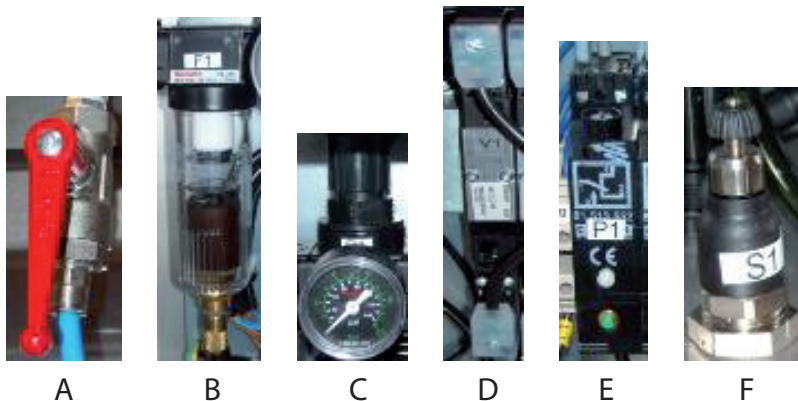
## AIR CABINET

The air cabinet supplies air to the various pneumatic components.



*Example of an air cabinet*

The components in the actual air cabinet are depicted in the pneumatic diagrams found inside the cabinet.



- A. Shutoff tap
- B. Filter
- C. Regulator
- D. Pneumatic valve
- E. Pressure guard
- F. Throttle valve<sup>1</sup>

The cabinet's air intake opens and closes with a shutoff tap. The incoming air passes through a filter, which normally need to be changed or cleaned under harsh conditions only.

The regulators adjust the pressure to air driven devices, e.g. the cylinders to the belt trackers<sup>1</sup>. For recommended pressure, see the pneumatic drawings in appendix.

The valves control the cylinders to air driven devices. The air to some devices can be throttled for a more even running.

The pressure guard ensure that the pressure is sufficient. If the guard triggers a "low air pressure" alarm, the machine will not start. Make sure that the machine is checked for air leaks before authorized personnel adjust the pressure guard.

### Note!

A too high air pressure can lead to damages.

<sup>1)</sup> *Optional or not on all equipment.*

*FUNCTION*

~ ~ ~

## BELT DRIVE AND TENSION

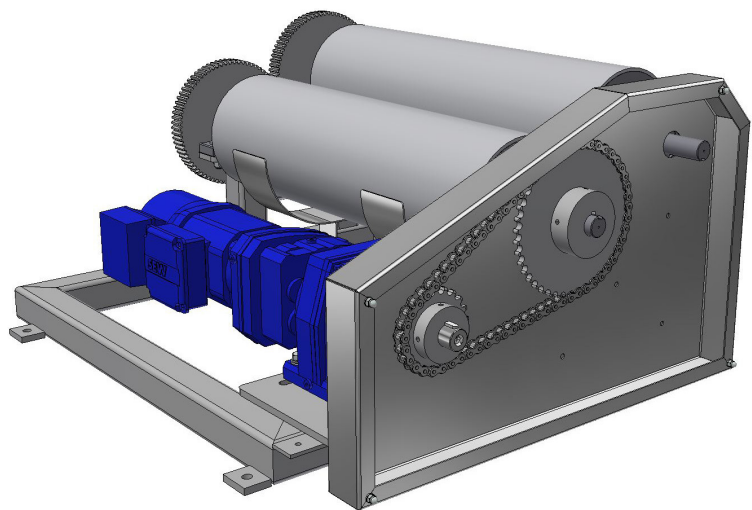
Each cooking belt has a separate belt drive unit. The drive rollers has a high-friction coating, powered by a motor placed on the frame.



### Warning

Moving equipment parts may crush or cut. Always be cautious when working nearby moving parts.

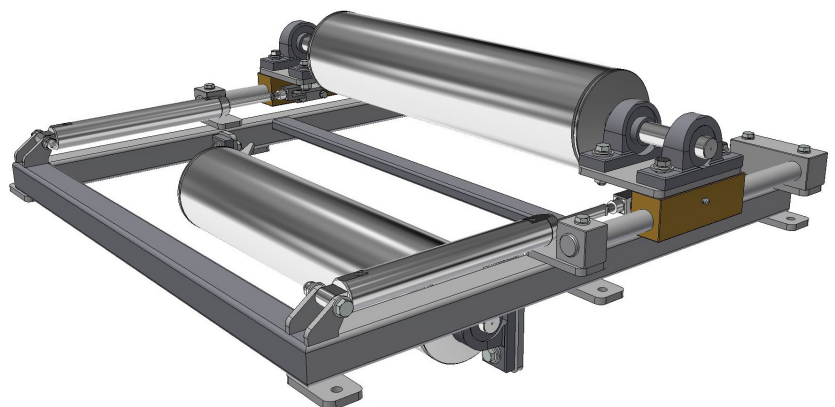
The belt speed (cooking time) is adjusted from the control panel. For further information, see chapter “Operation”.



*Example of a belt drive unit*

Normally there is one belt tension device for each cooking belt. Machines with long belts may be equipped with additional belt tension devices.

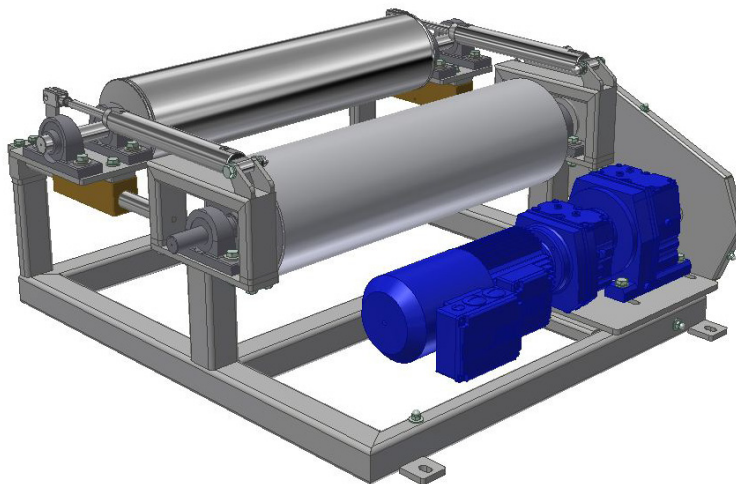
Two pneumatic cylinders placed on either side of a tensioning roller maintain belt tension. Cylinder pressure is adjusted via a pressure regulator located in the air cabinet. The tensioning starts automatically at machine start-up.



*Example of a belt tension device*

## FUNCTION

Some machines are equipped with combined drive and tension units.



*Example of a combined drive and tension unit.*

~ ~ ~

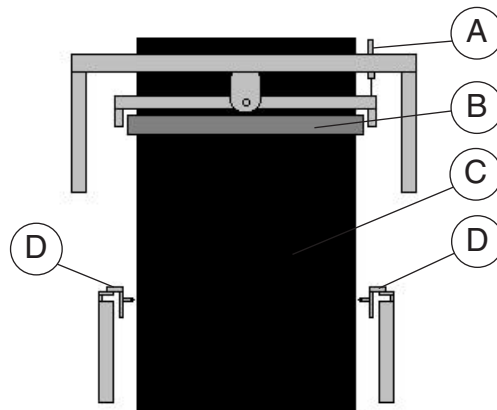
## BELT TRACKING DEVICE



### Warning

Moving equipment parts may crush or cut. Always be cautious when working nearby moving parts.

The belt tracking runs automatically. All machines are equipped with a belt tracking device at the front end of each cooking belt. Machines with long belts may have an additional belt tracking device at the rear end of the belt.

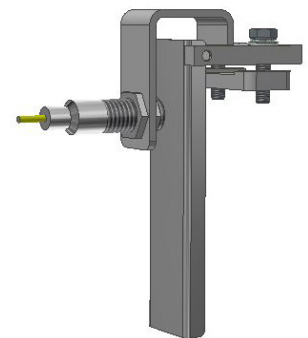
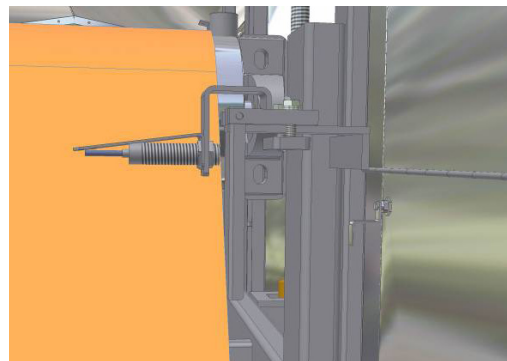


- A. Belt tracking cylinder
- B. Belt tracking roll
- C. Cooking belt
- D. Sensor/belt positioner

*Belt tracking device*

Belt positioners and sensors are used to control the belt tracking. At the belt tracking device, a pair of each are placed on both sides of the belt.

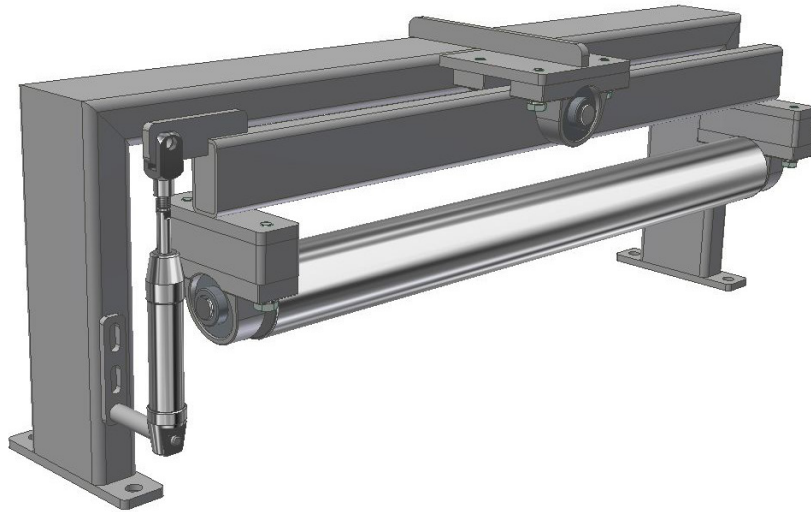
An alarm sensor<sup>1</sup> monitors the belt tracking and will trigger an alarm if the tracking is inadequate. If no measure is taken within the specified time, the machine will stop.



*Belt positioner with sensor*

The belt has a front end belt tracking device located close to the infeed and a rear end belt tracking device<sup>1</sup> close to the outfeed. A pneumatic cylinder arm tilts the tracking roller up and down.

## FUNCTION



### *Belt tracking device*

During production cycles, the belt tracking device will move the belt from side to side. This is its normal function.

The pressure is regulated from the air cabinet and controlled from the control panel, see chapter “Operation” section “Control panel”.

### **Note!**

The relationship between the tensioner and the tracking system should be carefully monitored to ensure an optimal tracking and avoid damage to the belt.

~ ~ ~

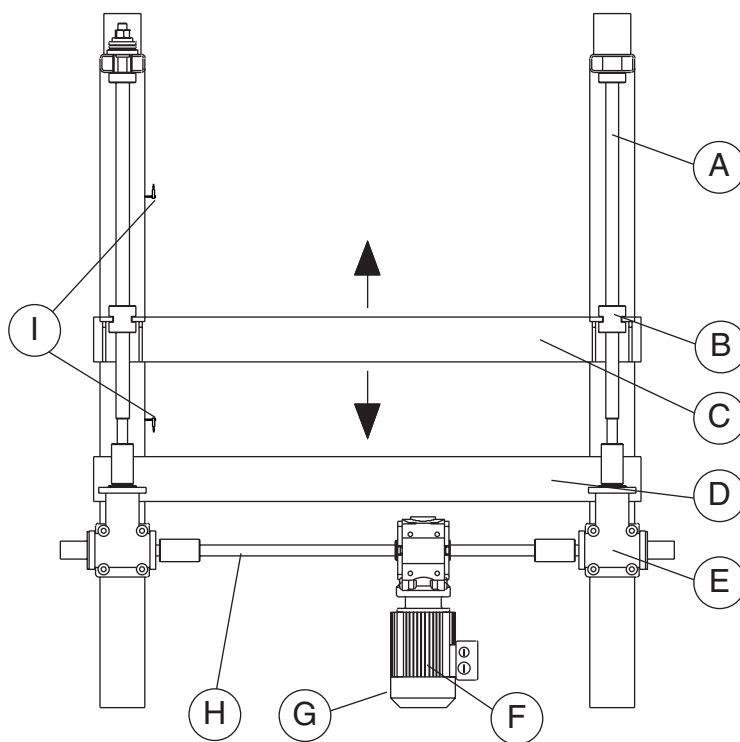


## FRAME LIFT

The upper cooking area is equipped with heating plates and stations for driving, tensioning, and washing. It can be adjusted horizontally on the control panel's Main page. For further information, see chapter "Operation" section "Control panel".

The upper plate bed is hanging in lifting nuts on lifting shafts. When the motor starts, a system of lifting shafts and bevel gear boxes raises or lower the plate bed. The lifting values displayed on the control panel is tracked by a sensor located on the motor.

Two sensors, located on the main frame, determine the end stops for the lift.



- A. Vertical lifting shaft
- B. Lifting nut
- C. Upper plate bed (adjustable)
- D. Lower plate bed
- E. Bevel gear box
- F. Motor
- G. Sensor (not in picture)
- H. Horizontal lifting shaft
- I. Sensor

*Schematic view of lift.*

At start-up, the lift should be calibrated, see chapter "Operation" section "Control panel". At calibration, the lift will automatically travel to its lowest point before rising to the requested height, after which the machine will begin to operate. If thermo fluid heating is used, the machine will operate as soon as the temperature reaches setpoint. The calibration manoeuvre ensures that the lift settings are correct.

The *HR lift*<sup>1</sup> is an option that comprises very accurate height measurement. The solution is used when heating very thin products.

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<sup>1)</sup> *Optional or not on all equipment.*



## HEATING PLATES

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### **DANGER!**

During production the plate beds hold a very high temperature that may cause injury at touch. Use appropriate personal protective equipment.

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Some equipment has a lower plate bed solely. This lower plate bed could be divided into two sections, infeed and outfeed. Other equipment has a lower and an upper plate bed, each with the same number of plates.

### **Electrical heated plates**

Machines equipped with electrical heated plate beds could regulate the temperature individually for each plate. The temperature is set on the Main and Setup pages on the control panel.

A sensor located on the plate's connection side measures the temperature. All plates are contactor controlled and the maximum temperature setting is 260 °C (500 °F).

The heating plates are made of aluminum and have a coating intended to protect from dirt and accretions. The coating is sensitive to impacts, tearing and negligent or improper cleaning. Thorough cleaning is required. For further information, see chapter "Operation" section "Cleaning".

### **Thermo fluid heated plates**

Machines equipped with thermo fluid heated plates regulate the temperature for each plate bed individually.

The temperature is set on the Main and Setup pages on the control panel.

A sensor located on the thermo fluid pipe measures the temperature and the maximum setting is 260 °C (500 °F). A pump distribute the thermo fluid evenly through the plates.

The thermo fluid heated plates are either made of mild steel with a chrome plated surface or from stainless steel.

The oil in this system shall be of food grade type.

~ ~ ~



## WASH PUMP

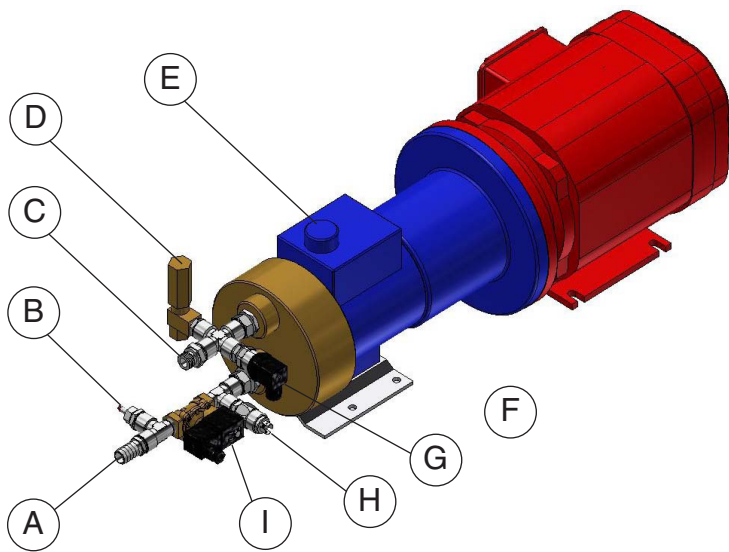
The high pressure pump is normally located under the infeed section, but could also be placed on a separate frame on request.

The filtered water should be connected to the inlet with the recommended piping and without pressure loss in the system. A temperature sensor measures the temperature of the incoming water, which should be 55–60 °C (131–140 °F). The actual setting value can be read in the wash pump service menu.

To prevent unnecessary water consumption, a valve opens when the machine starts and shuts off when the machine stops. A 30 seconds delay enables the water to fill the pump casing before the pump starts.

The inlet pressure transmitter reads the pressure of the incoming water. If the pressure drops below the recommended 4–6 bars, the pump can be damaged. A “low water pressure” alarm on the alarm page sets off and the pump stops.

The overflow valve allows excessive pressure in the outgoing water to be released. Recommended maximum pressure is 50 bars. The outlet pressure transmitter reads the pressure of the outgoing water. The actual setting value can be read in the wash pump service menu.



- A. Inlet
- B. Temperature sensor
- C. Outlet
- D. Overflow valve
- E. Oil refilling plug
- F. Bottom plug (located at the bottom of the pump)
- G. Outlet pressure transmitter
- H. Inlet pressure transmitter
- I. Valve

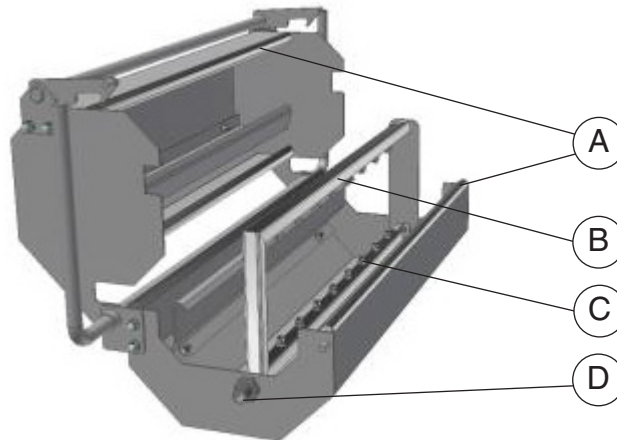
Wash pump

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**WASH**

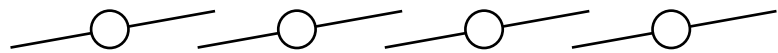
Each cooking belt is equipped with a wash unit for cleaning.



- A. Scrapers
- B. Spray ramp
- C. Nozzles
- D. Water inlet

*Wash with open lid*

The belt is cleaned by the nozzles, located on the spray ramp, which spray water over both sides of the belt. It is important that all the nozzles are functioning. For most effective cleaning of the belt should the nozzle openings be slightly inclined and overlapping each other's spray areas. See figure below:



*Nozzle spray areas*

The wash also has a scraping function for the top and bottom sides of the belt.

The outlet is normally located on the opposite side of the machine to where the control panel is.

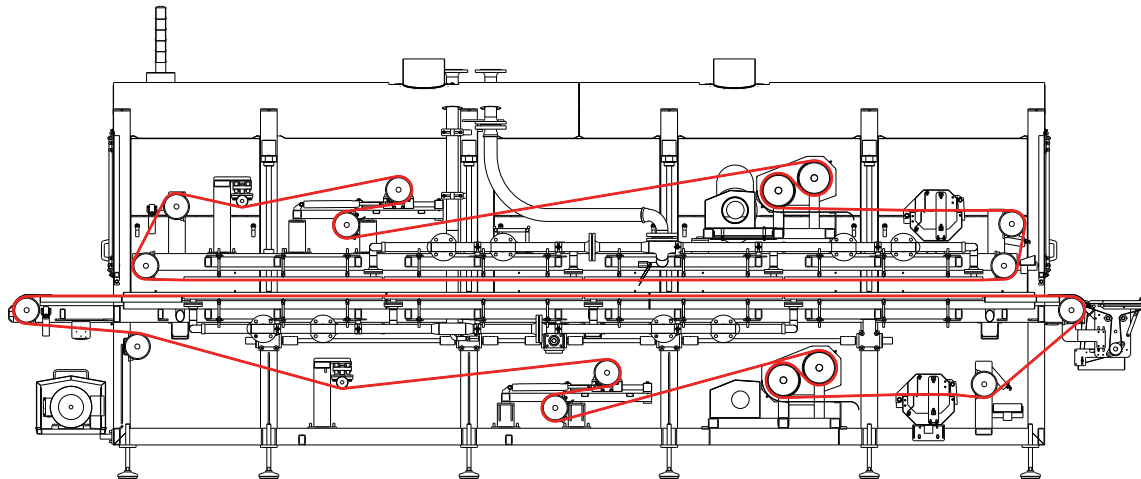
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## **COOKING BELT**

The nonstick cooking belt has a PTFE coating onto a core of spun threads of fabric.



*Routing of cooking belts (in red) in a configuration with one upper and one lower belt. The illustration shows an example of layout.*

How to route the belt in the actual machine is displayed on the Machine picture setup page, see chapter “Operation” section “Control panel”.

It is important that the belt is kept clean.

The coating is delicate and the belt could easily be damaged. Take care to avoid scratches or tears from tools, other items of machinery, transports etc. If the coating is damaged, fat will reach the core and the belt may suffer blistering. Damages should be attended promptly.

How to change a belt is described in chapter “Maintenance” section “Cooking belt replacement”.

Welding and reparation is described in the manual “Belt repair instructions”, see appendix.

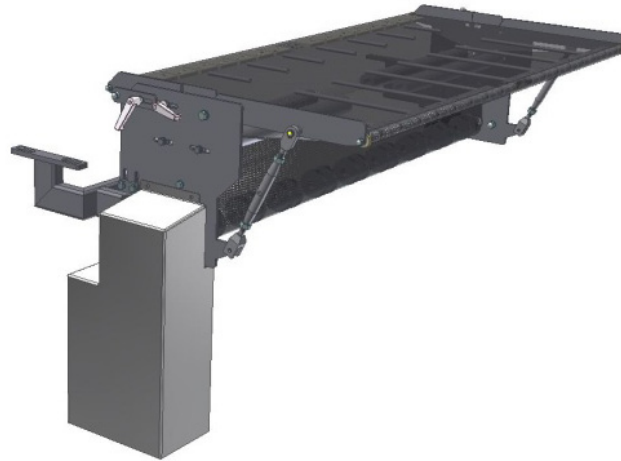
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### **INFEEED/OUTFEED CONVEYOR**

This conveyor could be placed at the infeed and/or outfeed end of the equipment.

The conveyor belt is a continuous stainless steel mesh construction. The belt is driven by a separate motor and the speed is adjusted from the control panel. Height and angle are adjusted manually.



*Infeed/outfeed conveyor*

~ ~ ~



**EXHAUST FANS**

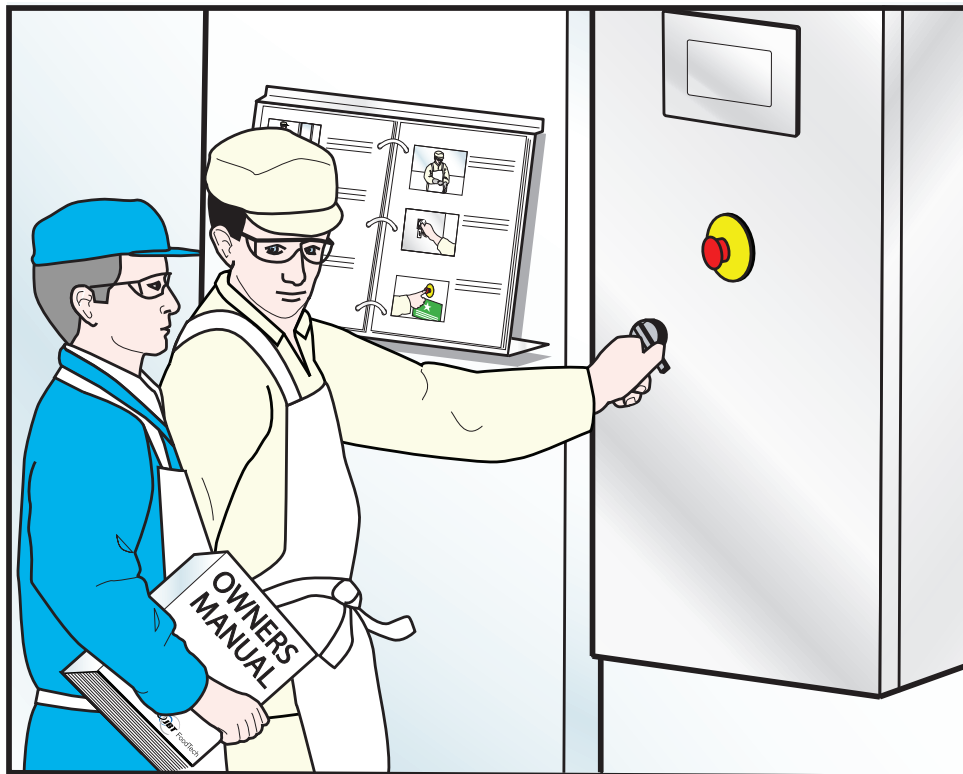
Sufficient exhaust is important to avoid damages and maintain proper use of the machine. Customer is responsible for providing proper extraction.

On request, JBT Foodtech can provide the exhaust fans and connections. Settings are made on the control panels Main or Setup pages, see chapter “Operation” section “Control Panel”.

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# ***OPERATION***



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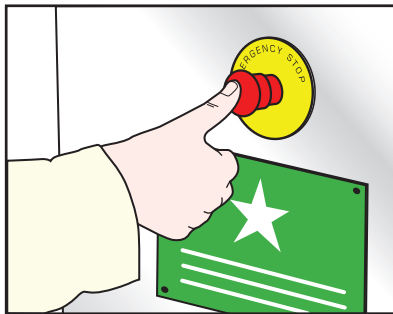
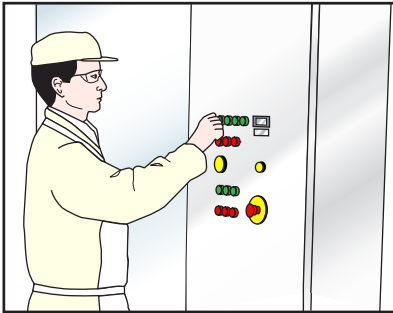


**SAFETY PRECAUTION**

This section lists important bullets that have to be evaluated before each production session to maintain a safe working condition.

**Note!**

The local conditions where the equipment is installed may vary and further safety precautions and guards may be required. We recommend the owner of the equipment to carry out a safety inspection, as suggested in EC Machinery Directive, to determine if further precautions are needed!

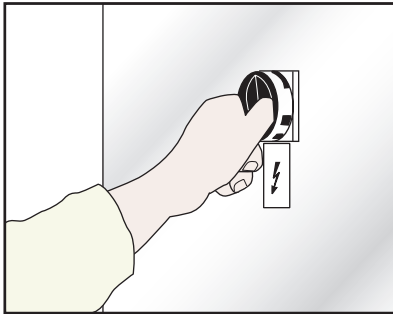


- Never operate the equipment until you have read and understood the operating instructions and is thoroughly familiar with the equipment and its controls.
- Make sure the equipment is handled by trained staff.
- Never start the equipment until all other personnel in the area have been warned and are out of the operating zone.
- Never operate the equipment if a safety device or guard is removed or disconnected.
- Never operate faulty or damaged equipment. Make certain proper service and maintenance procedures have been performed.
- Make sure you understand all warning signs on the equipment.
- Locate all emergency stops and make sure you understand how to use them.
- For equipment with Service Handle, make sure how to operate the equipment with the Service Handle and what risks that are associated with this by reading the Service Handle section in chapters “Function” and “Operation”.
- Make sure to wear suitable protective clothing.
- Make sure your clothing, hair, etc. does not risk getting caught in the conveyor/cooking belt or other moving parts.
- Make sure all tools or other foreign objects are removed from the equipment before operating.
- Keep the operating zone free of obstacles that could cause a person to trip or fall towards the operating equipment.
- Never step on the conveyor/cooking belt or other fragile areas.
- Never operate the equipment above specified speeds, pressures, or temperatures.
- Never manually operate limit switches while the equipment is powered on.
- Never move the machine during operation.

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## OPERATION

- Make sure the conveyor/cooking belt is well fixed on the rolls and that the settings on the machine are correct before you start producing.
- Do not use conveyor/cooking belt in other sizes than those provided in the machine specifications.
- Keep alert and observe indication lights and warnings.
- Make sure to switch off the main power supply, lock it with a pad lock, and label it with a working sign before any mechanical or electrical work. (Lock out/Tag out/Notify)



### Warning

On some equipment, internal lighting<sup>1</sup>, PC power supply<sup>1</sup> and electrical cabinet ventilation fan<sup>1</sup> are not connected to the main switch and will remain live even when the main switch is in position '0'.



### Warning

Certain components, for example fans, will continue to move several minutes after the equipment is shut down. Keep clear of the equipment until all parts have come to a complete stop.

## In case of fire<sup>2</sup>

Fryers shall be equipped with a fire suppression system to discharge and put out a fire within the fryer.

In case of fire:

- Call the fire department and follow local rules and regulations.
- Check that the heating system is turned off.
- Close doors, hatches, and hoods, in order to keep oxygen away from the fire. Keep them closed until the fire is entirely extinguished.



### Warning

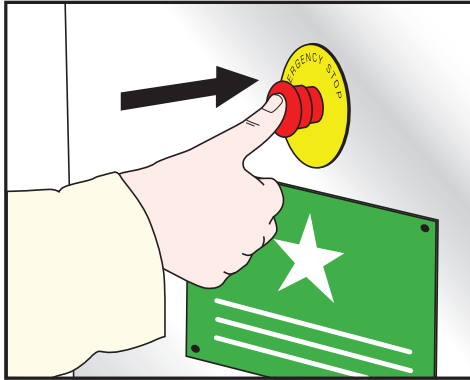
Do not use water! This could make the fire spread very fast and cause severe personal injuries and damage.

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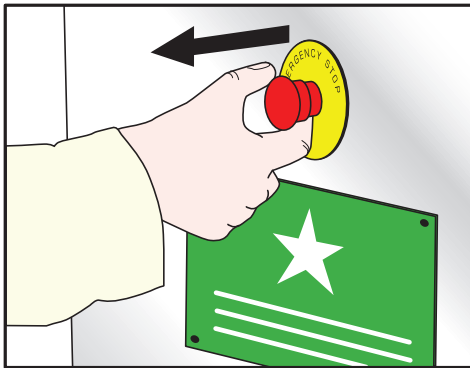
<sup>1)</sup> If installed

<sup>2)</sup> Only valid for cookers and fryers

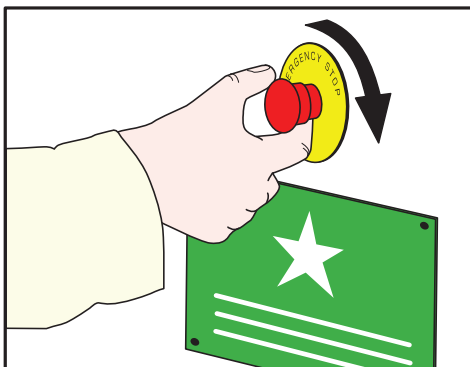
## EMERGENCY STOP



To activate the emergency stop press the red button.



Depending on equipment, to reset the alarm pull out the button or

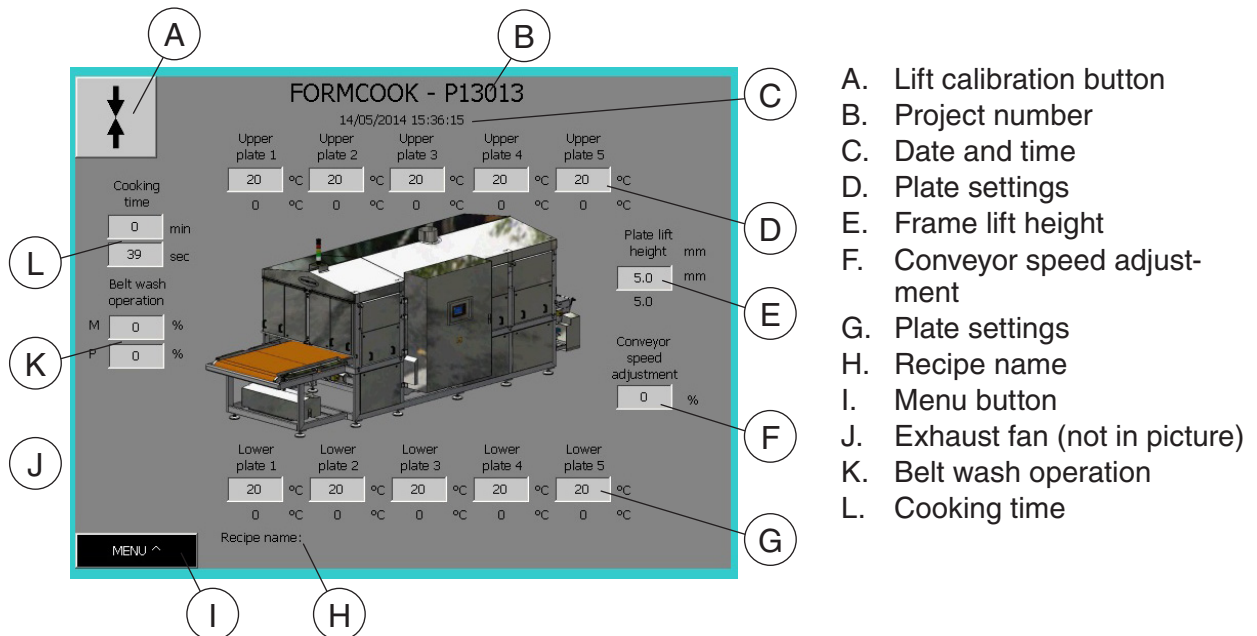


turn the button clockwise.

~~~



## CONTROL PANEL Main page



- A. Lift calibration button
- B. Project number
- C. Date and time
- D. Plate settings
- E. Frame lift height
- F. Conveyor speed adjustment
- G. Plate settings
- H. Recipe name
- I. Menu button
- J. Exhaust fan (not in picture)
- K. Belt wash operation
- L. Cooking time

The Main page displays all the selected parameter values in the lighter shaded boxes. Beneath each of these the actual, real-time, operating value is shown.

The functions on the control panel are aligned with the machine's direction, here with the infeed to the left.

The machine's project number (B) should always be provided in contacts with JBT FoodTech.

Date and time (C) can be changed on the setup pages.

### Note!

All parameters are changed with immediate effect when pressing ENTER on the keyboard.

### Frame lift calibration

Before start-up, the lift should be calibrated with this button (A). When the button is pressed, the lift will automatically travel to its lowest point and calibrate the positioning system. When this is done the frame lift is calibrated and the machine is ready to start in an automatic operation. When the machine is started the lift will travel to requested height.

If the machine is equipped with thermo fluid heating, the machine will go up to a safe distance while heating, then automatically travel to requested height setpoint.

The calibration manoeuvre ensures that the lift settings are correct. The button is not visible once the machine started.

### Note!

Only use this button when starting up a machine that is cool and empty.

### Heating plates

These settings (D, G) are for the temperature parameters for heating plates, in this example electrical heated plates. Permitted interval is 0–260 °C (32–500 °F).

### Cooking time

This is for setting the cooking time (L), in minutes and seconds. The cooking time is customized and measured from the beginning of the first heating plate to the end of the last.

### Frame lift height

This is for setting the distance (E) between the upper and lower cooking belts in tenth of a millimetre.

### Exhaust fan<sup>1</sup>

This (J) is for setting the speed in % (Hz) for the motor. Permitted interval is between 20 and 100 %. Default is 50.

### Belt wash operation

This (K) is for setting the parameters for operation frequency and water pressure.

- M is the operation frequency of the water pump. If the value is set low, the pump is off. Permitted interval is 0–100. The recommended correction factor is 10. It can be changed in the setup pages.

The calculation formula for belt wash time is:  
*cooking time X correction factor X M (in %).*

**Example 1:** The cooking time is 8 minutes 0 seconds and M is set to 20.

Calculation: 8 min x 10 = 80 x 0,2 = 16

During the given 80 minutes, the pump will operate for 16 minutes and be idle for 64 minutes.

**Example 2:** The cooking time is 2 minutes 0 seconds and M is set to 20.

Calculation: 2 min x 10 = 20 x 0,2 = 4

During the given 20 minutes, the pump will operate for 4 minutes and be idle for 16 minutes.

- P is the water pressure to the washes. Permitted interval is between 20% (approx. 15 bars) and 100% (approx. 40 bars). Recommended value is 100.

### Conveyor speed adjustment

This box (F) is for setting the speed for the conveyor in % of the cooking belt speed. If set to zero, both belts will move at the same speed.

Permitted interval is between -50 and 100 %. Default is 0.

### Recipe name

Displays the name of the selected recipe (H).

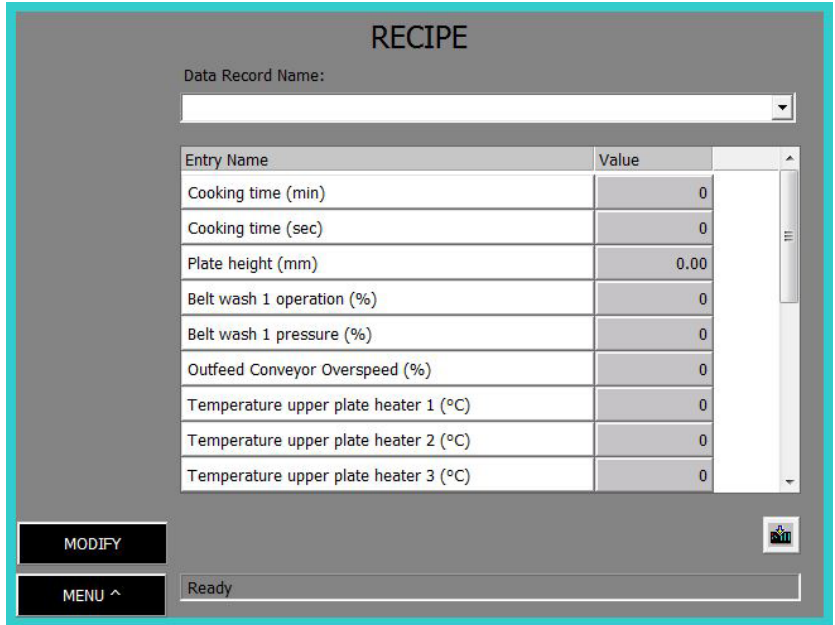
### Menu buttons

When pressing the menu button (I), a menu bar with available alternatives is displayed. Press any button to open the corresponding page.



<sup>1)</sup> Optional or not on all equipment.

## Recipe



| Entry Name                            | Value |
|---------------------------------------|-------|
| Cooking time (min)                    | 0     |
| Cooking time (sec)                    | 0     |
| Plate height (mm)                     | 0.00  |
| Belt wash 1 operation (%)             | 0     |
| Belt wash 1 pressure (%)              | 0     |
| Outfeed Conveyor Overspeed (%)        | 0     |
| Temperature upper plate heater 1 (°C) | 0     |
| Temperature upper plate heater 2 (°C) | 0     |
| Temperature upper plate heater 3 (°C) | 0     |

*Recipe page example*

Press the menu button RECIPE to open the Recipe page and display the stored recipes.

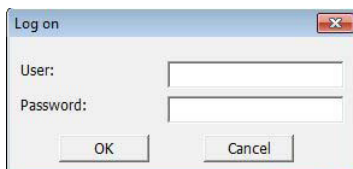
### Loading a recipe

To load an existing recipe requires no authorization.

1. Scroll down the “Data record name” list and select a recipe.
2. Press the “Download” icon (at the lower right corner).  
When the recipe has been downloaded, “Transfer completed” will be displayed in the bottom box.
3. Return to the Main page. All the recipe’s parameters should be displayed in their respective boxes. The name of the current recipe is displayed at the bottom of the screen.

### Modifying a recipe

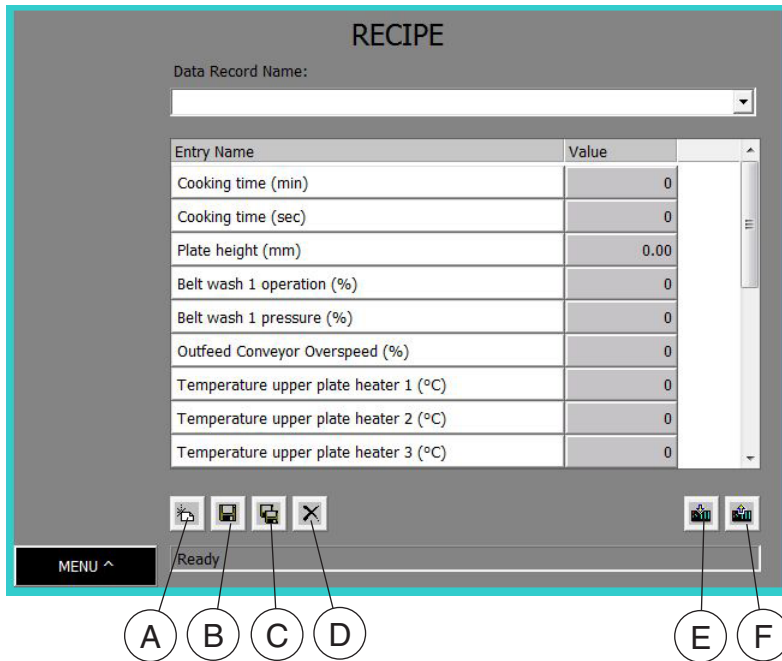
For adding, deleting or modifying recipes, authorization is mandatory.



1. Press the menu button MODIFY and a Log on box will pop-up.
2. Log on to achieve authorization to make changes.

#### Note!

If you have lost your user account details (user name or password) contact your administrator or JBT FoodTech for assistance.



- A. Create new recipe
- B. Save recipe
- C. Save recipe as
- D. Delete recipe
- E. Download data
- F. Upload data

#### Create a new recipe 1

1. Click on the icon "Create new recipe" to bring up an empty recipe page.
2. Click on the icon "Upload data". All values will be uploaded from Main page and displayed in the list.
3. Enter the new recipe name at "Data record name" using the keyboard.
4. Click on the icon "Save recipe".

#### Create a new recipe 2

1. Press menu button MODIFY to bring up a keyboard display.
2. Enter the desired values in the list displayed and finish each value with "Enter" on the keyboard. Scroll down if required.
3. Click on the icon "Save recipe as".
4. Type in the new recipe name followed by "Enter".
5. Click on the icon "Download data" to transfer the parameters to Main page.
6. Click on the icon "Upload data".
7. Press the menu button MAIN; answer "Yes" to question SAVE?
8. Return to the Main page. All the recipe's parameters should be displayed in their respective boxes. The name of the recipe is displayed at the bottom of the screen.

#### Delete a recipe

1. Select the desired recipe from the "Data record name" list by scrolling down and selecting the name.
2. Click on the icon "Delete recipe" and then confirm when prompted.



**Modify a recipe**

1. Scroll down the “Data record name” list and select a recipe.
2. Make desired changes.
3. Click on the icon “Save recipe” or “Save recipe as”.
4. Click on the icon “Download data”.
5. Return to the Main page. All the recipe’s parameters should be displayed in their respective boxes. The name of the recipe is displayed at the bottom of the screen.

**Note!**

Changing the parameters on the recipe pages can cause the machine or production to malfunction. Authorization is required.

**Digital and Analogue I/O**

|                        |          |
|------------------------|----------|
| Option relay output 1  | Active   |
| Option relay output 2  | Inactive |
| Option analog output 1 | 50       |
| Option analog output 2 | 75       |

At the end of the “Data record name” list are the following parameters:

- Programmable, digital ports that can be active or inactive. The parameters are set on the Digital I/O setup page.
- Programmable analogue outputs, controlled as a percentage. Permitted interval is between 0% (approx. 4 mA) and 100% (approx. 20 mA). These are activated on the Analogue outputs setup page.

**Note!**

Only authorized personnel may change these settings.

**Cleaning program**

Create and save a recipe to be used during cleaning, with the following settings:

- 0 °C on all heating plates
- 150 mm lift height
- 5 min cooking time (belt speed)
- belt wash activated, M = 100 and P = 100 for the wash pump.

## Manual mode



*Manual mode page*

Press the menu button MANUAL to open the Manual mode page.

On the Manual mode page, most of the important functions can be manually controlled. When activated, the buttons show green steady light.

### Note!

It is not possible to perform manual operations during production.

### Belt tension

- “Belt tension on” or “off” will tighten or slack the belt tension for the selected belt.
- “Release” forces the valve to release air and the belt tensioner is left unpressurized.

### Belt drive

- “On” and “Off” starts and stops all the drive motors/belts. When starting the belt drive, the belt tension is activated automatically.
- The belt speed is set in % (Hz) in the lighter shaded right hand box. Permitted interval is between 3 and 100%.

### Belt wash

- “On” and “off” starts and stops the water pump.
- The pump speed is set in % (Hz) in the lighter shaded right hand box. Permitted interval is between 40 and 100%. Default is 40.
- A 10 seconds delay enables the water to fill the pump casing before the pump starts.
- The pressure is set at “P” on the Main page.

**Infeed/Outfeed conveyor<sup>1</sup>**

- “On” and “Off” starts and stops the conveyor.
- The speed is set in % (Hz) in the lighter shaded right hand box. Permitted interval is between 3 and 100%.

**Exhaust Fan<sup>1</sup>**

- “On” and “Off” starts and stops the exhaust fan.
- The speed is set in % (Hz) in the lighter shaded right hand box. Permitted interval is between 20 and 100%.

**Frame lift**

- The “arrow up/down” buttons must be pressed during the lift movement.
- Current value is shown below the frame lift button.
- When the lift moves down until it stops at the lower sensor, the value is calibrated. The calibrated value is 2 or 5 mm, depending on customer requirements. See the Frame lift setup page for calibration instructions.

**Run time**

Shows the machine’s total run time in automatic mode.

<sup>1)</sup> *Optional or not on all equipment.*

### Setup

Press the menu button SETUP to open the Setup pages.

**Note!**

All parameters are changed with immediate effect when pressing ENTER on the keyboard.



**Caution**

Changing sensitive parameters on the setup pages can result in machine or production damage, with significant subsequent costs. Authorization is required.

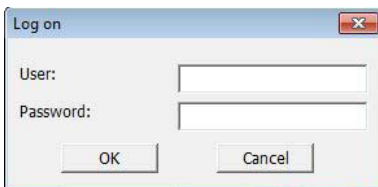
To watch a Setup page requires no authorization. For modification, authorization is mandatory. Only personnel with extensive knowledge of the machine should be authorized.

**Log on**

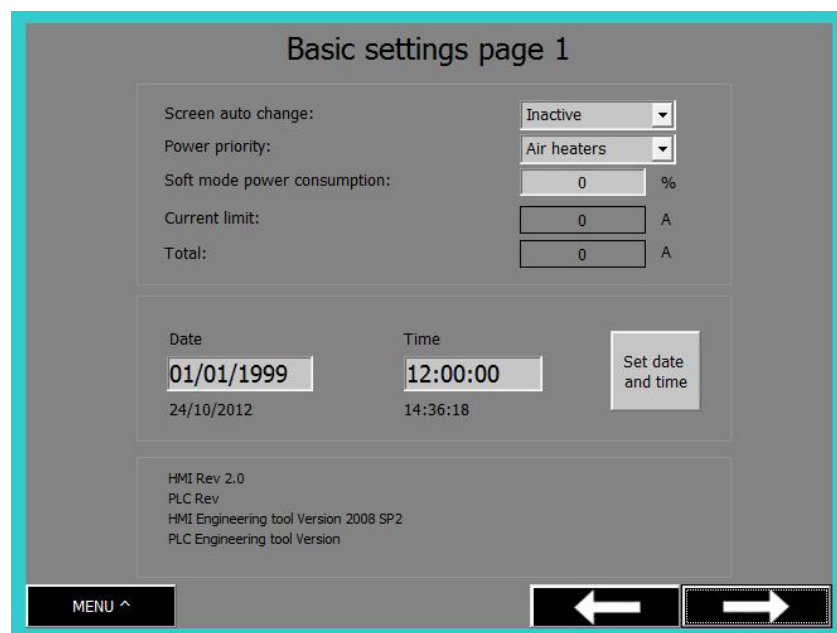
Log on to achieve authorization to make changes.

**Note!**

If you have lost your user account details (user name or password) contact your administrator or JBT FoodTech for assistance.



### Basic setup page



Page displaying the basic settings

**Screen auto change**

When activated, this setting automatically switch to the alarm list if an alarm is triggered.

- “Inactive” or “active” is set in the lighter shaded right hand box.

**Power priority**

This is not used for machines without air heaters.

**Soft mode power consumption**

This is a limiting effect on the electrical heating, values as a %. If the machine receives too little electricity, the startup process will be prolonged.

- The effect is set as % in the lighter shaded right hand box. Permitted interval is between 0 and 100%.
- As lower setting, as longer warm-up time.

**Current limit**

Displays the maximum current the machine is allowed to use, in Ampere.

**Total**

Displays the total electricity consumption for the machine, in Ampere.

**Date/Time**

Sets the date and time displayed on the Main page.

- Enter day/month/year and hour:min:sec
- Press and hold the “Set date and time” button for a couple of seconds.

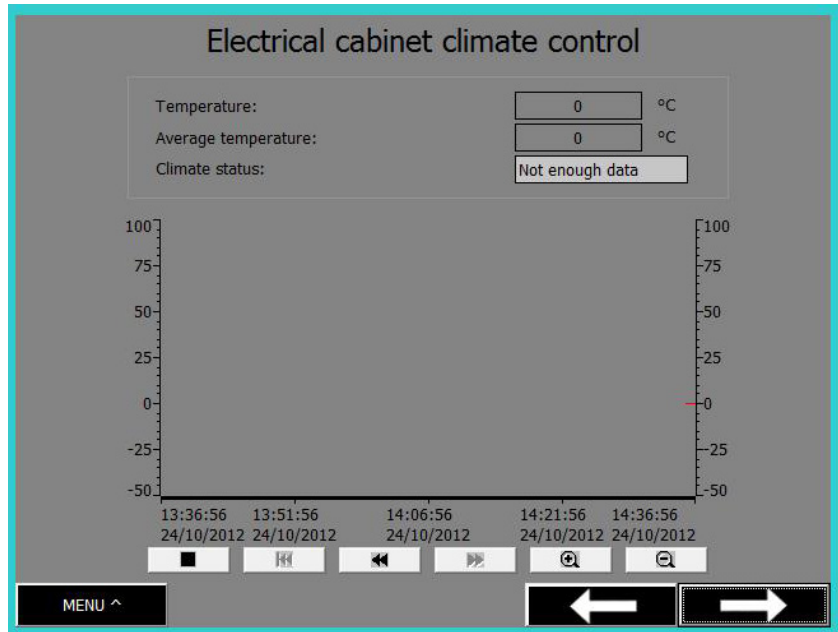
**Program versions**

Displays the HMI and PLC versions for the machine.

**Arrows**

Step forward to the next or back to the previous setup page.

**Electrical cabinet climate control**



*Page displaying the temperature in the electrical cabinet.*

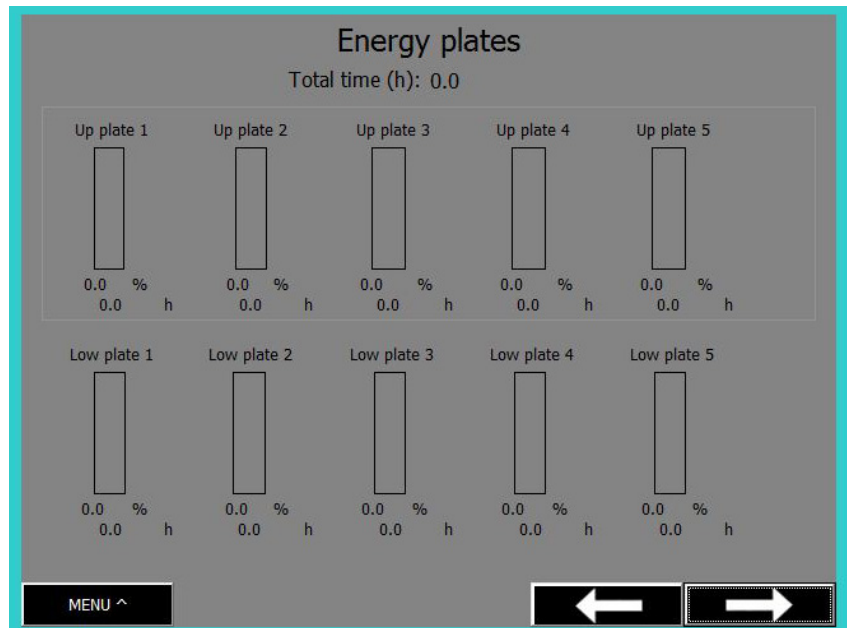


**Caution**

It is important to ensure that the temperature settings in the electrical cabinet are correct. Too high temperatures will result in damage to the electrical cabinet components.

The thermostat in the cabinet should be set to 20 °C (68 °F). The actual temperature is read from a sensor in the cabinet and constantly logged. Permitted temperature is -10–40 °C (14–104 °F). A too high/too low temperature will trigger an alarm.

**Energy heating plates**



*Page displaying the plates' individual operating time and usage. The number of plates varies between machines.*

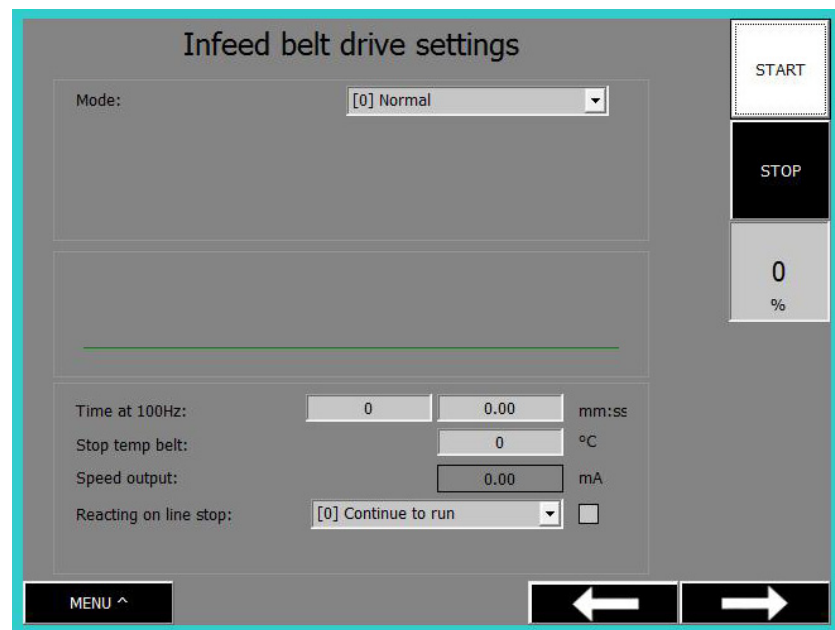
**Usage**

Displays how often, in %, the plate is on in relation to the machine's total running time.

**Operating time**

Displays the total amount of time the plate has been on.

## Belt drive setup



Page displaying the belt drive settings.

### Mode

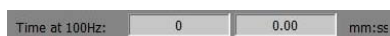
There are three options for this setting:

- “Normal”  
Normal drive, as per the cooking time parameters on the home page.
- “Intermittent run/pause”  
Runs in run/pause cycles. Time for on/off is set in seconds. No start signal required.
- “Intermittent pulse run once”  
Runs in run/pause cycles. Start signal required. If this option is chosen, corresponding connections in the electrical cabinet must be made by authorized personnel.

### Time at 100 Hz

This is the shortest possible cooking time, measured from the beginning of the first heating plate to the end of the last. To adjust the setting, proceed like this:

1. Open the Manual mode page.
2. Enter “100” in the lighter shaded box next to the desired belt drive. Press “On”.
3. Measure the time the cooking belt travels from the beginning of the first heating plate to the end of the last.
4. Open the Belt drive setup page.
5. Enter the measured value in minutes and seconds at “Time at 100 Hz”.
6. Open the Main page.
7. Under “Cooking time”, enter “0” in both the lighter shaded boxes “min” and “sec”.
8. Press “Enter” on the keyboard. The values on the Main page should change to the measured value entered earlier.





### Stop temp belt

With a too high plate temperature when stopping, the belt will be damaged. This setting prevents the belt to stop before the plate temperature has cooled down to the setting value. This is normally set to 120 °C (248 °F).

- The parameter enables a lower stop temperature - i.e. allowing the machine to cool down to a lower temperature.

### Speed output

The control signal to the frequency converter, in mA. Permitted value is between 4 to 20 mA.

- This setting facilitates troubleshooting the:
  - frequency converter
  - PLC system

### Reacting on line stop

Determines what the belt would do if the machine stops. There are three options for this setting:

- Continue to run
- Reduce speed (safe speed)
- Stop

Default is “Continue to run”. If any other option is chosen, corresponding connections in the electrical cabinet must be made by authorized personnel.

### Buttons

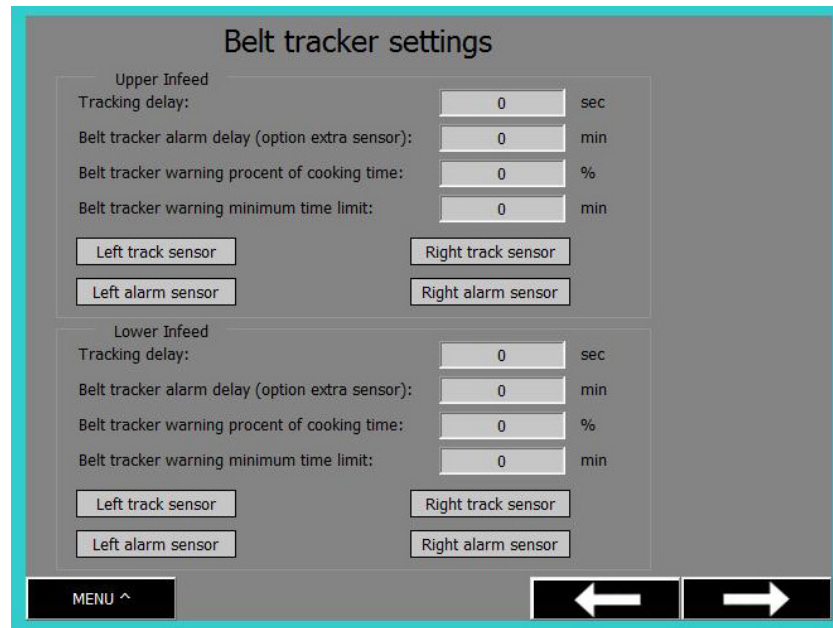
Start: manual operation

Stop: manual operation

0 %: sets the speed of the belt drive in manual operation.



## Belt tracker setup



Page displaying the settings for the belt control stations.

### Tracking delay

The time delay between sensor and valve.

Permitted interval is between 0 and 10 seconds, default is 5.

### Belt tracker alarm delay

Used only by the belt alarm sensor<sup>1</sup>. Permitted interval is between 0 and 10 minutes, default is 2.

First appears a warning in the alarm list. If no measure is taken, the machine will stop after the specified time.

### Belt tracker warning percentage of cooking time

A warning is given if the tracker sensor is activated for a longer time than the set percentage of the cooking time.

Permitted interval is between 0 and 100%, default is 75.

### Belt tracker warning minimum time limit

Used for short cooking times when the belt moves quickly. The warning will not be activated before the specified time. This is to prevent the alarm from sounding repeatedly.

### Left/right track sensor

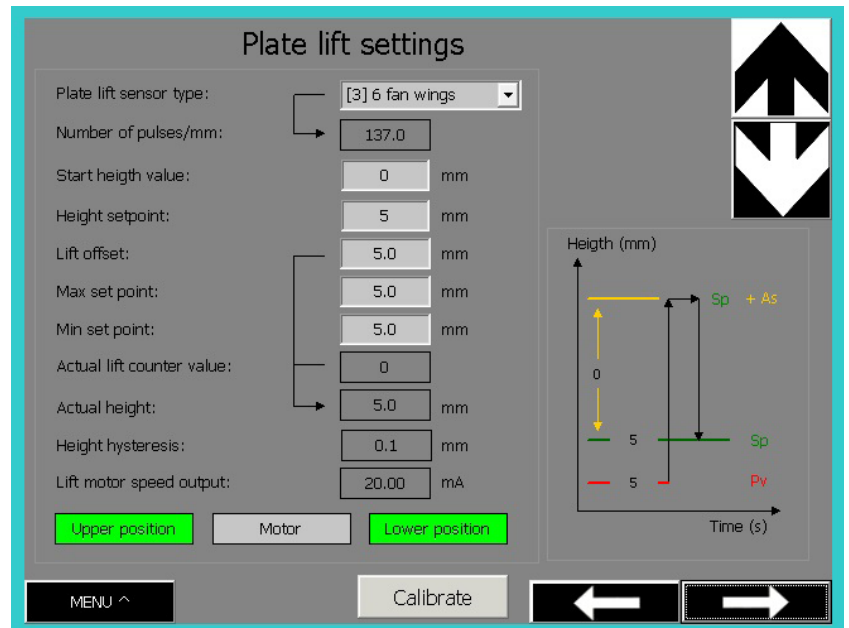
Indicates when the sensors have been activated.

### Left/right alarm sensor<sup>1</sup>

Indicates when the alarm sensor have been activated. Resets automatically.

<sup>1)</sup> Optional or not on all equipment.

## Frame lift setup



Page displaying the frame lift height settings, i.e. the distance between the belts.

It is possible to change the frame lift height settings on this page.

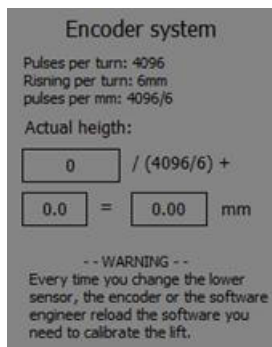
### Note!

The machine must be empty.

### Frame lift sensor type

There are three types of sensors with different accuracies:

- The “2 fan wings” encoder have a basic degree of accuracy.
  - Accuracy 1 mm.
  - A message indicating that calibration is required will be displayed on the panel.
  - Frequent calibration necessary.
- The “6 fan wings” encoder have a higher degree of accuracy.
  - 1/10 mm of accuracy.
  - Frequent calibration necessary.
- The “Absolute” encoder has the highest degree of accuracy.
  - 1/100 mm of accuracy.
  - Calibration necessary when a component is replaced on the lift’s units.
  - Calibration necessary when the plates have been adjusted.



This box, showing the actual height and its calculations, is displayed when the encoder is in use.

**Caution**

Make sure the settings are correct for the lower sensor and for the distance between belts. If the upper and lower plates get in contact, this may cause severe machine damage.

If the lift in operation forces the cooking belt to extend, the belt may suffer damage.

**Number of pulses/mm**

Shows the number of pulses per millimetre, depending on the sensor type.

**Start height value**

The lift stops at this height and waits here until the heating plates reaches operating temperature.

**Height setpoint**

This box is for setting the distance between the cooking belts in millimetres. Have the same function as the “Frame lift height” box on the Main page.

**Lift offset**

This value is the distance between the cooking belts, according to customer specifications. A change of the value require a physical adjustment of the lower sensor as this sensor will stop the lift at the minimum value. The value must be the same as the minimum setpoint value. Changes may only be performed by authorized personnel.

**Maximum setpoint**

A highest value can be set to make the lift stop without activating the upper sensor. The lift will never raise higher than the upper sensor (at 250 mm).

**Minimum setpoint**

The value must be the same as the lift offset. This value limits the lowest value entered in the lift parameters on the Main page.

**Actual lift counter value**

The lift value from sensors/encoders displayed in digital pulses.

**Actual height**

Displays the actual distance between the cooking belts.

**Height hysteresis**

Displays the stability in the calculation.

**Lift motor speed output**

Displays the control signal to the frequency converter in mA. Facilitates troubleshooting in frequency converter or PLC system.

**Upper position/Motor/Lower position**

Displays which sensor, upper or lower, that is affected (box lights green). If the “Motor” box lights green, the lift is in operation.

**Calibrate**

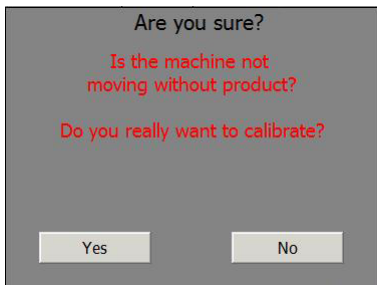
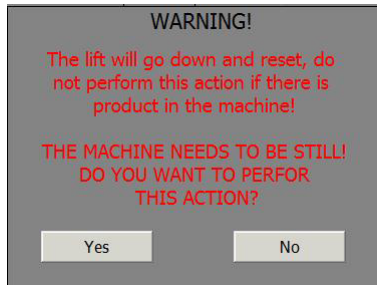
---



**Caution**

Before starting the calibration, make sure the settings are correct for the lower sensor and for the distance between belts. If the upper and lower plates get in contact, this may cause severe machine damage.

---



This button have the same function as the “Lift calibration” button on the Main page.

If pressing this button, a warning box will pop-up.

If pressing “Yes”, the next warning will be displayed.

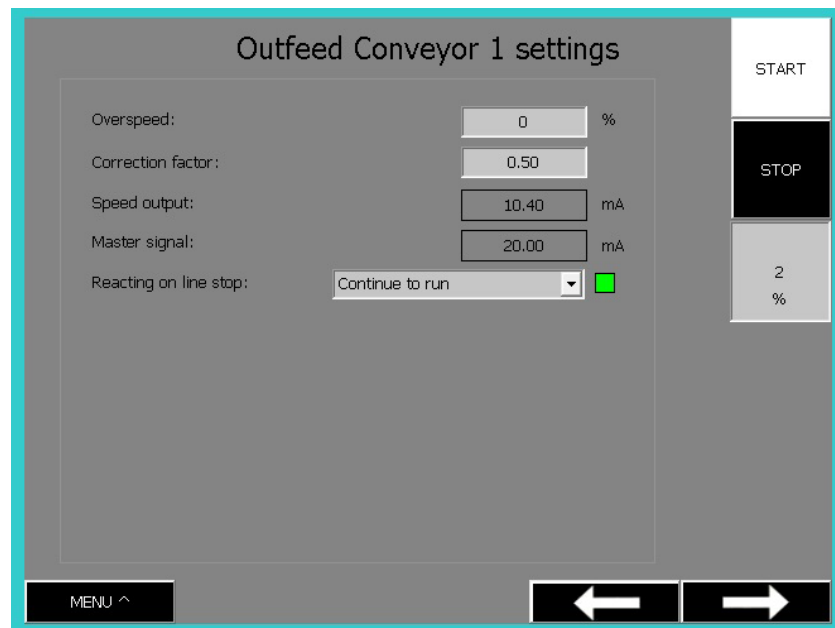
If pressing “Yes” on this warning, calibration of the lift will begin. This means that the lift will automatically travel to its lowest point and calibrate the positioning system. When this is done the frame lift is calibrated and the machine is ready to start in an automatic operation. When the machine is started the lift will travel to requested height.

If the machine is equipped with thermo fluid heating, the machine will go up to a safe distance while heating, then automatically travel to requested height setpoint.

If you press “No” on the first or second warning the calibration will be cancelled.

**Arrow up/Arrow down**

Buttons used for manual control of the lift.

**Infeed<sup>1</sup> / Outfeed<sup>1</sup> conveyor setup**


Page displaying conveyor settings. Configuration of conveyors varies between machines.

**Overspeed**

This setting is the same as “Conveyor speed adjustment” on the Main page. 0% should be the same speed as the belt previous to the conveyor in the production line. If the actual speed on this belt and the conveyor differs, the “Correction factor” setting below must be changed.

A setting of -50 % (2.0 Hz) is approximately half of the speed. 100 % (125 Hz) is approximately the double speed.

Permitted interval is between -50 and 100 %. Default is 0.

**Correction factor**

This setting makes it possible to correct the speed. If 50 Hz on the conveyor motor is not the same speed that 50 Hz on the motor of the previous belt, this setting needs to be adjusted. 0.1 is corresponding to 10 % of the master signal.

Permitted interval is between 0.5 and 2. Default is 1.

**Speed output**

This output value is the current signal sent from the PLC to the frequency drive.

**Master signal**

This output value is the current signal that the conveyor drive is using as master signal, i.e. from the belt previous to the conveyor in the production line.

<sup>1)</sup> Optional or not on all equipment.

**Reacting on line stop**

Determines what the belt would do if the machine stops. There are three options for this setting:

- Continue to run
- Use safe speed
- Stop

Default is “Continue to run”. If any other option is chosen, corresponding connections in the electrical cabinet must be made by authorized personnel.

**Safe speed**

If previous parameter is set to “Use safe speed”, this parameter is telling the machine how fast it’s going to run in safe speed. Permitted interval is between 3 and 100 %. Default is 3.

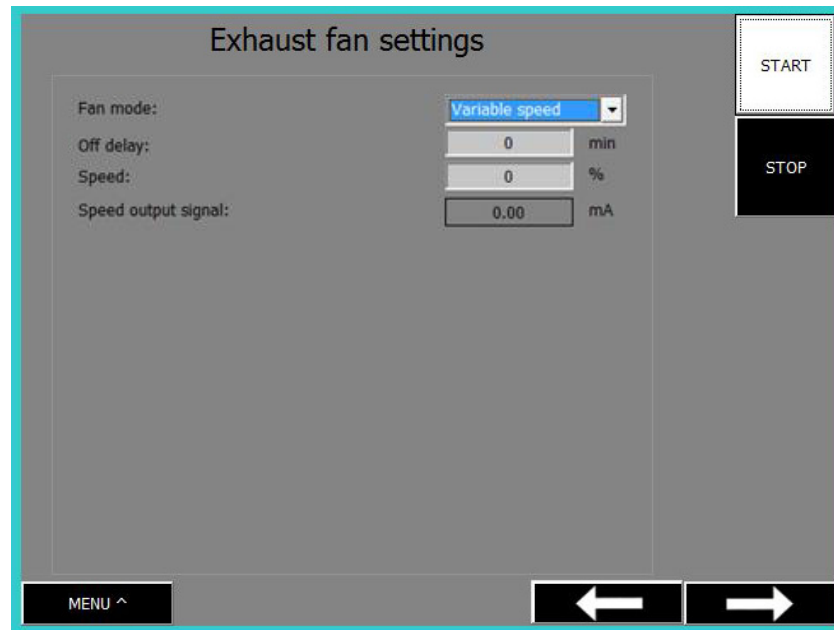
**Buttons**

Start: manual operation

Stop: manual operation

%: sets the speed of the conveyor in manual operation.

### Exhaust fan setup<sup>1</sup>



Page displaying the exhaust fan settings

Depending on customer demands, the exhaust fans may, or may not, be controlled by the built-in PLC. When included, the settings are:

#### Fan mode

- At “fixed speed” the setting is 50 Hz.
- At “variable speed” the page also include settings for “Speed” and “Speed output signal”.

#### Off delay

The time the fan is running after the machine has been stopped. Permitted interval is between 30 and 200 minutes. Default is 60.

#### Speed

This box show at which Hz (in %) the motor is working. This is the same function as on the Main page. If set to zero, the fan will not start. Permitted interval is between 20 and 100 %. Default is 50.

#### Speed output signal

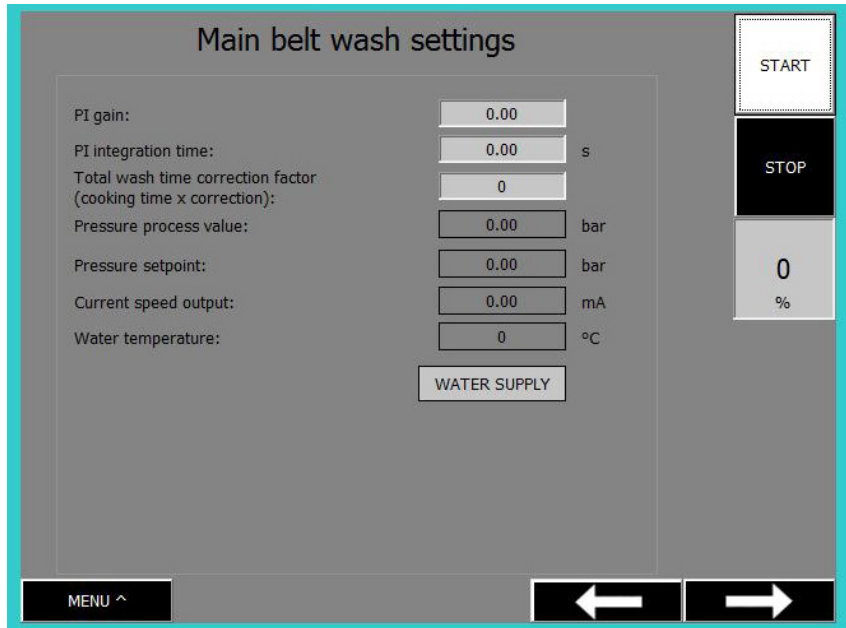
Sets the control signal to the frequency converter, in mA. Permitted value is between 4 and 20 mA.

- This setting facilitates troubleshooting the:
  - frequency converter
  - PLC system

<sup>1)</sup> Optional or not on all equipment.



## Belt wash setup



*Page displaying the wash pump settings*

### PI gain

Enforces the signal that controls the pump pressure. The signal is provided from the outfeed pressure sensor and controls the motor speed to ensure an even water pressure to the washes. The value acts together with “PI integration time”.

Permitted interval is between 0.01 and 199.99. Default is 2.

- A higher value results in faster regulation but makes it less stable and more sensitive to disturbances.
- A lower value reduces the sensitivity but could result in sluggish regulation.

### PI integration time

A reset value for how long the loop that calculates the pressure lasts. The value acts together with “PI gain”.

Permitted value is between 0.1 and 999.9 seconds. Default is 10.

- A higher value results in slow regulation. This increases the damping that gives a more stable regulation and is less sensitive to disturbances.
- A lower value enhance the regulation speed. However, the damping is reduced and the sensitivity increases.

### Note!

Follow the recommended settings for “PI gain” and “PI integration time”. The pump pressure may otherwise be affected out of control.

**Total wash time correction factor**

Gives an intermittent washing of the belt. This value is connected to the wash pump settings on the Main page. For calculations and further information, see section “Main page”, subsection “Belt wash operation”.

Permitted interval is between 1 and 10.

The recommended correction factor is 10. If the correction factor is changed, the prerequisites for the intermittent operation will be affected.

**Pressure process value**

Displays the current pressure of the water outflow from the pump. Default value is 40 bar.

**Pressure setpoint**

The value entered in the “P” box on the Main page is here displayed in bar.

- 100 % is approx. 40 bar
- 75 % is approx. 30 bar

**Current speed output**

Displays the control signal to the frequency converter in mA. Facilitates troubleshooting in frequency converter or PLC system.

**Water temperature**

Displays the actual temperature of the inflow of water to the pump. The recommended temperature is 55–60 °C (131–140 °F).

- 65 °C or more will trig an alarm; the yellow lamp flashes and the audible signal sounds.
- 75 °C or more and the pump is stopped.

**Water supply**

Lights green when the water reaches the pump. If the pressure disappears during operation the pump will stop and an alarm is triggered.

**Buttons**

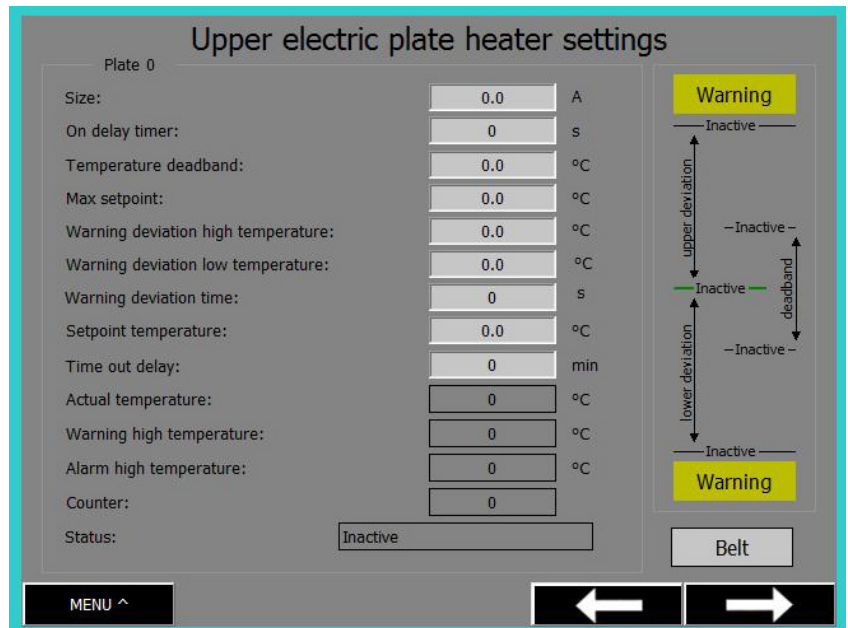
Start: manual operation

Stop: manual operation

?: sets the water pressure for manual operation.  
20–30 % corresponds to 5 Hz, 100 % to 50 Hz



## Electric plate heater<sup>1</sup> setup



Page displaying the settings of an electrical heating plate. All electrical plates uses similar pages.

### Note!

Avoid changing the settings on the plate heating pages as this may cause disruptions in production. Adjustments are to be made by authorized personnel only.

### Plate

Number of the actual plate.

### Size

Displays the total energy of the plate per phase given in Amperes. Do not change the default value.

### On delay timer

Enables delayed contactor switch-on when the machine is started. Permitted interval is between 1 and 59 seconds. Default is 1.

### Temperature deadband

Shows the difference in temperature compared with the value set. Permitted interval is between 0.5 and 10 °C. Default is 2.

Example: With the value set to 140 °C, the contact switches on when the temperature falls below 139 °C and switches off when the temperature raises above 141 °C.

### Max setpoint

Sets the upper limit for the setpoint temperature. Permitted interval is between 0 and 260 °C. Default is 260.

<sup>1)</sup> Optional or not on all equipment.

**Warning deviation high temperature**

The machine will generate a warning if the actual temperature is higher than the setpoint plus this parameter setting after one minute.

Permitted interval is between 5 and 100 °C. Default is 30.

**Warning deviation low temperature**

The machine will generate a warning if the actual temperature is lower than the setpoint minus this parameter setting after one minute.

Permitted interval is between 5 and 100 °C. Default is 30.

**Warning deviation time**

Time before the “Too high/low temperature” warning is activated.

Permitted interval is between 0 and 90 seconds. Default is 10.

**Setpoint temperature**

This is the same function as “Upper/lower plate settings” values on the Main page.

Permitted interval is between 0 and 260 °C.

**Time out delay**

There will be generated a time out warning if the plates has not reached the ready state within the “Time out delay” parameter.

Permitted interval is between 0 and 60 minutes. Default is 30.

**Actual temperature**

Shows the current temperature in °C.

**Warning high temperature**

The machine will generate a warning when the actual temperature reach this value.

Permitted interval is between 0 and 280 °C. Default is 280.

**Note!**

Troubleshooting contactors and electrical systems should only be carried out by appropriate qualified personnel.

**Alarm high temperature**

The machine will generate an alarm when the actual temperature reach this value and start to cool down the machine.

Permitted interval is between 0 and 300 °C. Default is 300.

**Note!**

Troubleshooting on contactors and electrical systems should only be carried out by appropriate qualified personnel.

**Counter**

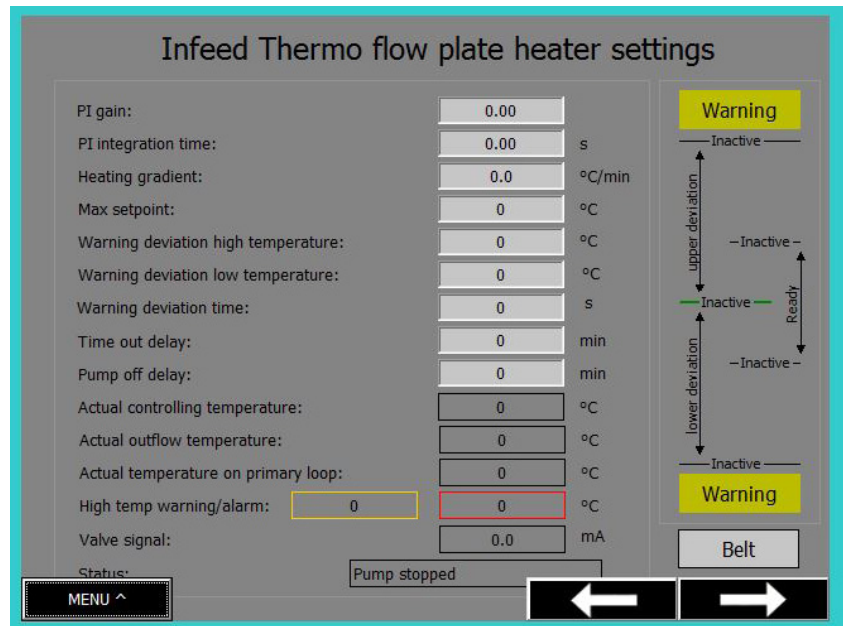
Count the number of times a contactor is switched on.

- The service life of the contactor is limited.
- The contactor should be replaced after approx. three years.

**Status**

Displays if the plate is active or inactive.

### Thermo fluid plate heater<sup>1</sup> setup



Page displaying thermo fluid plate heater settings. Configuration of thermo fluid plate heaters varies between machines.

#### Note!

Avoid changing the settings on the plate heater pages as this may cause disruptions in production. Adjustments are to be made by authorized personnel only.

#### PI gain

Enforces the signal that controls the temperature. The signal is provided from the inlet sensor and controls the thermo fluid valve to ensure a uniform temperature to the heating plates. The value acts together with “PI integration time”. Permitted interval is between 1 and 100. Default is 2.

- A higher value results in faster regulation but makes it less stable and more sensitive to disturbances.
- A lower value reduces the sensitivity but could result in sluggish regulation.

#### PI integration time

A reset value for how long the loop that calculates the temperature lasts. The value acts together with “PI gain”. Permitted interval is between 0.1 and 999.9 seconds. Default is 10.

- A higher value results in slow regulation. This increases the damping that gives a more stable regulation and is less sensitive to disturbances.
- A lower value enhance the regulation speed. However, the damping is reduced and the sensitivity increases.

#### Note!

Follow the recommended settings for “PI gain” and “PI integration time”. The temperature may otherwise be affected out of control.

<sup>1)</sup> Optional or not on all equipment.

**Maximum setpoint**

Sets the upper limit for the setpoint temperature.  
Permitted interval is between 0 and 260 °C. Default is 260.

**Warning deviation high temperature**

The machine will generate a warning if the actual temperature is higher than the setpoint plus this parameter setting after one minute.  
Permitted interval is between 5 and 100 °C. Default is 5.

**Warning deviation low temperature**

The machine will generate a warning if the actual temperature is lower than the setpoint minus this parameter setting after one minute.  
Permitted interval is between 5 and 100 °C. Default is 5.

**Warning deviation time**

Time before the “Too high/low temperature” warning is activated.  
Permitted interval is between 0 and 90 seconds. Default is 30.

**Time out delay**

There will be generated a time out warning if the thermo fluid plates has not reached the ready state within the “Time out delay” parameter.  
Permitted interval is between 1 and 59 minutes. Default is 30.

**Pump off delay**

Sets a time delay for stopping the thermo fluid pumps after the machine is stopped.  
Permitted interval is between 1 and 59 minutes. Default is 10.

**Actual controlling temperature**

Shows the actual controlling temperature for the thermo fluid plates, in °C.

**Actual outflow temperature**

Shows the actual temperature on the thermo fluid out from the secondary loop, in °C.

**Actual temperature on primary loop**

Shows the actual temperature on the primary loop, in °C. This temperature is the same for all secondary loops on the same primary loop.

**High temperature warning**

The machine will generate a warning when the actual temperature reach this value.  
Permitted interval is between 0 and 280 °C. Default is 280.

- Check/troubleshoot the thermo fluid valve controller in the secondary loop.
- Check the temperature in the primary loop.

**Note!**

Troubleshooting the thermo fluid valve and the electrical system should only be carried out by appropriate qualified personnel.

**High temperature alarm**

If the actual temperature reach this value, the machine will generate an alarm and automatically start to cool down.

Permitted interval is between 0 and 300 °C. Default is 300.

- Check/troubleshoot the thermo fluid valve controller in the secondary loop. It is very important that the troubleshooting is thorough.
- Check the temperature in the primary loop.

**Note!**

Troubleshooting the thermo fluid valve and the electrical system should only be carried out by appropriate qualified personnel.

**Valve signal**

This indicates how high the signal is to the thermo fluid valve.

If the valve is indicating 4 mA the valve should be closed. If it is indicating 20 mA it should be fully open.

Permitted interval is between 4 and 20 mA.

- If the “Valve signal” value is 4 mA and the measured PLC signal is 20 mA, the PLC analogue card is damaged.
- If the “Valve signal” value is 20 mA and the measured PLC signal is 4 mA, the PLC analogue card is damaged.
- If the “Valve signal” value is 20 mA and the measured PLC signal is 20 mA, and “time out” warning is given, there is a problem outside the controlling equipment.
  - Check thermo fluid temperature in secondary loop.
  - Check cables, valve and controller.

**Status**

This status box will display the status of the heating plates:

**0 Pump stopped**

Displayed if the pump is stopped, independent of alarms and valve position.

**1 Valve closed but not ready**

Displayed if the pump is started, valve signal is lower or equal to 4 mA, plate bed is not ready, no warnings and no alarms.

Green lamp is flashing.

**2 Valve opened but not ready**

Displayed if the pump is started, valve signal is higher than 4 mA, plate bed is not ready, no warnings and no alarms.

Green lamp is flashing.

**3 Valve closed and ready**

Displayed if the pump is started, valve signal is lower or equal to 4 mA, plate bed is ready, no warnings and no alarms.

Green lamp is lit.

**4 Valve opened and ready**

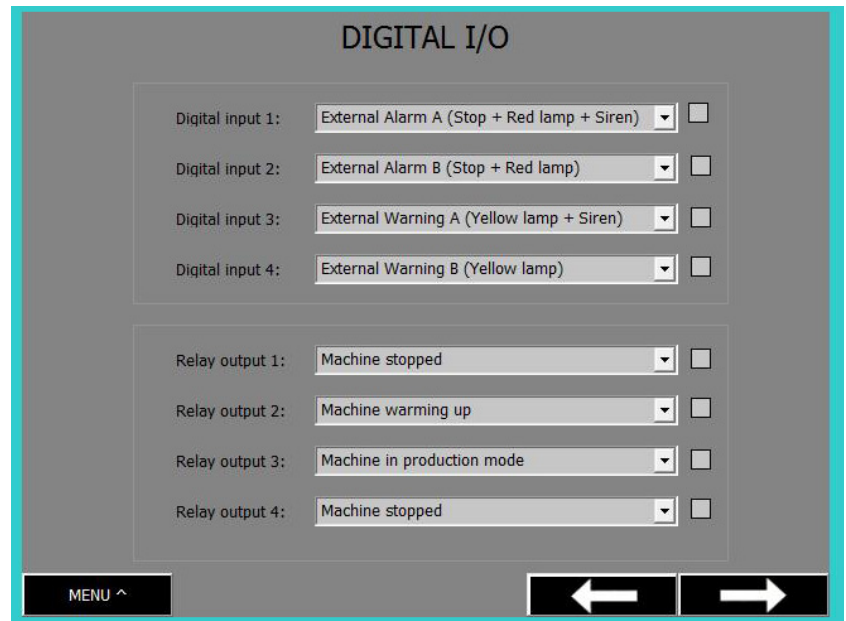
Displayed if the pump is started, valve signal is higher than 4 mA, plate bed is ready, no warnings and no alarms.

Green lamp is lit.

- 5 **Valve closed with warning**  
Displayed if the pump is started, valve signal is lower or equal to 4 mA, active warnings and no alarms.  
Yellow lamp is flashing.
- 6 **Valve opened with warning**  
Displayed if the pump is started, valve signal is higher than 4 mA, active warnings and no alarms.  
Yellow lamp is flashing.
- 7 **Valve closed with alarm**  
Displayed if the pump is started, valve signal is lower or equal to 4 mA, active alarm.
- 8 **Valve opened with alarm**  
Displayed if the pump is started, valve signal is higher than 4 mA, active alarm.



## Digital I/O



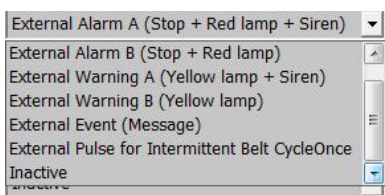
Page displaying the options for handling signals to and from remote equipment.

The electrical equipment is designed for and ready to receive and deliver digital signals to and from remote equipment. The connections must be performed by qualified personnel only. See the electrical wiring diagram for further information.

It is possible to configure how the machine will respond to the signals received. This configuration will not affect the Emergency Stop buttons.

### Digital input 1–4

Two of these inputs are potential-free signals from remote equipment, the other two are outputs for 24 V DC. All digital inputs are arranged in the same way:

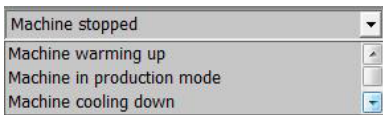


- External alarm A (stop + red lamp + audible signal): when the PLC receives the signal, both the alarm system and the remote equipment will alert with a red light and audible signal.
- External alarm B (stop + red lamp): when the PLC receives the signal, the remote equipment stops and the alarm system alerts with a red light.
- External warning A (yellow lamp + audible signal): when the PLC receives the signal, the alarm system is activated with a yellow light and audible signal.
- External warning B (yellow lamp): when the system receives the signal, the alarm system is activated with a yellow light.
- External event (message): when the PLC receives the signal, a message will appear on the display. The alarm system will not interpret the fault as text.

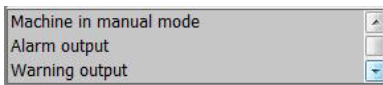
- External pulse for intermittent belt cycle once: when the PLC receives the signal, the belt will travel one time cycle. However, this must be activated on the Belt drive setup page at section “Mode”. When the time cycle is completed, the PLC waits for a new pulse. If the pulse does not arrive within two minutes, the system will close down; the machine begins the cooling process and the “Time-out alarm” is activated. If the pulse arrives before the belt has stopped, an “Intermittent pulse warning” will be activated. See settings on the Belt drive setup page.
- Inactive: Function deactivated.

### Relay output 1–4

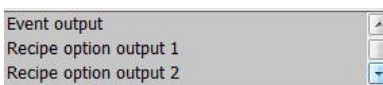
These are not activated by an emergency stop. All outputs are potential-free and have different options:



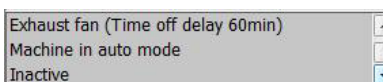
- Machine stopped: activates the output when all motors in the machine have stopped.
- Machine warming up: activates the output during heat-up. Flashing green light.
- Machine in production mode: activates the output when the machine is ready for production. Steady green light.
- Machine cooling down: activates the output during the cooling phase and will remain activated until the machine reaches 120 °C (248 °F).



- Machine in manual mode: immediately activates the output when a function is activated on the Manual mode page.
- Alarm output: activates the output when an alarm A or B is activated.  
**A** alarm with light and audible signal  
**B** alarm with light only.
- Warning output: activates the output when an A or B warning is activated.  
**A** warning with light and audible signal  
**B** warning with light only.

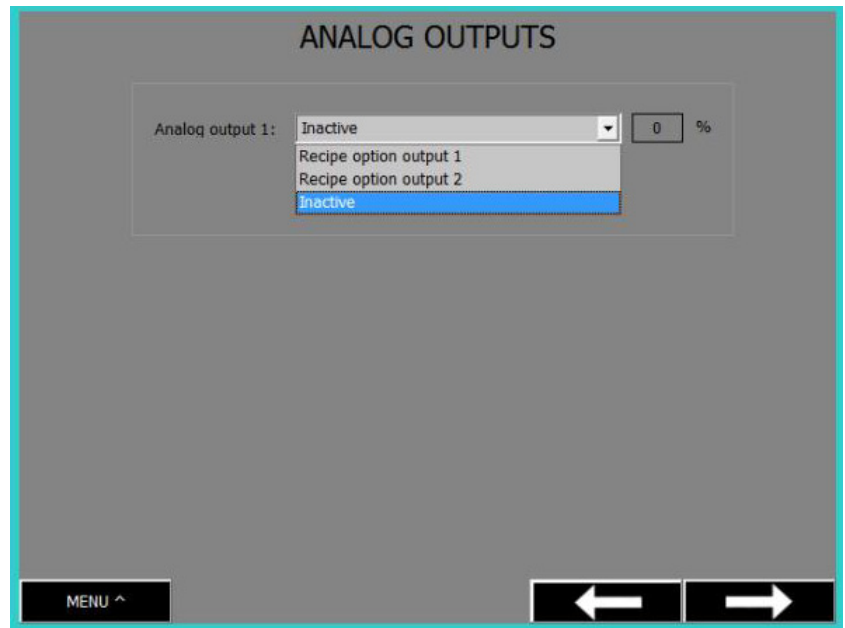


- Event output: activates the output when an event occurs.
- Recipe option output 1: activates the output when it is chosen from the recipe. This function must be activated in the recipe handling in order to function.
- Recipe option output 2: activates the output when it is chosen from the recipe. This function must be activated in the recipe handling in order to function.



- Exhaust fan (time-off delay 60 min): activates the output when a delayed switch-off signal is desired.
- Machine in auto mode: activates the output when the machine is started.
- Inactive: Function deactivated.

### Analogue outputs



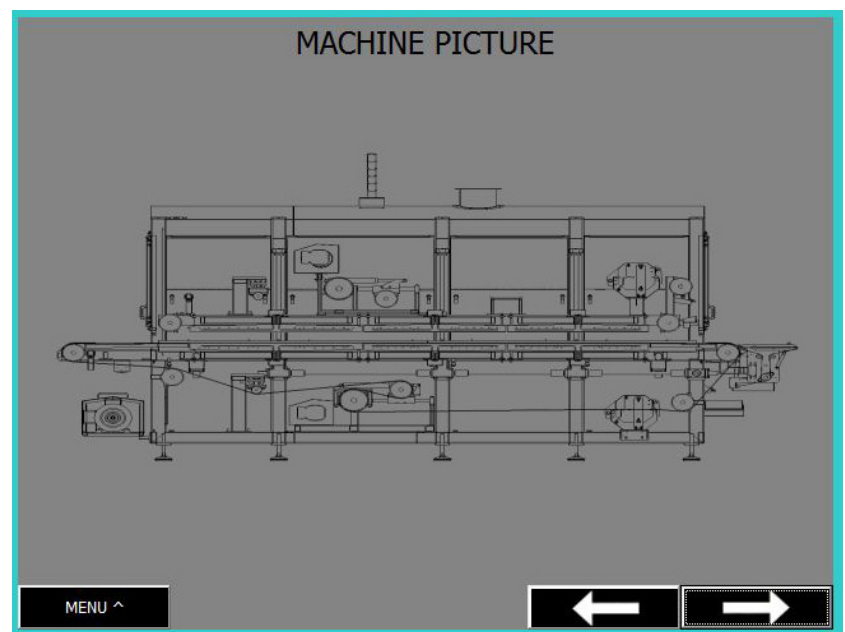
*Page displaying the options for analogue output signals.*

The analogue outputs are activated on this page. The value is set on the Recipe page, see this section for further information.

**Note!**

Do not use this page for any safety functions. It cannot be switched off by Emergency Stop buttons or machine stops.

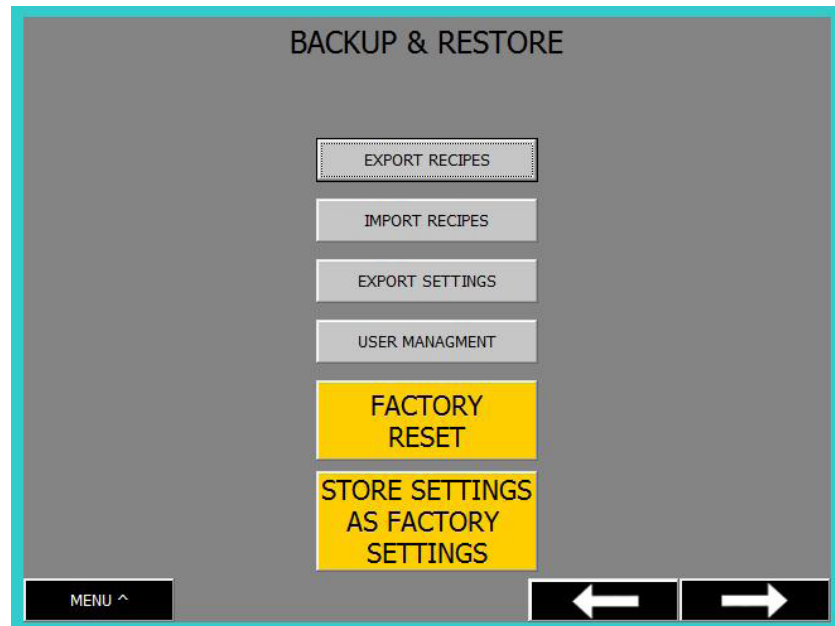
### Machine picture



*This page illustrates the path of the belt through the actual machine. Useful during replacement.*

3220-05-01GB-00-00

## Backup and Restore



Page displaying buttons for downloading/uploading recipes and for resetting the machine.

### Export recipes

Press this button to store the recipe on a USB memory device. The function is used when replacing control panels or updating programs.

### Import recipes

Press this button to upload the recipe from a USB memory device to the recipe handling.

### Export settings

Press this button to store the machine's settings on the SD card. The function is used when:

- replacing or updating programs.
- the files are to be sent to JBT FoodTech for analysis.

### User management

Do not press this button! May only be used by authorized personnel from JBT FoodTech.

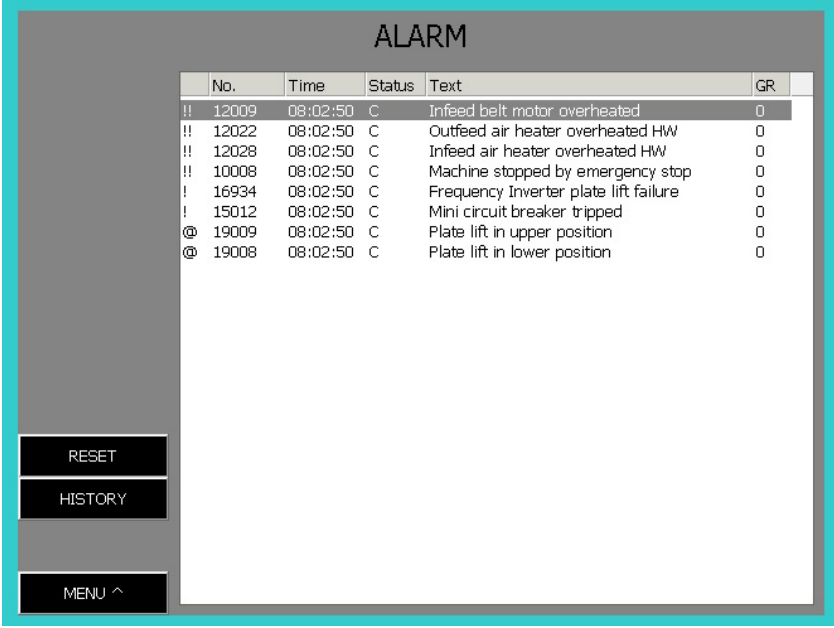
### Factory reset

Press this button only after special permission from JBT FoodTech.

### Store settings as factory settings

Do not press this button! May only be used by authorized personnel from JBT FoodTech.

## Alarm



| No.      | Time     | Status | Text                                  | GR |
|----------|----------|--------|---------------------------------------|----|
| !! 12009 | 08:02:50 | C      | Infeed belt motor overheated          | 0  |
| !! 12022 | 08:02:50 | C      | Outfeed air heater overheated HW      | 0  |
| !! 12028 | 08:02:50 | C      | Infeed air heater overheated HW       | 0  |
| !! 10008 | 08:02:50 | C      | Machine stopped by emergency stop     | 0  |
| ! 16934  | 08:02:50 | C      | Frequency Inverter plate lift failure | 0  |
| ! 15012  | 08:02:50 | C      | Mini circuit breaker tripped          | 0  |
| @ 19009  | 08:02:50 | C      | Plate lift in upper position          | 0  |
| @ 19008  | 08:02:50 | C      | Plate lift in lower position          | 0  |

Page displaying active alarms.

Press the menu button ALARM to open the Alarm page.

If an Emergency Stop button is activated, this will be displayed on the screen.

### Alarm list

This list displays alarms that are currently activated. As soon as you notice an Alarm has been triggered, press the “Alarm list” and an alarm/fault report will be displayed.

- No.: the number of the current alarm. Useful information when in contact with JBT FoodTech.
- Time: the time when the alarm occurred.
- Status: shows the alarm levels:  
**A** means that the alarm has been acknowledged.  
**C** is an active alarm - check and act upon!  
**D** is an active alarm that has become inactive - should be checked.
- Text: information about the alarm.

### Note!

The Alarm list is recorded in the language in use on the control panel when the alarm was triggered.

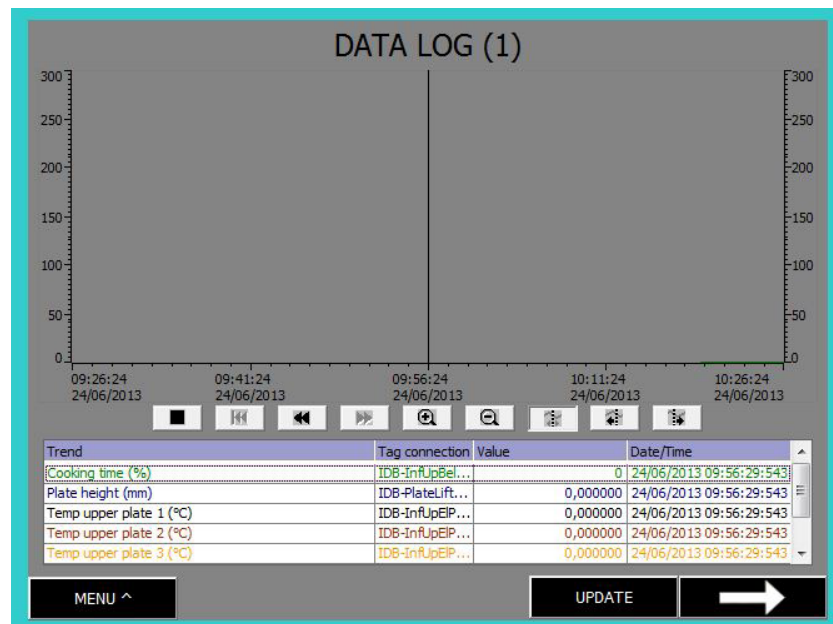
### Reset

Pressing this button resets the alarm. The alarm light will turn off and the audible signal will be silenced. Pressing the “Reset” button on the cabinet door below the screen have the same function.

### History

Pressing this button displays all previous alarms. The list is endless.

### Data log



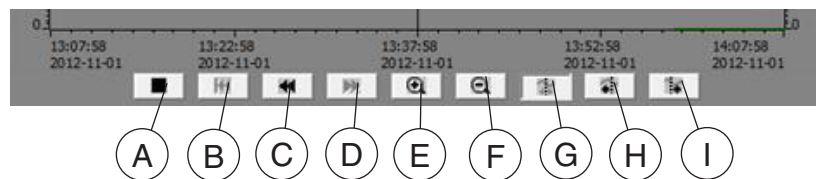
Page displaying the data log

Press the menu button DATA LOGS to open the Data log page. Press the arrows to switch between different Data log pages.

This page displays the values that have been logged into the program, plotted on a graphic curve.

The data logging continuous as long as the machine is powered. The number of graphical curves vary depending on the size and type of facility. Each parameter has a unique color.

The log is saved to an USB memory device attached to the back of the panel. The USB memory can be removed and log files can be copied for analytical purpose. Also see section "Analyzing the log files" below.



The buttons enable exploration of the graph

- Functionality of the buttons:
  - A** halts the logging view. The logging continues in the background and will be updated when pressing the button a second time.
  - B** jumps to the beginning of the log (a month earlier).
  - C** scrolls backward in the log.
  - D** scrolls forward in the log.
  - E** jumps to the end of the log.
  - F** moves the ruler forward.
  - G** moves the ruler backward.

**H** makes the graph zoom in at the ruler position, showing a shorter time span and more details.

**I** makes the graph zoom out at the ruler position, showing a longer time span and less details.

| Trend                                 | Tag connection   | Value    | Date/Time               |
|---------------------------------------|------------------|----------|-------------------------|
| Belt speed                            | IDB-InfBeltDr... | 0        | 14/10/2013 13:02:42:631 |
| Temperature air heater control        | IDB-InfElectr... | 0,000000 | 14/10/2013 13:02:42:631 |
| Temperature air heater alarm sensor 1 | IDB-InfElectr... | 0,000000 | 14/10/2013 13:02:42:631 |
| Steam consumption                     | IDB-InfStea...   | 0,000000 | 14/10/2013 13:02:42:631 |
| Fan speed                             | IDB-InfFanD...   | 0        | 14/10/2013 13:02:42:631 |
| Temperature infeed plate 1            | IDB-Inf/Up...    | 0,000000 | 14/10/2013 13:02:42:631 |
| Temperature outfeed plate 1           | IDB-Outf/Lo...   | 0,000000 | 14/10/2013 13:02:42:631 |

The box displays a list of parameter values which are of importance when logging.

The number of graphs vary depending on size and type of the facility. The box displays:

- Parameter text in the same colour as the corresponding graph.
- The tag connection in the PLC program. Used for debugging only.
- Parameter values.
- Date and time for latest updating.

### Analyzing the log files

#### Note!

To be performed by authorized personnel only.

1. Shut down the control panel to avoid damage to the USB memory device, see section “Shut Down”.
2. Remove the USB memory device from the rear side of the panel and connect it to a PC.
3. Copy the log files from the USB memory to an Excel file.
4. Trend graphs are saved once in a minute for one month in files named:  
Archive\_6\_2014.csv,  
Archive\_7\_2014.csv,  
Archive\_8\_2014.csv etcetera.  
Open the desired .csv file.
5. Select the first column by clicking on A.
6. Access to “Data” and “Text to Columns”.
7. Select “Delimited Fields” and click Next.
8. Select “Semicolon” and click Next.
9. Press “Finish”.
10. Press Ctrl + A to select the entire document.
11. Go to “Insert” and “Line”.
12. Select “2D line”.
13. Press “Switch Row / Column” for correct graph.
14. If you want to save the graph in a different calculation sheet, press “Move Chart”.
15. Select a new sheet and click OK.
16. Save the graph.





### Language

Press the menu button LANGUAGE to open the Language settings box.

Different languages are installed depending on destination. As a basic rule, English and Swedish are always available.

Default language is English. At power interrupt, the machine will return to default language despite chosen language.

Select a language by pressing the corresponding nation flag. All pages will change to the chosen language except the Setup pages, which are always displayed in English.

### Log out

The LOGOUT menu button allows instant logging out from the current account. This can be useful, i.e. to prevent access for unauthorized persons before the time limit expires.

Automatic log out will occur after five minutes of idleness.

### Shut down

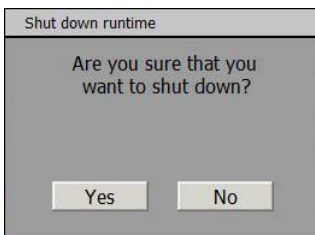
Press the menu button SHUT DOWN prior to turning off the main switch. Perform the operations in this sequence to avoid damaging/corrupting the USB memory device.

This action, if confirmed, will close down the control panel but not the functionality. In the pop-up box, press:

- “No” to cancel the shut down.
- “Yes” and the control panel will shut down.  
Wait until another box pops-up with the commands: “transfer”, ”start”, “control panel” and “task bar”.

This second box is not relevant for the shut down process, but it confirms that the machine now is ready for shut down, i.e. power break at the main switch.

If the machine is in Auto or Manual mode, the facility will still function but no values can be changed.



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## START

### Precautions before starting

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**DANGER!**

DO NOT leave any combustible materials in the cooking zone of the equipment unattended. This could result in an explosion or a fire which may cause severe damage!

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**Warning**

The internal surface of the equipment may still be hot from previous process. Where necessary use suitable personal protective equipment.

---

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1. Be absolutely positive that all guards and safety devices are installed and operative.
2. Make sure that all indicating lights, audible signals, pressure gauges or other safety devices or indicators are in working order.
3. Remove any materials, tools or other foreign objects, from the operating zone, that could cause injury to personnel or damage the machine.
4. Check that the equipment is clean.
5. Check that all supplies are available.
6. Check the fresh water connection and that water is distributed to the belt wash.
7. Check that draining trays and guides<sup>1</sup> are correctly fitted along the cooking belt.
8. Check that the cooking belt is properly stretched and is aligned and in close contact with the heating plates<sup>1</sup>.
9. Check that the equipment is adjusted according to intended product.

<sup>1)</sup> Optional or not on all equipment.

## Start-up procedure

---



### Warning

Stand clear of the cooking belt when it is about to start or in motion.

---

1. Make sure that all personnel are clear of the equipment.
  2. Press the menu button ALARM to enter the Alarm page.
  3. Check for any active alarms, if necessary locate and correct the cause of the alarm.
- 



### Warning

It is of utmost importance to investigate the reason and remedy before resetting any alarms.

---

4. Securely close all doors and hatches.
5. Press the menu button RESET, or press the “Reset” button on the cabinet, to reset any alarms.
6. Press the menu button RECIPE to enter the Recipe page.
7. Load a recipe as described in section “Control panel” subsection “Recipe”.
8. Press the “Start” button on the cabinet. The cooking belt starts after an audible warning.
9. For machines equipped with nonmetallic cooking belts, also ensure the belt is running true and not wandering. The belt tracking should be working automatically.

### Note!

Do not leave the machine unattended at start-up.

~ ~ ~

## PRODUCTION

### Loading the equipment

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**Warning**

JBT FoodTech strenuously recommends the use of hearing protection when operating this equipment, to prevent injury or hearing loss due to the noise generated.

---

**Warning**

When loading, care must be taken to ensure clothing and other loose objects do not get caught in the moving belt.

---

1. Before loading, ensure the equipment is operating correctly.
  2. If applicable, check that appropriate recipe is loaded.
  3. Check that the equipment has reached the required temperature.
  4. Load the product evenly across the cooking belt, or check the product distribution from the previous process.
- 

### Unloading the equipment

---

**Warning**

When unloading, care must be taken to ensure clothing and other loose objects do not get caught in the moving belt.

---

**Warning**

Where manual unloading is necessary, suitable protective equipment must be worn to prevent burn injuries.

---

The outfeed from the cooking belt should be arranged to deposit the processed product into a suitable heat resistant container or onto a suitable transfer mechanism for ongoing processing.

**Note!**

Ensure that the downstream conveyor speed is fast enough to prevent a build up of product at the outfeed of the equipment.

## Controls during production

Regularly check the product result. If necessary, adjust temperature or cooking time.

### Handy tip!

If the product sticks or does not release easily from the belt, apply citric acid to neutralise the pH value. Then allow the belt wash to run for 5–10 minutes.

## Alarms<sup>1</sup>

If a fault occurs, an alarm will be triggered.



### Warning

It is of outmost importance to investigate and act upon any alarm before resetting.

For further information regarding alarms, see section “Control panel”, subsection “Alarms”.



## Noise

Check for unusual noise.

~ ~ ~

<sup>1)</sup> Optional or not on all equipment.

## STOPPING AND COOLING

1. Run the equipment until it is emptied from products.
2. Select the “Cleaning” program on the Recipe page and allow the machine to run for 30 minutes.
3. Press the “Stop” button on the cabinet door.



### Warning

The internal surface of the equipment may still be hot from previous process. Where necessary use suitable personal protective equipment.

---

4. Wait until the automatic door safety switches<sup>1</sup> release. Open all doors and hatches.
5. The cool-down sequence starts automatically if the equipment temperature is above the preset cool-down threshold temperature, typically 120 °C (248 °F). During the cool-down phase, the heating system is disabled while fan(s) and cooking belt(s) continue to run. When the temperature sinks below the cool-down threshold, the equipment automatically shuts down.

The equipment can safely be left in this state during periods of downtime, for example between shifts. If the machine is not to be used for a longer time, it should be powered off at the main switch to save energy.

~~~

<sup>1)</sup> *Optional or not on all equipment.*



## CLEANING

It is recommended that the following cleaning procedure should be carried out daily or at suitable production break.



### Caution

In order to avoid burn injury, we recommend the use of hot water at maximum 60 °C (140 °F) as a safety limit. Always use appropriate/recommended protective equipment.



### Caution

DO NOT attempt to clean the motors, electrical cabinet, air supply cabinet, control panel or outer panels using a foam cleaner or by hosing down. These should only be cleaned with a damp cloth using a suitable cleaning agent. Clean the control panel by wiping with a damp cloth only.



### Caution

Inadequate or poor cleaning can give rise to bacterial infestation and contamination.

---

## Preparations



### Warning

Surface temperatures above 50 °C (122 °F) are hazardous and can cause personal injury.

Furthermore, evaporating could make the remaining cleansing products aggressive.

- 
1. Switch off and allow the machine to cool down as described in section “Stopping and Cooling”. The heating plate temperatures must be below 50 °C (122 °F) before the cleaning starts.
  2. Release the belt tension as described in section “Control panel” subsection “Manual mode”.
  3. Open and latch the doors.
  4. Remove all product guides from the machine.
  5. Open the wash access panels on both sides, a key is required. Open the wash lids.
  6. Protect the electrical cabinet, air supply cabinet and control panel from splashing water.

## Rinsing

---



### Caution

Charred, burnt-on fats (coke) on heating, infeed, and outfeed plates, or on the rollers, can have sharp edges that may damage the cooking belt.

---

1. Rinse the cooking zone from grease, fat, and residues with hot water 55–60 °C (131–140 °F), using high-pressure or steam.
  - Rinse all heating, infeed, and outfeed plates. The surface and the space between plates must be free from coke and grease. Remove residues using a plastic scraper.
  - Rinse the rollers to maintain good friction towards the belt. Remove remaining residues using a scouring sponge, stainless steel wool, or a plastic scraper.

**Note!** If a drive roller surface friction is still poor, roughen the surface using a scouring sponge, or buff using a circular (rotating) wire brush.

  - Rinse the belt wash(es). Remove remaining residues using a scouring sponge, stainless steel wool, or a plastic scraper.
  - Rinse the scrapers. Use a plastic scraper or high-pressure spray. Disassemble scrapers to allow easier access.
  - Rinse the earlier removed product guides.

## Cleaning

JBT FoodTech recommends the use of Ecolab P3-TOPAX cleansing and disinfectant products. If you choose equivalent products, your supplier is responsible for ensuring equivalence to Ecolab products. JBT FoodTech accepts no liability for, nor any duty to investigate, incidents where suppliers other than Ecolab have been used.

### Note!

Use P3-TOPAX 17 for aluminum and other “soft” metals and P3-TOPAX 36 for stainless steel and chrome. For more information about the cleansing products, refer to the supplier’s product information enclosed with each product. Data sheets are also included in Appendix.

---



### Warning

The customer is responsible for reading and adhering to the selected cleaning agent manufacturer’s information regarding use and recommended solution strength(s).

All operators should be made aware of the hazards associated with the cleaning agent used and use appropriate personal protective clothing.

---



**Caution**

If cleanser residues remain on the surfaces after cleaning, the water in the solution will evaporate and the chemicals may become aggressive. This will reduce the service life considerably.

1. For machines equipped with a hot air system, clean the hot air channel:
    - apply suitable cleanser inside the channel, on heat exchangers and fans. Leave for 10–20 minutes but do not allow to dry on surface.
    - rinse with hot water 55–60 °C (131–140 °F).
  2. Apply suitable cleanser on the infeed, outfeed, and heating plates. Leave for 10–20 minutes but do not allow to dry on surface.
  3. Rinse the plates with hot water 55–60 °C (131–140 °F). If necessary, use a plastic scraper, apply more cleanser and repeat the plate cleaning procedure.
  4. Clean inside and outside of the washes with a suitable cleanser. Take extra care to clean spray nozzles and grain holes thoroughly.
  5. Close and lock the wash lids.
  6. Ensure the cooking belt is centralized.
  7. Tension the cooking belt. This will give some protection to the heating plates during the rest of the cleaning schedule.
  8. Clean the remaining machine parts.
    - Spray on suitable cleanser. Leave for 10–40 minutes but do not allow to dry on surface.
    - Rinse with hot water 55–60 °C (131–140 °F).
    - If necessary, use a plastic scraper, apply more cleanser and repeat the cleaning procedure.
- Handy tip!**  
A blast of dry ice can make it easier to clean exceedingly dirty items.
9. Clean all removed parts, such as product guides, with a suitable cleanser.
  10. Rinse the removed parts with hot water 55–60 °C (131–140 °F). If necessary, use a plastic scraper, apply more cleanser and repeat the plate cleaning procedure.
  11. Assemble the earlier removed parts and ensure correct function.
  12. Close and lock the access panels.

**Caution**

Special care must be taken to ensure that liquids do not enter the side air vents or around the door seals of the electrical cabinet or the air supply cabinet. Ensure that liquids do not enter the protective covers of the control panel.

---

13. Carefully clean by hand the outside casing, motors, the electrical cabinet, and the air supply cabinet.
  - If necessary, spray on suitable cleanser and leave for 10–20 minutes. Do not allow to dry on surface. **DO NOT** use any cleaning agent on the control panel.
  - Use a soft sponge to remove grease, residues and product remnants.
  - Wipe off with a damp cloth. Do not use a water hose or high-pressure. Frequently rinse the cloth in fresh water.
14. Release the belt tension as described in section “Control panel” subsection “Manual mode”.

**Disinfect****Caution**

If disinfectant residues remain on the surfaces, the water in the solution will evaporate and the chemicals may become aggressive. This will reduce the service life considerably.

---

1. Disinfect the whole machine, outside and inside, including the heating plates, heat exchangers, and hot air fans, if present. Use P3-TOPAX 99 or P3-TOPAX 990.
  - Spray on disinfectant. Leave for 15–60 minutes. **DO NOT** spray on the motors, electrical cabinet, air supply cabinet, or control panel.
  - Rinse thoroughly with hot water 55–60 °C (131–140 °F). Do not use high-pressure.
2. Dry off the heating, infeed and outfeed plates using a squeegee to remove any trace of water. Remaining water can cause the belt to stick to the plate, resulting in a break or tear.
3. Tighten the belt tension as described in section “Control panel” subsection “Manual mode”.

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# ***MAINTENANCE***



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## SAFETY PRECAUTIONS

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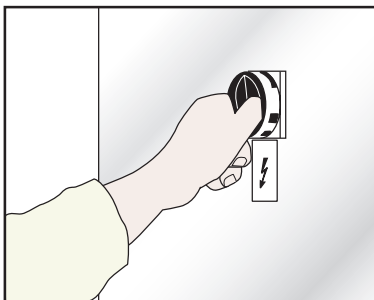
### **DANGER!**

Failure to obey the safety precautions could result in death or serious injury and/or damage to property and equipment.

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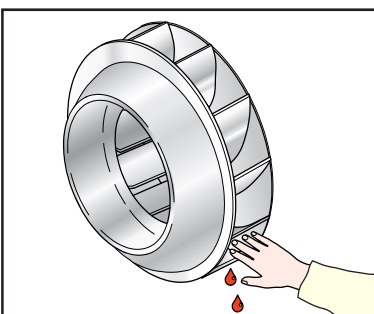
- Ensure that any local safety regulations are known, understood and followed.
- All procedures described in this manual should be carried out by authorized personnel.
- JBT FoodTech's personnel are not permitted to perform work alone.
- When directed to make adjustments on machines in motion, extreme care must be taken.
- Before any work is started, make a risk assessment.
- Prior any work, the person responsible for health and safety and nearby personnel have to be well-informed about the plans and procedures of the intended work.
- Never operate any controls while other persons are performing maintenance on the machine.
- Do not by-pass a safety device.
- Always use the proper tool for the job.
- Never open covers that house electrical components with power on.
- If present, should all air and hydraulic pressure be relieved before performing maintenance or loosening connections on any pressurized system.
- If present, should air, hydraulic, and electrical power be turned off unless absolutely required for the specific servicing being performed.
- Replace fuses only when electrical power is off (locked out).



### **Lock out / Tag out / Verify**

Before any maintenance work is started within the equipment, always follow the "Lock out/Tag out/Verify" procedure:

1. Switch off the main power supply and lock it with a pad lock. Keep the key in your pocket.
2. Hang a "Do not operate" tag with your name on the switch.
3. Verify that the power is off.



### **Warning**

Certain components, for example fans, may continue to move several minutes after the equipment is shut down. Do not get near the equipment before all parts have come to a complete stop.

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## Securing the equipment prior to work

- Do not cut into pressurized tubes, vessels or live cables.
- Ensure that heavy components in the equipment are securely and stable supported before they are detached.
- Before carrying out any potentially dangerous work on an item of equipment, it should be mechanically isolated, depressurised, drained if appropriate, and made safe.
- Make the equipment electrically safe, see chapter “Safety”, section “Electrical System”.
- Isolate the equipment from, if present, steam, gas, fuel, and air supplies, by closing all inlet isolation valves.
- When closing a valve the handwheel or lever should be removed. If not possible, the handwheel or lever should be securely fixed in a secure position to prevent the valve is accidentally opened.
- Never rely on any isolation valve when a line connection is broken, unless there are no doubts that the valve and its mechanical seat is operation satisfactorily. In event of any doubts, a blank flange should be fitted instead of the valve.
- All closed valves should carry a sign or label stating “DO NOT OPEN THIS VALVE, WORK IN PROGRESS”.
- Where necessary, depressurise the equipment by slowly opening the relevant vent or drain valves as appropriate.

~ ~ ~

**PREVENTIVE MAINTENANCE SCHEDULE**

This schedule is a suggestion on maintenance intervals. Use the schedule to report maintenance.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Daily Maintenance																										
Monday																										
Tuesday																										
Wednesday																										
Thursday																										
Friday																										
Saturday																										
Sunday																										
Weekly Maintenance																										
Monthly Maintenance																										

Week	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Daily Maintenance																										
Monday																										
Tuesday																										
Wednesday																										
Thursday																										
Friday																										
Saturday																										
Sunday																										
Weekly Maintenance																										
Monthly Maintenance																										
Six Months Maintenance (date)																										
Yearly Maintenance/Adjustment (date)																										





## CONTINUOUS MAINTENANCE

Make a copy of the Preventive Maintenance Schedule and sign for every maintenance occasion described below. Save the schedule for a minimum of two years.

### Note!

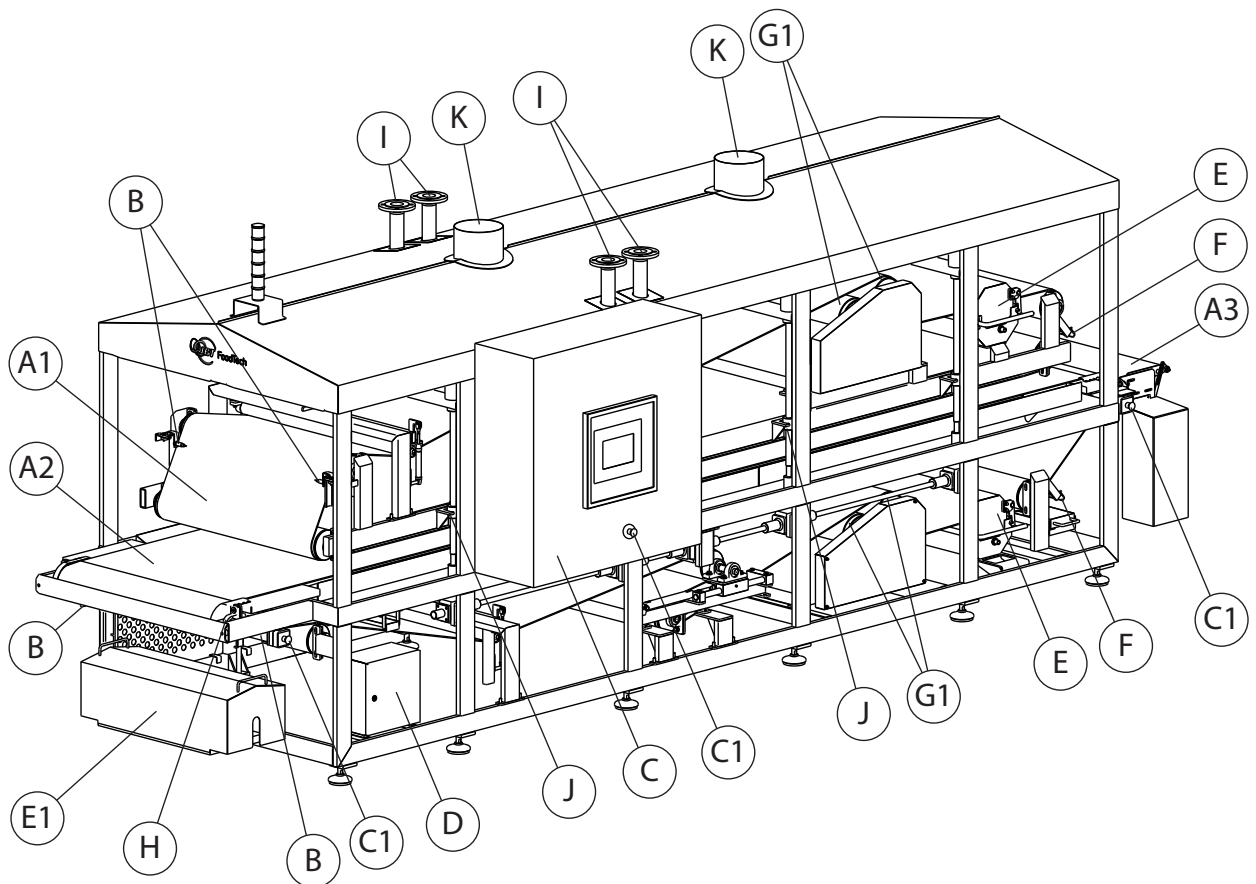
The recommended service intervals are valid for one-shift operation. For two- or three-shift operation the intervals should be shortened by half.



### Warning

Temperatures above 50 °C (122 °F) are hazardous and can cause personal injury.

Before undertaking any maintenance or repair work, ensure the heating plate temperatures are 50 °C (122 °F) or less



Pos. No.	Maintenance place	Type of maintenance	Every day	Every week	Every month	Twice / year
<b>A</b>	<b>Belts</b>					
	A1. Cooking belt, upper	Check belt for damages.	X			
	A2. Cooking belt, lower					
	A3. Conveyor belt, infeed <sup>1</sup> /outfeed <sup>1</sup>					

<sup>1)</sup> Optional or not on all equipment.

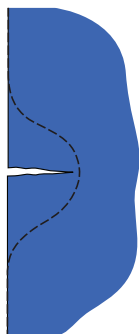
## MAINTENANCE

Pos. No.	Maintenance place	Type of maintenance	Every day	Every week	Every month	Twice / year		
<b>B</b>	<b>Sensors</b>							
	Belt tracking Belt alarm <sup>1</sup>	Check function and position				X		
<b>C</b>	<b>Electrical equipment<sup>2</sup></b>							
	C1. Emergency stops Door safety switches	Check function			X			
	Junction boxes; connections Cables	Check tightness Check condition				X		
	Electrical cabinet ventilation	Check filters Change filters		X		X		
	Electrical cabinet door seals Control cabinet <sup>1</sup> door seals	Check condition				X		
	<b>D</b>	<b>Pneumatic equipment</b>						
		Air cabinet connections Air filter	Check the incoming air pressure Check condition				X X	
		Air hoses Air cabinet door seals	Check for leaks Check condition		X		X X	
<b>E</b>		<b>Wash</b>						
	Nozzles Water hoses Water temperature	Check position and condition Check for leaks Check	X					
	E1. Water pump	Check service status Check the filter Check gear oil Change gear oil		X			X X X X	
		<b>F</b>	<b>Debris scraper</b>	Check position and condition	X			
		<b>G</b>	<b>Rollers</b>					
			G1. Drive rollers All rollers	Check coating condition Check for damages and residues		X X		
	<b>H</b>		<b>Bearings</b>					
		Check and fasten all screws Check that all bearings run freely		X		X		
<b>I</b>	<b>Thermo fluid system<sup>1</sup></b>							
	Flexible tube Heating plates and connections	Check condition Check for leakage	X X					
	<b>J</b>	<b>Frame lift</b>	Calibrate	X				
<b>K</b>	<b>Exhaust fan</b>	Check function	X					

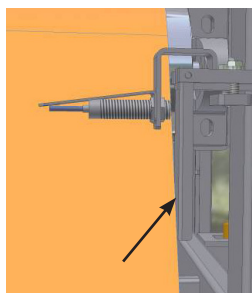
Lubricate as described in section "Lubrication".

<sup>1)</sup> Optional or not on all equipment.

<sup>2)</sup> Checks on electrical equipment should be carried out by qualified technicians only.



*Cutting pattern*



*Belt tracking sensor*

## Belts

Perform condition checks for all belts with the belt running:

1. Check the belt for irregularities and damage.

If a belt made of PTFE gets a small tear at the belt edge:

1. Stop the belt.
2. Cut around the tear according to the illustration.

## Sensors

### Belt tracking

Function check:

1. Move the belt positioner (arrow) sideways by hand.
2. Check that the tracking roller try to compensate.
3. Repeat for all belt positioners.

### Belt alarm <sup>1</sup>

Function check:

1. Block the sensor during the time given on Belt tracker setup page, at “Belt tracker alarm delay”.
2. Observe that an alarm is triggered on the Belt tracker setup page.
3. Repeat with all belt alarm sensors.

## Electrical equipment



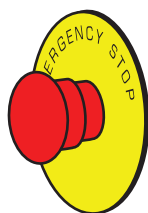
### Warning

Checks on electrical equipment should be carried out by a qualified electrical engineer.

## Door safety switches

Function check:

1. Open a door and check that the “Door open” alarm is triggered.
2. Reset the alarm.
3. Close the door and repeat the procedure until all doors have been checked.



## Emergency Stop button and Safety relay

Check that:

- The terminal connections are tightly fitted.
- The LEDs operate correctly.
- The safety relay locks out on single faults.

<sup>1)</sup> Optional or not on all equipment.

To check the safety relay, proceed like this:

1. Set the equipment to full operational mode, i.e. that the cooking belt, heating, and steam<sup>1</sup> are operating.
2. Press any Emergency Stop button.
3. Ensure the unit shuts down and cannot be restarted with the Emergency Stop button latched in.  
**Note!** The cooking belts should “dead” stop.
4. Reset the Emergency Stop button.
5. Press the menu button ALARM to enter the Alarm page.
6. Press the Reset button several times to remove “false” alarms. If any alarm remains on the Alarm page, this is an active alarm and it is necessary to locate and correct the cause of the alarm before resetting it.
7. Press the Start button.
8. Repeat for each Emergency Stop button fitted to the unit.

### **Note!**

Where the safety relay monitors more than one device, e.g. Emergency Stop buttons, the lock out checks **MUST** be repeated for each device in turn.

### **Electrical cabinet**

Check the condition:

1. Check the rubber seal in door.
2. Check the junction boxes for leakage.
3. Check the connections for loose screws.
4. Check the cables for damage.
5. Check the air inlet filters. Replace when necessary.

During normal conditions, the cooling fan filter should be replaced twice a year. In operational environments containing high levels of aerosols the filter should be replaced more frequently.

### **Control cabinet<sup>1</sup>**

Check the condition:

1. Check the rubber seal in door.

### **Pneumatic equipment**

Check the condition:

1. Check the rubber seal in door.
2. Check that the incoming air pressure is 6–8 bar.
3. Check the air hoses for damage.
4. Check the air inlet filter. Replace when necessary.

### **Wash**

Check the condition and setting:

1. Check nozzles.
2. Check water hoses for leaks.
3. Check that the water temperature is 55–60 °C (131–140 °F).

<sup>1)</sup> *Optional or not on all equipment.*

## Water pump

### General maintenance

1. Check the service status of the pump according to the manufacturers manual, see appendix.
2. Check the filter; replace when necessary.
3. Check the gear oil.

### Changing oil

Initial oil change after 50 hours of operation. Subsequent changes after every 200 hours or every six months of operation, whichever is the sooner. For suitable oil, see section “Recommended lubricants”.



### Caution

When operating in areas with high humidity or high temperature fluctuations, oil and condensate can emulsify in the gearbox. If frothy oil is observed in the gearbox, the oil must be changed.

- 
1. Remove the oil plug.
  2. Drain the oil by removing the bottom plug.
  3. Fit the bottom plug.
  4. Fill with oil according to section “Recommended lubricants”.
  5. Fit the oil plug.

The NPSH (net positive suction head) values must be observed.

- Maximum input pressure: 10 bar
- Maximum suction head: -0.3 bar

For further information, please refer to manufacturer’s manual in appendix.

## Debris scraper

Check the condition and setting:

1. Make sure the debris scraper is securely fastened and align with the cooking belt.
2. Check the debris scraper, for wear, deep scratches and deformation. Replace when necessary.

## Rollers and bearings

Check the condition:

1. Check surface friction on drive rollers. Roughen the rubber surface if necessary. Use a scouring sponge, or buff using a circular (rotating) wire brush.
2. Check that all rollers rotate and are fixed sideways to the shaft in the correct position.
3. Check for wear, deep scratches and deformation. Replace when necessary.
4. Check that all bearings run freely. Replace when necessary.



### Flexible tube

Check for wear or damages. Replace when necessary.

### Exhaust fan

Check function

### Annual adjustment

To ensure consistent and reliable production, JBT Foodtech recommends a complete adjustment of rollers and plates once a year. This should be performed by at least two people and with the cooking belts removed.

After the adjustment, and before starting production, a test run should be carried out on the machine. Follow the procedure described in chapter “Delivery information”, section “Test run”.

Depending on machine type, up to two days interrupted production may be experienced.

~ ~ ~

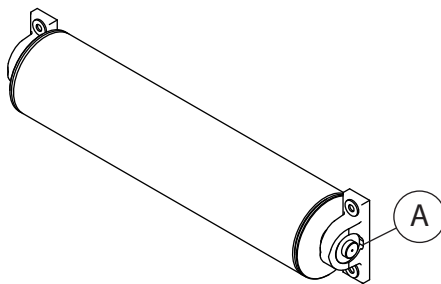
## LUBRICATION

Use the lubricants described in section “Recommended lubricants”.

### Note!

The recommended intervals between lubrication are valid for one-shift operation. For two- or three-shift operation the intervals should be shortened by half. If very hot water is used during cleaning, the lubricating intervals should be shortened by half.

## Lubrication points

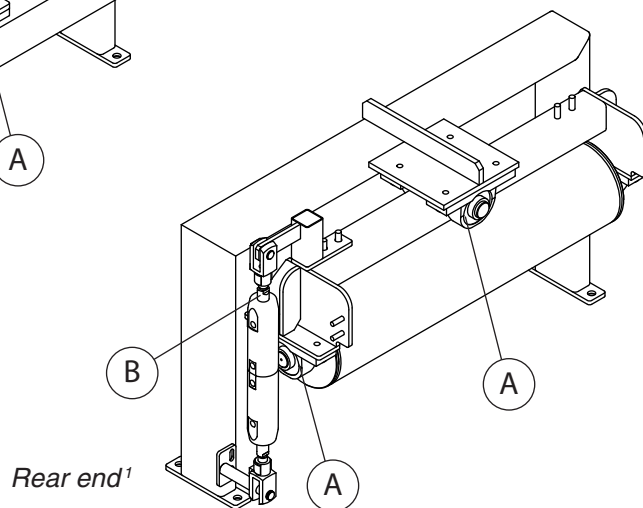
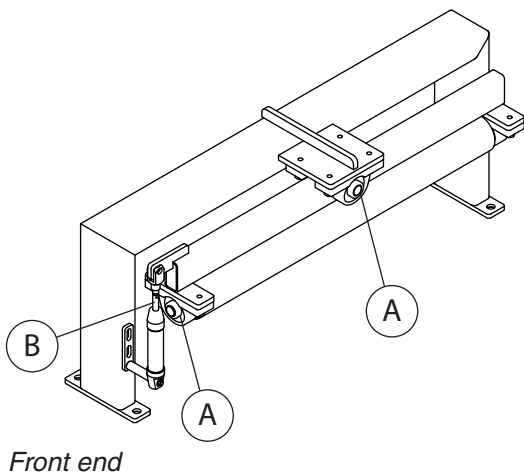


### Rollers

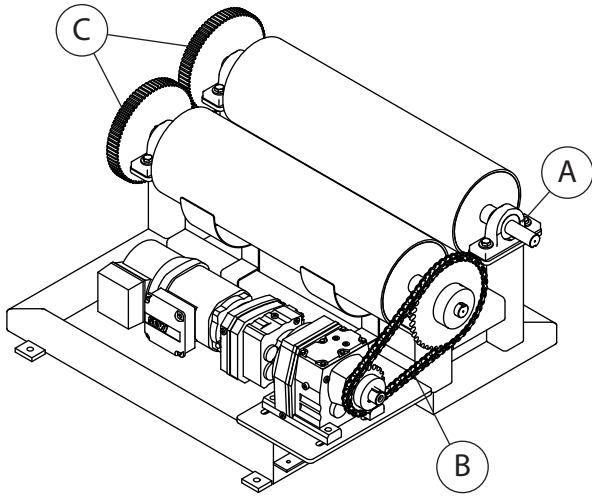
Pos.	Place	Every day	Every week	Twice /year
A	Nipple on all bearings		X	

### Belt tracking

Pos.	Place	Every day	Every week	Twice /year
A	Nipple on all bearings		X	
B	Cylinder piston	X		

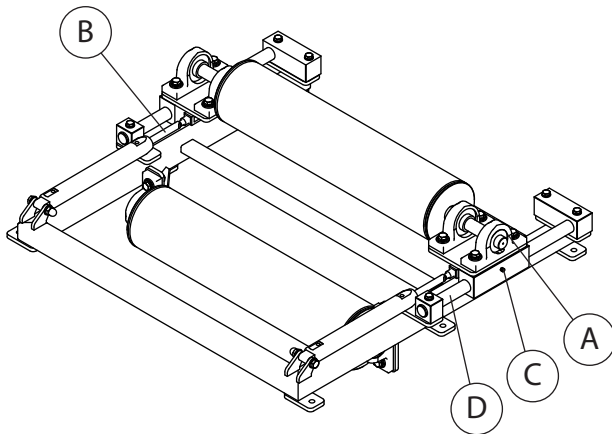


<sup>1)</sup> Optional or not on all equipment.



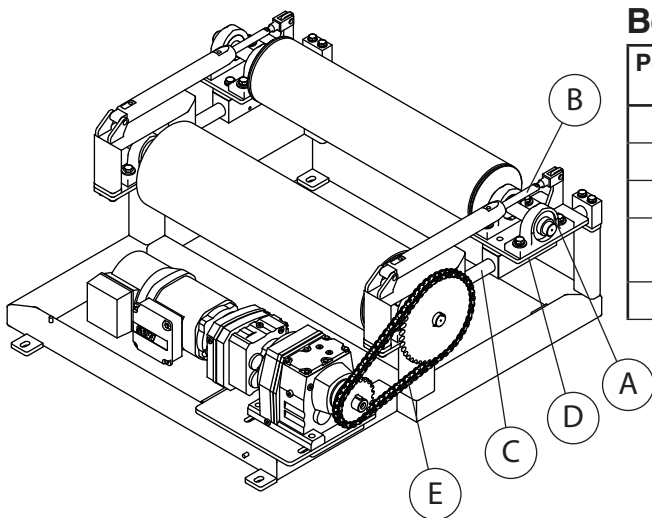
### Belt drive<sup>1</sup>

Pos.	Place	Every day	Every week	Twice /year
A	Nipple on all bearings		X	
B	Chain transmission			X
C	Cog wheels			X



### Belt tension<sup>1</sup>

Pos.	Place	Every day	Every week	Twice /year
A	Nipple on all bearings		X	
B	Cylinder pistons	X		
C	Nipple on tension blocks	X		
D	Slide face at tension blocks	X		



### Belt drive combined with belt tension<sup>1</sup>

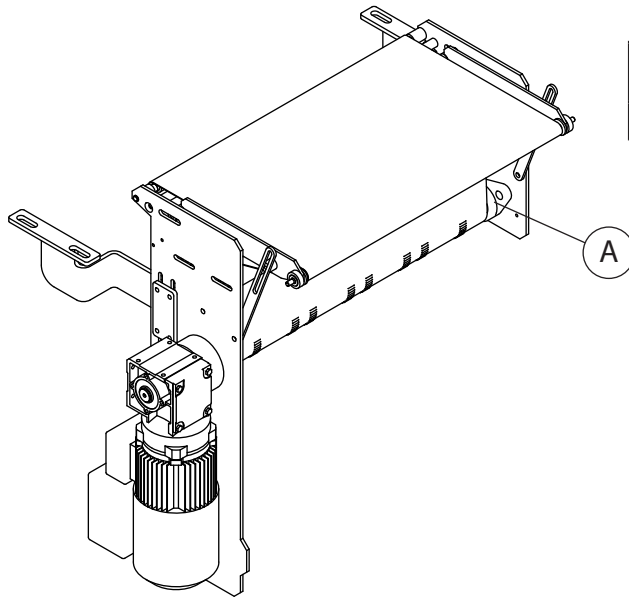
Pos.	Place	Every day	Every week	Twice /year
A	Nipple on all bearings		X	
B	Cylinder pistons	X		
C	Nipple on tension blocks	X		
D	Slide face on tension blocks	X		
E	Chain transmission			X

<sup>1)</sup> Optional or not on all equipment.



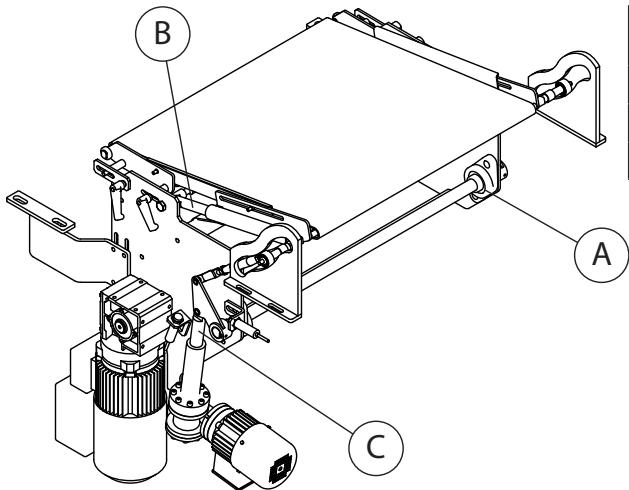
## Infeed<sup>1</sup> / Outfeed<sup>1</sup> conveyor

Pos.	Place	Every day	Every week	Twice /year
A	All flanged bearings		X	



## Flip<sup>1</sup>

Pos.	Place	Every day	Every week	Twice /year
A	All flanged bearings		X	
B	Telescopic piston	X		
C	Lift engine piston	X		



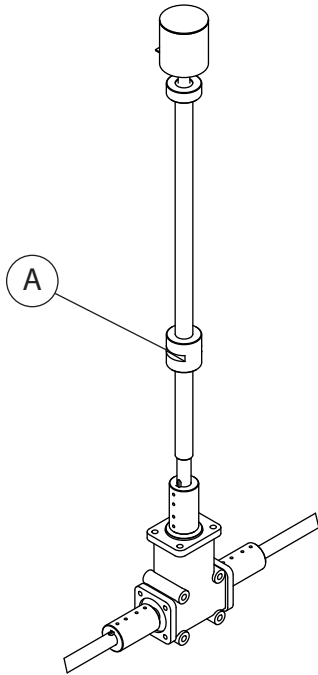
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<sup>1)</sup> Optional or not on all equipment.

**MAINTENANCE**

**Frame lift<sup>1</sup>**

Pos.	Place	Every day	Every week	Twice /year
A	All lifting nuts		X	



~ ~ ~

<sup>1)</sup> *Optional or not on all equipment.*

## RECOMMENDED LUBRICANTS

Use only approved class H1 food grade oils/lubricants capable of withstanding working temperatures of 160 °C (320 °F).

### Oils

#### Drive motor

Shell Cassida Fluid GL460.

#### Frame lift motor<sup>1</sup>

Shell Cassida Fluid GL460.

#### Flip motor<sup>1</sup>

Klübersynth UH1 6-460.

#### Conveyor motor<sup>1</sup>

Klübersynth UH1 6-460.

#### HP pump

ISO VG 220 GL4 (e.g. Aral Degol BG220) or  
SAE 90 GL4 gear oil.

#### Cylinder pistons<sup>1</sup>

Food graded paraffin oil. Total Nevastane AW22

### Grease

For lubrication of cog wheels, sprockets, chains, bars, and bearings:

White grease (400 g) spare part No. 308498A

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<sup>1)</sup> Optional or not on all equipment.



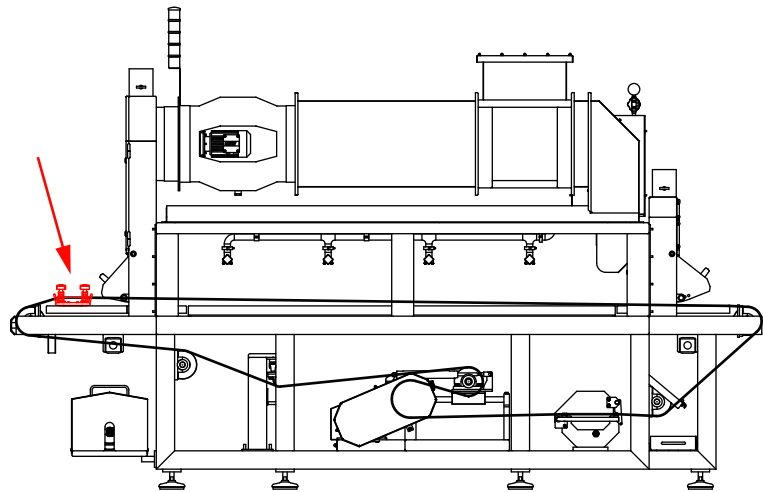
## COOKING BELT REPLACEMENT

To replace the cooking belt, proceed like this:

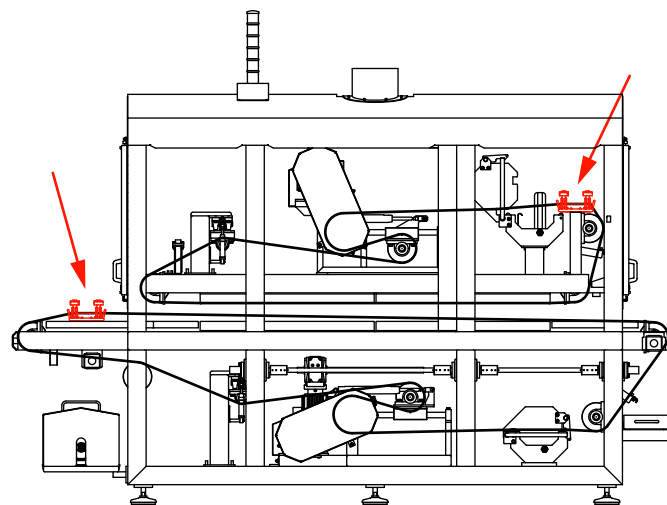
1. Release the belt tension on the Manual mode page, see chapter "Operation" section "Control panel".
2. Cut the old belt and pull it out.
3. Ensure that plates and rollers are clean. If necessary, clean as described in chapter "Operation" section "Cleaning".
4. Thread the new cooking belt as displayed on the Machine picture setup page, see chapter "Operation" section "Control panel". Feed the new belt into the machine and weld the seam. How to weld and repair the belt is described in appendix "Belt repair instructions".

### Note!

The welding must be made with the belt in position on the machine.



Placement of welding plate (arrow) on a Combi Cooker (typical).



Placement of welding plates (arrows) on a Contact Cooker (typical).

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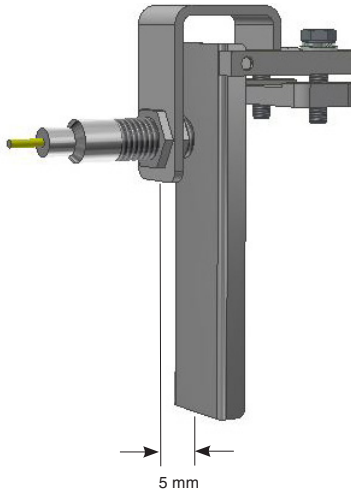
# *MAINTENANCE*

### **BELT POSITIONER ADJUSTMENTS**

Check the setting of the belt positioners for belt tracking. Adjust if necessary.

1. The distance between the belt positioner and the sensor should be 5 mm. Adjust with the nuts.
2. Centre the belt in the middle of the rollers.
3. The distance between the belt positioner and the belt should be 0 mm. Adjust with the screws and nuts.

This is the basic belt positioner setting. It is possible to adapt to current circumstances.



*Belt positioner and sensor*

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# *MAINTENANCE*



## COOKING BELT ADJUSTMENTS

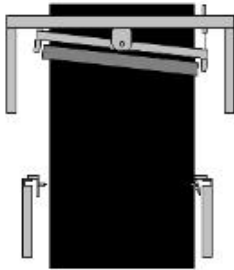


Illustration showing a tracking roller centralizing a belt

The band tracking runs automatically. If the cooking belt moves sideways and touches the belt positioner, the sensor will signal to the valve in the air cabinet to affect the tracking cylinder. The cylinder arm will depress or expand, forcing the tracking roller to steer the belt in position.

The belt must run fairly straight in order to remain durable. If the belt starts to wander considerably, adjustments need to be made.

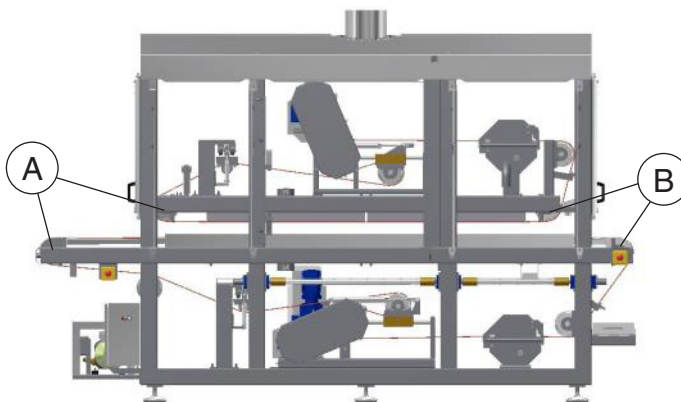
Several conditions contribute to the belt movements. The belt could be new/aged, cold/warm, with/without product, or have an uneven splice.

If adjustments are necessary, proceed in the following order until the problem is solved:

### Note!

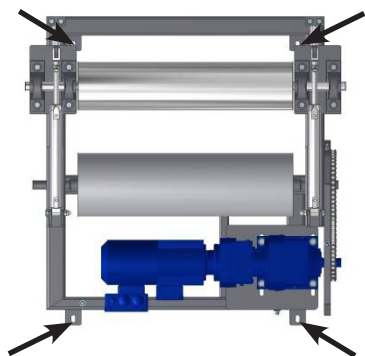
Do NOT make any adjustments to the end rollers!

1. Check if the belt is running straight at the infeed end roller (A). If not, adjust the belt positioners. See section "Belt positioner adjustments".
2. Check if the belt is running straight at the outfeed end roller (B). If not, adjust the belt positioners. See section "Belt positioner adjustments".



- A. Infeed end roller
- B. Outfeed end roller

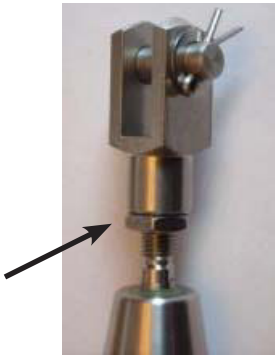
Schematic illustration of the end rollers. These should NOT be adjusted.



Belt drive/tension unit.  
Loosen three out of four screws

3. Adjust the belt drive unit. First mark out the position of the unit on the frame with a pen.
4. Loosen three of the screws. Note! Leave the fourth screw fastened. See arrows. Make only small adjustments at a time. Fasten the screws.
5. Run the belt until the effect of the adjustment is visible. Repeat if necessary.
6. If it is not combined with the belt drive unit, repeat for the belt tension device.

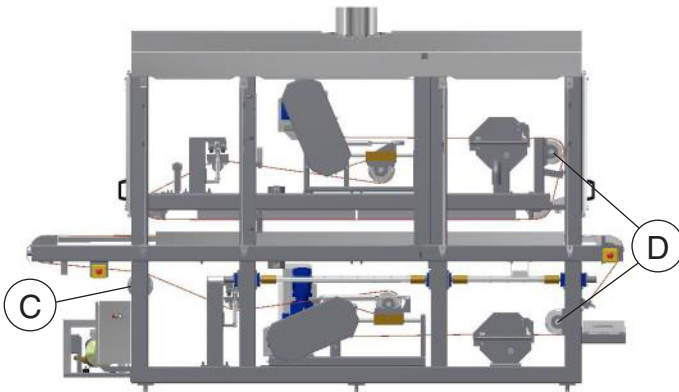
## MAINTENANCE



Tracking cylinder adjustment point

7. Check if the tracking roller is working satisfactory. If it unsuccessfully try to correct the belt at one side, loosen the nut (see arrow) and adjusting the head lock ring and attachment of the tracking cylinder could approve.

8. Loosen the nuts and adjust the rear roller (D) until the belt runs in the middle.



- C. Front roller
- D. Rear roller

Schematic illustration of the location of the belt rollers.

9. If necessary, repeat for the front roller (C).
10. If the belt is still not running straight, reset the machine to original state:
  - Center the cylinders
  - Center the stations
  - Center the rollers
  - Center the belt onto the rollers.
11. Change the cooking belt.

~~~

## FRAME LIFT ADJUSTMENTS

The height of the heating plates must comply with the values on the control panel in order to achieve the desired cooking results.

### Note!

Before adjusting the frame lift, check that the upper and lower plate beds are parallel. Adjust if necessary, see section “Heating plate adjustments”.

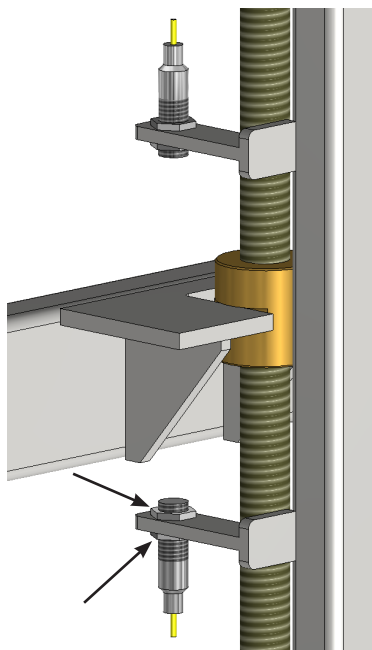


1. Press the “Stop” button to stop the machine and wait until the cooking belt automatically stops.
2. Enter the control panels Main page.
3. Enter the value “0” in the lighter shaded box under “Plate lift height”. The value given in the box below, e.g. 5, is the calibration value.
4. Proceed to the “Manual mode” page. Press and hold the “arrow down” button to move the lift down until it stops at the lower sensor.



### Caution

Take care to avoid that the upper and lower plates get in contact as this may cause severe machine damage.



*Upper and lower plate lift sensors*

5. Put a plastic spacer of the same size as the calibration value, e.g. 5 mm, between the plates. Put the spacer in a corner and make sure that it also covers both cooking belts.
6. Adjust with the lower lift sensor until the spacer fits. To reduce the gap, loosen the nuts (see arrows) and turn the sensor counterclockwise until the LED goes out. To increase the gap, turn the sensor clockwise. Fasten the nuts.
7. Remove the spacer and press the “arrow up” button to raise the lift a few millimetres.
8. Press the “arrow down” button to move the lift down until it stops at the lower sensor.
9. Check with the spacer.
10. Repeat until the gap is consistent to the Main side value.
11. Enter the Frame lift setup page and calibrate the lift.

~~~



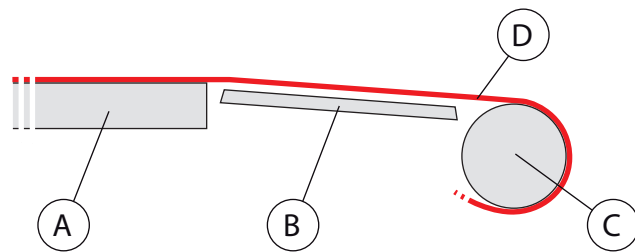
## HEATING PLATE ADJUSTMENTS

The upper and lower heating plates must be parallel to achieve an uniform cooking.

At adjustment, all plates must be free of residues, grease and coke. Clean if necessary, see chapter “Operation” section “Cleaning”.

### Lower plate bed

1. Cut and remove the cooking belt.
2. Tie two strings, very tight, along the edges of the plates (A) and around the end roll (C), see illustration. Adjust the infeed/outfeed plate (B) to a minimum distance of 1 mm below the strings. This is to avoid contact between the feed plate and the strings during adjustment.



- A. Heating plate
- B. Infeed/outfeed plate
- C. End roll
- D. String

*How to tie the strings*

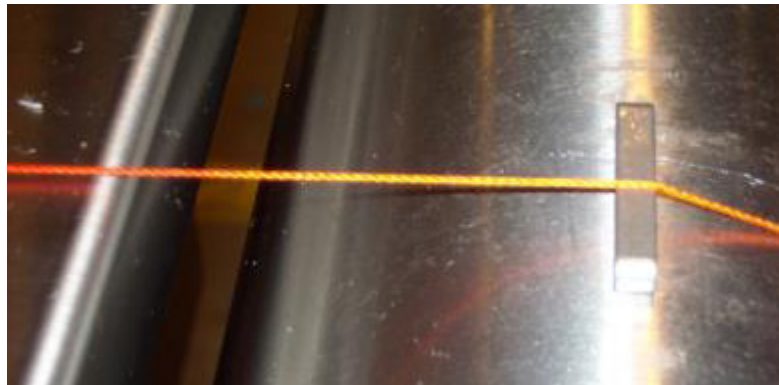
3. Each plate has up to nine adjustment bolts. Start by loosening the nuts on the first plate. Leave the corner bolts but loosen all other nuts, see illustration.



*Adjustment bolts.*

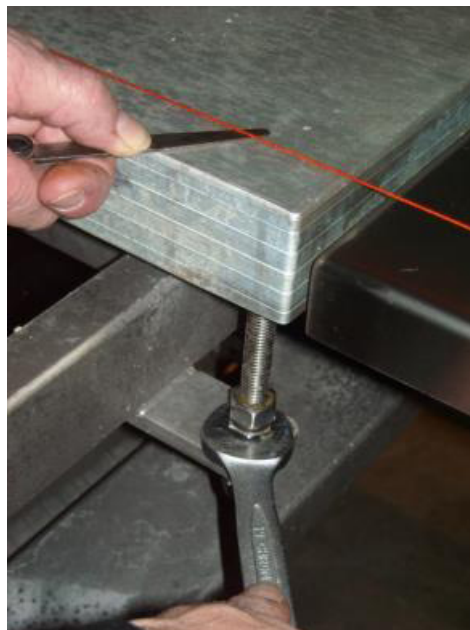
## MAINTENANCE

4. Put a 6 mm spacer between the string and the end roller.



*Location of the spacer*

5. The distance between the string and the heating plate should now be 1 mm. Check using a spacer placed directly over the corner bolt. Adjust the height using the nuts in the corners, one side at a time.



*Height adjustment with the corner bolt*

6. Repeat with the remaining heating plates.
7. Check the plates versus the strings once more.
8. Tighten all the nuts loosened earlier.
9. Adjust the infeed and outfeed plates to be aligned to and in close contact with the strings.
10. Cut and remove the strings.
11. Assemble a new cooking belt.



## Upper plate bed<sup>1</sup>

First adjust the lower plate bed.

1. Cut and remove the cooking belt.

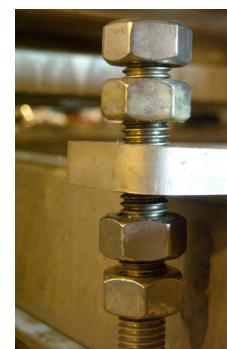
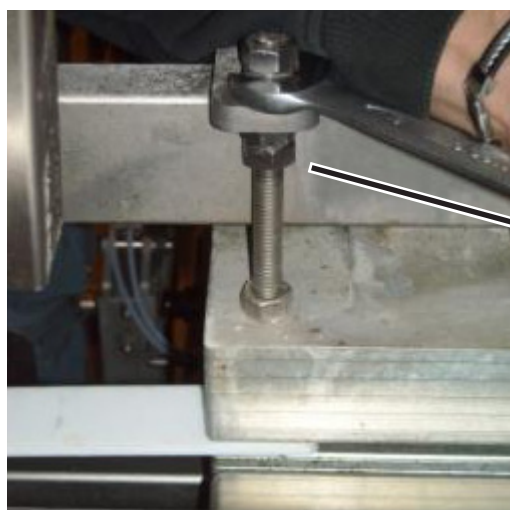


### Caution

Take care to avoid that the upper and lower plates get in contact as this may cause severe machine damage.

Remove all objects from the lower plate bed.

2. Each plate has up to nine adjustment bolts. Start by loosening the nuts on the first plate. Leave the nuts on the corner bolts but loosen all other nuts, see illustration.



*Nuts to be loosened*



3. On the control panels Main page, enter the value “5” in the lighter shaded box under “Plate lift height”.
4. Proceed to the “Manual mode” page. Press and hold the “arrow down” button to move the lift down until it stops at the lower sensor.
5. Put a 5 mm plastic spacer between the upper and lower plates.



*Plastic spacer*

6. Adjust with the nuts in the corners, one side at a time, until the spacer fits.
7. Repeat with the remaining heating plates.

<sup>1)</sup> *Optional or not on all equipment.*

## *MAINTENANCE*

8. Check the distance between upper and lower plates once more.
9. Tighten all the nuts loosened earlier.
10. Assemble a new cooking belt.

Continue by adjusting the lift, see section “Lift Adjustments”.

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## **INFEED/OUTFEED CONVEYOR ADJUSTMENTS**

Height and angle are adjusted manually.

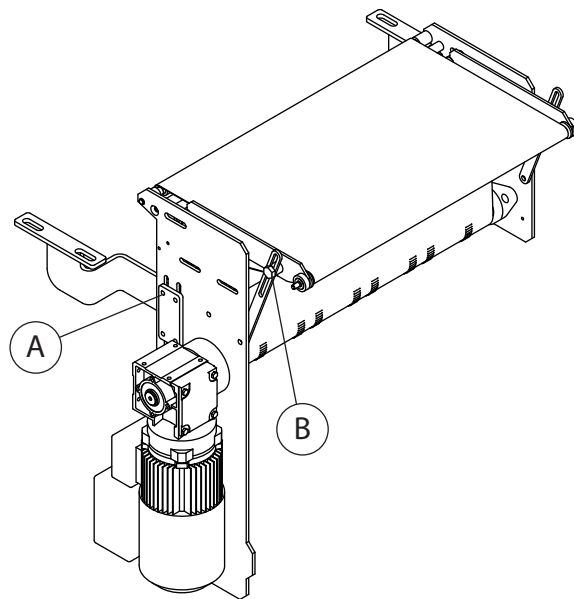
### **Adjust height**

1. Loosen the four screws (A) on each side of the conveyor.
2. Slide the loosened screws in the slots to either raise or lower the unit.
3. Tighten the screws (A).

### **Adjust angle**

1. Loosen the screws (B) on each side of the conveyor.
2. Adjust up or down.
3. Tighten the screws (B).

On some equipment, this construction is replaced by turnbuckles.



- A. Screw (8 pieces)
- B. Screw (2 pieces)

~ ~ ~

<sup>1)</sup> *Optional or not on all equipment.*

# FAULT FINDING



0000-11-01GB-00-00



**EQUIPMENT FAULTS**

| Symptom                                            | Cause                                                               | Remedy                                                                                                                                                                                                                                                                            |
|----------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment not working                              | No electrical power                                                 | Check supply.                                                                                                                                                                                                                                                                     |
|                                                    | Main contactor not energised                                        | Check main switch and switch ON if OFF. Check and replace main switch if faulty. Check all contacts in circuit (see appendix “Drawings and Wiring Diagrams”).<br><b>Note!</b><br>Contacts are wired in series. Any one open circuit will prevent the main contactor from closing. |
|                                                    | High temperature                                                    | Allow equipment to cool. Restart by switching OFF and back ON at the main switch.                                                                                                                                                                                                 |
| Equipment not starting                             | Emergency stop activated                                            | Check and reset.                                                                                                                                                                                                                                                                  |
|                                                    | Air pressure guard <sup>1</sup> activated                           | Check for air leaks in the machine. Adjust the pressure guard.                                                                                                                                                                                                                    |
| Over temperature protection <sup>1</sup> initiated | High temperature switch <sup>1</sup> tripped                        | Allow equipment to cool. The thermal overheat protection switch must be reset manually.                                                                                                                                                                                           |
|                                                    | Fire in equipment                                                   | <b>DO NOT open hatches or doors.</b><br><b>Call the Fire Service!</b><br>Thoroughly clean/remove all debris before re-commissioning the equipment.                                                                                                                                |
|                                                    | Temperature sensor fault                                            | Change sensor                                                                                                                                                                                                                                                                     |
| Heating plates do not heat up or heat unstable     | One electrical phase down                                           | Check electrical supply                                                                                                                                                                                                                                                           |
|                                                    | Temperature sensor loose                                            | Check temperature sensor, tighten if necessary                                                                                                                                                                                                                                    |
|                                                    | Product too cold                                                    |                                                                                                                                                                                                                                                                                   |
|                                                    | Machine capacity insufficient                                       |                                                                                                                                                                                                                                                                                   |
| Heating plate temperature drops during cooking     | Temperature sensor fault                                            | Replace temperature sensor                                                                                                                                                                                                                                                        |
|                                                    | Product is cold, affecting the first pair of plates                 |                                                                                                                                                                                                                                                                                   |
| Cooking belt slipping                              | Belt tension loose                                                  | Increase belt tension                                                                                                                                                                                                                                                             |
|                                                    | Grease on the belt or dirty drive rollers                           | Check the belt wash system<br>Clean                                                                                                                                                                                                                                               |
|                                                    | Worn drive rollers                                                  | Roughen the rubber surface<br>Replace when necessary                                                                                                                                                                                                                              |
| Cooking belt pulls to one side                     | <b>Note!</b><br>The belt will pull towards the less tensioned point | Adjust belt. See chapter “Maintenance”, section “Cooking belt adjustments”                                                                                                                                                                                                        |

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<sup>1)</sup> Optional or not on all equipment.

*FAULT FINDING*

# ***RECYCLING***



0000-14-01GB-00-00





## **RECYCLING**

'End of life' machines and parts must be disposed of with due respect for the environment and in accordance with current legislation and codes of practice.

Drain all liquids into collecting vessels. Do not mix different liquids into the same vessel.

Separate and recycle or dispose all known dangerous materials from the equipment according to local regulations. It is recommended to use a certified (ISO 14001 or similar) scrapping/waste handling company.

Recycle or dispose of all materials, groups, and components according to local practices and regulations. If there is any uncertainty regarding what material a component is made of, contact JBT Foodtech.

Disassemble the machine as far as possible and separate the following materials:

- stainless steel, aluminum, and other metals
- glass
- rubber
- nylon and other plastics
- electrical components
- oil, thermo fluid, and other fluids.

Electrical components, batteries, fluids, and so on may need to be disposed of in special systems. Follow local practices and regulations.

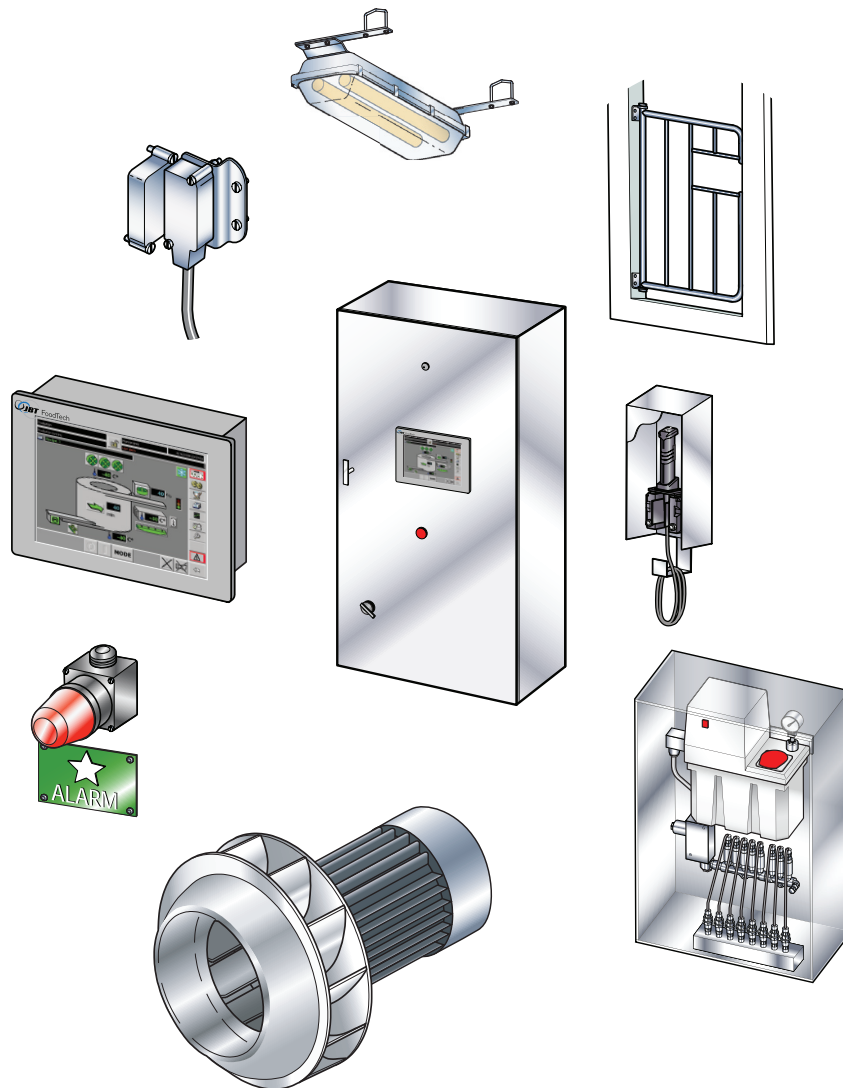
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# ***APPENDIX***



# SPARE PARTS



0000-08-01GB-00-00

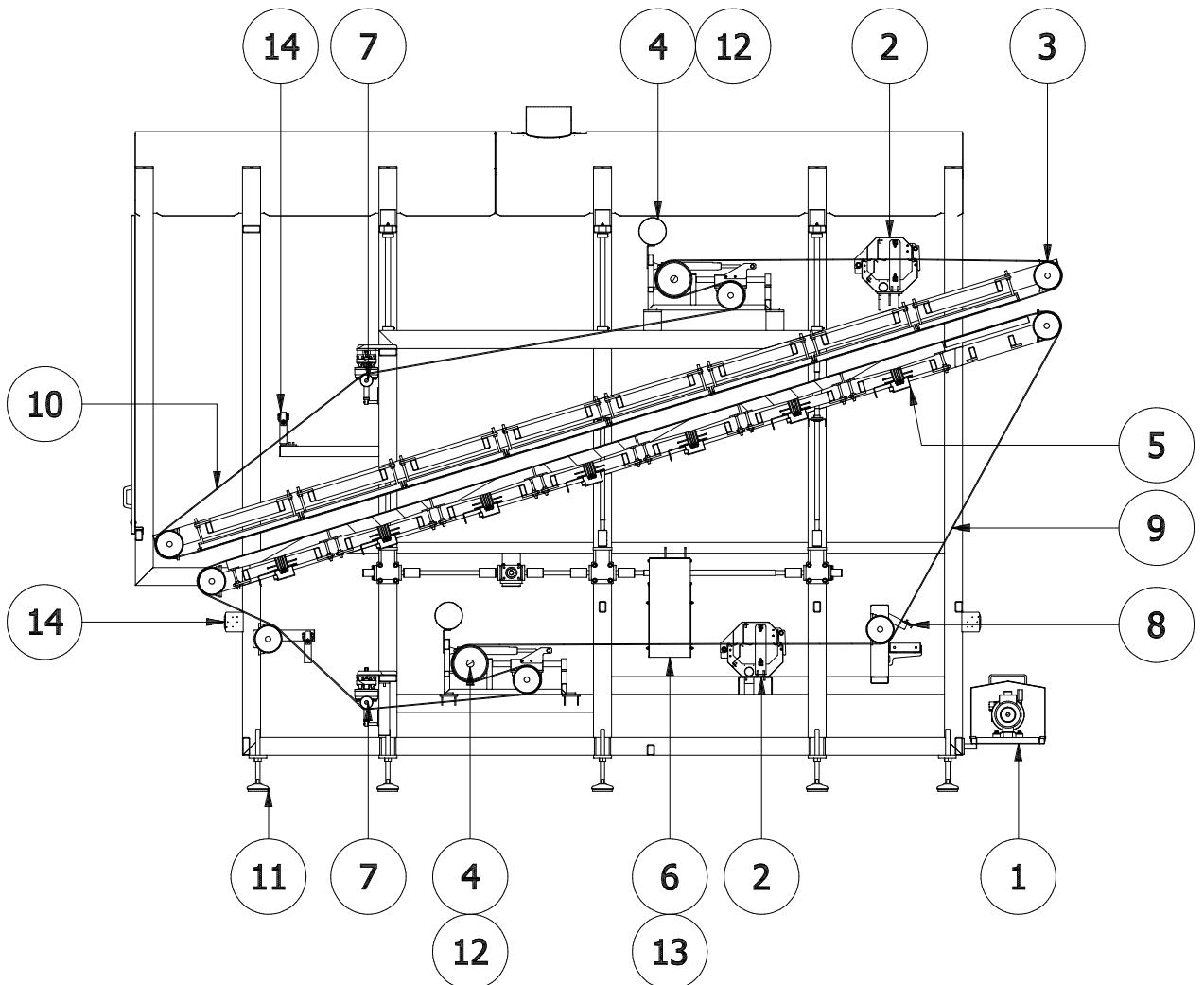




## SPARE PARTS

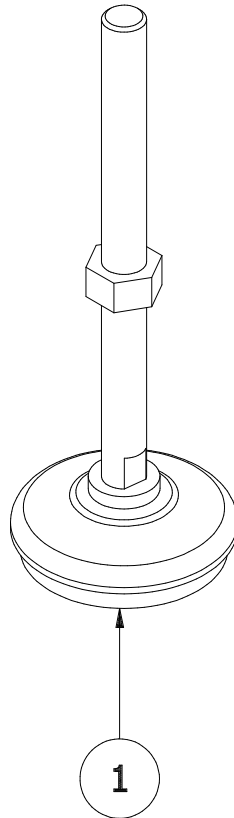
| ITEM NO. <b>90003950A</b>                      |                     |          | MANUFACTURING NUMBER<br><b>32290006</b> |                        |
|------------------------------------------------|---------------------|----------|-----------------------------------------|------------------------|
| TITLE<br><b>SP PROGRILL 1542 MAIN ASSEMBLY</b> |                     |          |                                         | SHEET OF<br><b>1 1</b> |
| INDEX                                          | ITEM NO.            | QTY      | DESCRIPTION                             | DIMENSION              |
| <b>1</b>                                       | <b>9003692A.IAM</b> | <b>1</b> | <b>BELT WASH PUMP</b>                   |                        |
| 2                                              | 9003940A.IAM        | 2        | BELT WASH UNIT                          |                        |
| 3                                              | 9003945A.IAM        | 6        | ROLL, END ASSY, 1500                    |                        |
| 4                                              | 9003948A.IAM        | 2        | BELT DRIVE UNIT UPPER, 1500             |                        |
| 5                                              | 9003949A.IAM        | 1        | HEATING PLATES ASSY, 1542ES             |                        |
| 6                                              | 9004500A.IAM        | 1        | FRAME LIFT ASSEMBLY                     |                        |
| 7                                              | 9004590A.IAM        | 2        | BELT TRACKING ASSY                      |                        |
| 8                                              | 9004595A.IAM        | 1        | SCRAPER ASSY                            |                        |
| 9                                              | 308472E.IPT         | 1        | COOKING BELT, PTFE, W=1500              | L=12550mm*             |
| 10                                             | 308472E.IPT         | 1        | COOKING BELT, PTFE, W=1500              | L=12150mm*             |
| 11                                             | 9003290B.IAM        | 10       | MACHINE FEET, ASSEMBLY                  |                        |
| 12                                             | 193326AAX.IPT       | 2        | GEARMOTOR, R47 DRS71                    |                        |
| 13                                             | 193344AAX.IPT       | 1        | GEARMOTOR, SA47 DRS71                   |                        |
| 14                                             | 9003526A.IPT        | 1        | ASSY, EL MECH                           |                        |

\*BELT LENGTH INCLUDE WELD





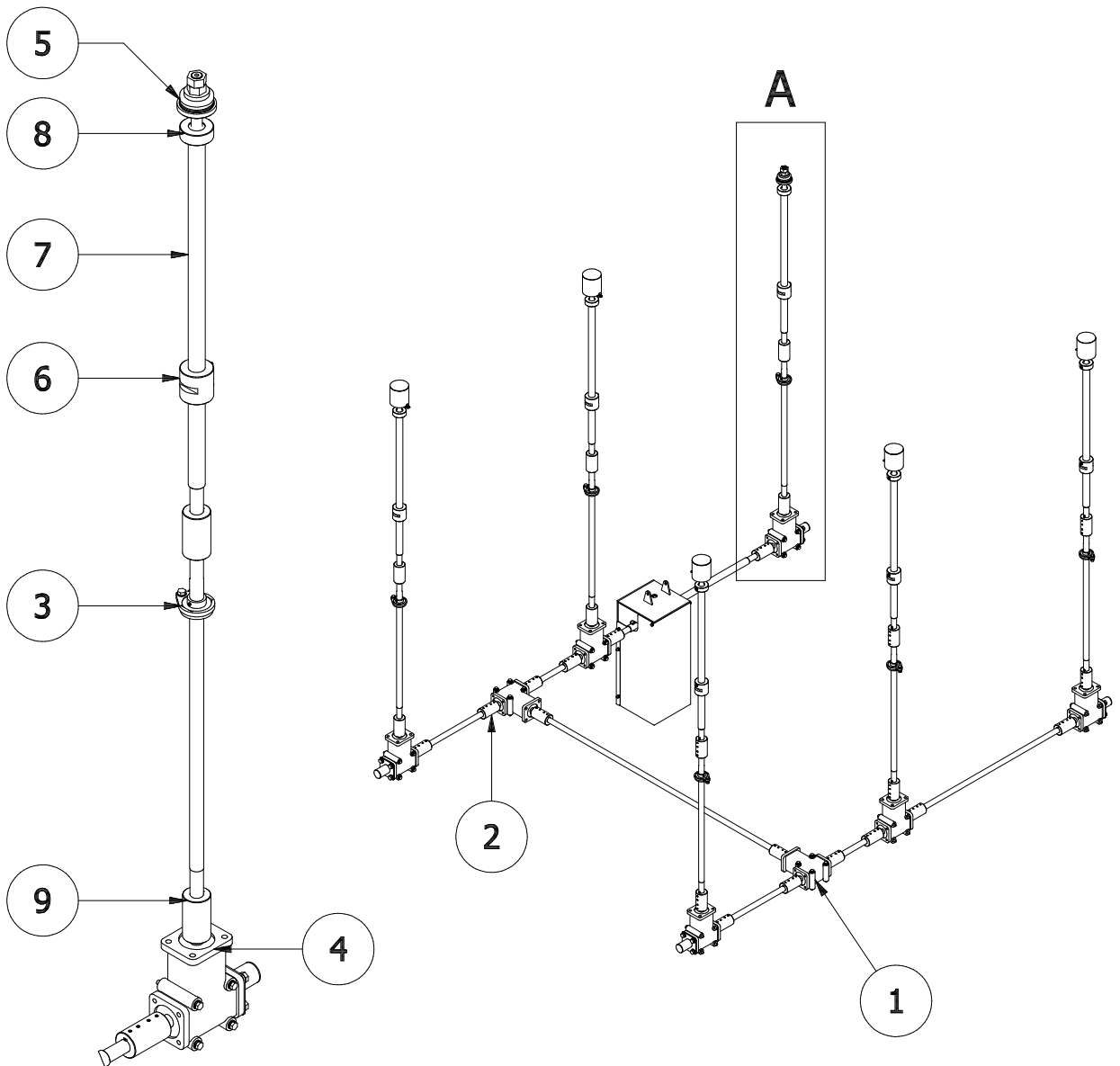
| <b>SPARE PARTS</b>                        |                    |          |                                         |                        |
|-------------------------------------------|--------------------|----------|-----------------------------------------|------------------------|
| ITEM NO. <b>9003290B</b>                  |                    |          | MANUFACTURING NUMBER<br><b>32290006</b> |                        |
| TITLE<br><b>SP MACHINE FEET, ASSEMBLY</b> |                    |          |                                         | SHEET OF<br><b>1 1</b> |
| INDEX                                     | ITEM NO.           | QTY      | DESCRIPTION                             | DIMENSION              |
| <b>1</b>                                  | <b>308444F.IPT</b> | <b>1</b> | <b>MACHINE FEET, ADJUSTABLE,L=310</b>   |                        |







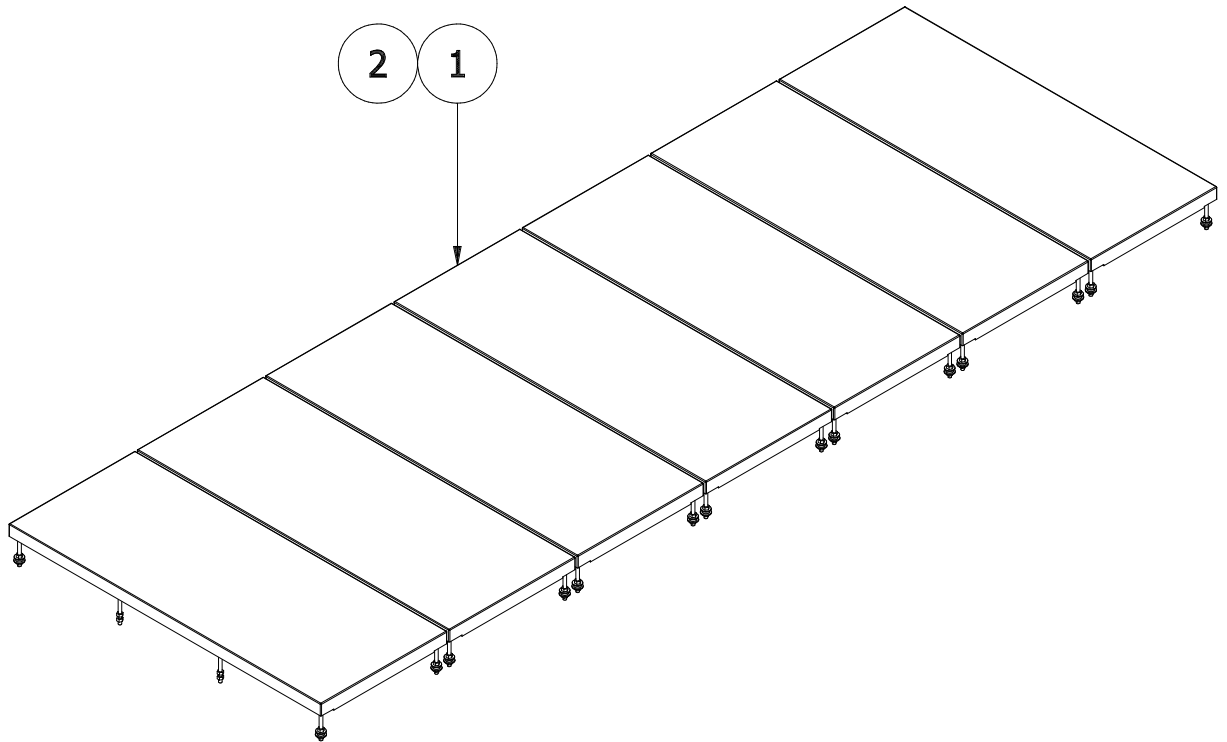
| <b>SPARE PARTS</b>                     |                    |          |                                         |                        |
|----------------------------------------|--------------------|----------|-----------------------------------------|------------------------|
| ITEM NO. <b>9004500A</b>               |                    |          | MANUFACTURING NUMBER<br><b>32290006</b> |                        |
| TITLE<br><b>SP FRAME LIFT ASSEMBLY</b> |                    |          |                                         | SHEET OF<br><b>1 1</b> |
| INDEX                                  | ITEM NO.           | QTY      | DESCRIPTION                             | DIMENSION              |
| <b>1</b>                               | <b>308475A.IPT</b> | <b>2</b> | <b>ANGULAR TRANSMISSION, LIFT</b>       |                        |
| 2                                      | 9002471A.IPT       | 14       | COUPLING, FRAME LIFT                    |                        |
| 3                                      | 1061138A.IPT       | 6        | FLANGE BEARING 25 MM SPECIAL            |                        |
| 4                                      | 308475A.IPT        | 6        | ANGULAR TRANSMISSION, LIFT              |                        |
| 5                                      | 308482L.IPT        | 6        | BEARING, BALL, Ø30                      |                        |
| 6                                      | 9002468A.IPT       | 6        | LIFTING NUT, FRAME LIFT                 |                        |
| 7                                      | 9002469A.IPT       | 6        | LIFTING SHAFT, FRAME LIFT               |                        |
| 8                                      | 9002470A.IPT       | 6        | LOCK NUT, FRAME LIFT                    |                        |
| 9                                      | 9002471A.IPT       | 12       | COUPLING, FRAME LIFT                    |                        |



**A (1 : 12)**

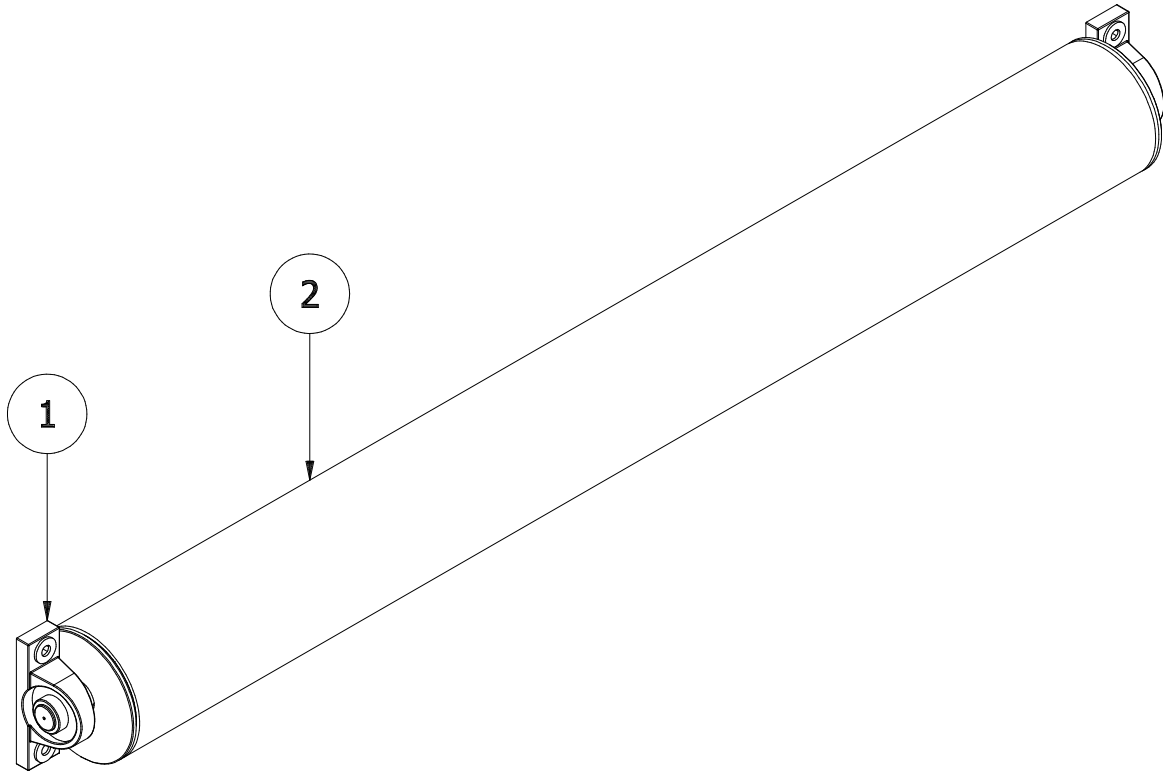


| <b>SPARE PARTS</b>                             |                     |          |                                         |                        |
|------------------------------------------------|---------------------|----------|-----------------------------------------|------------------------|
| ITEM NO. <b>9003949A</b>                       |                     |          | MANUFACTURING NUMBER<br><b>32290006</b> |                        |
| TITLE<br><b>SP HEATING PLATES ASSY, 1542ES</b> |                     |          |                                         | SHEET OF<br><b>1 1</b> |
| INDEX                                          | ITEM NO.            | QTY      | DESCRIPTION                             | DIMENSION              |
| <b>1</b>                                       | <b>308622M.IPT</b>  | <b>7</b> | <b>TEMP SENSOR, TYPE J, 15M</b>         |                        |
| <b>2</b>                                       | <b>9003920A.IAM</b> | <b>7</b> | <b>HEATING PLATE, ASSY, 590X1460</b>    |                        |



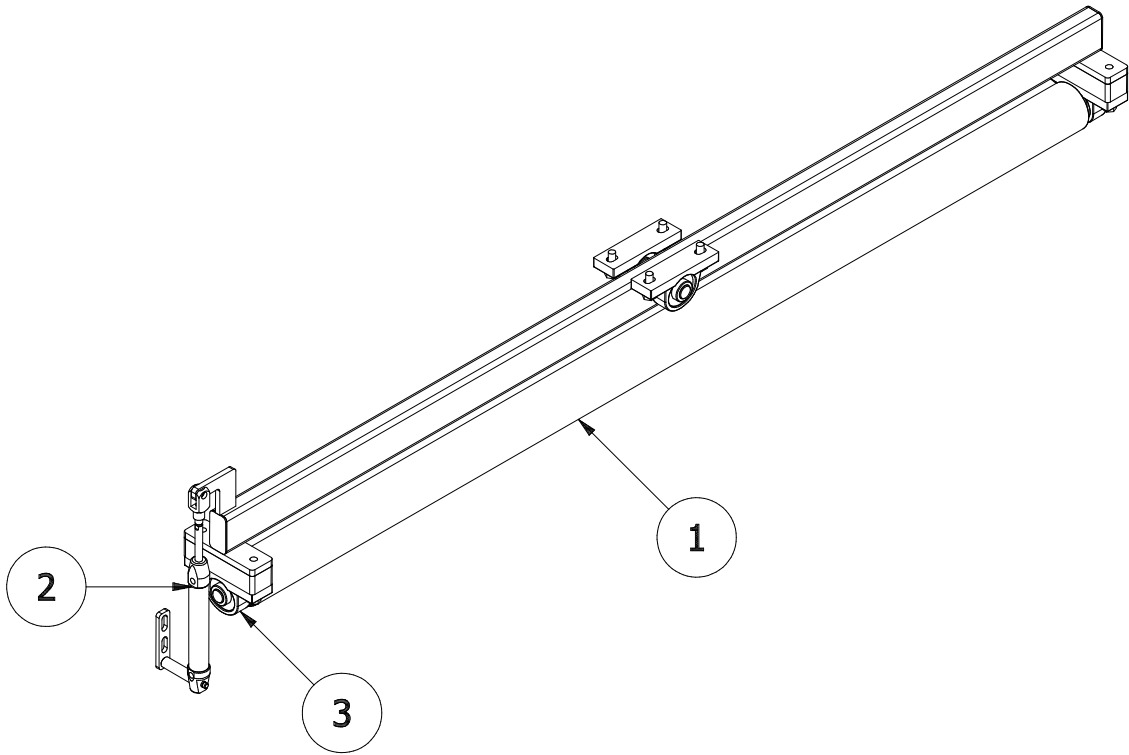


| SPARE PARTS                             |                    |          |                                         |                        |
|-----------------------------------------|--------------------|----------|-----------------------------------------|------------------------|
| ITEM NO.<br><b>9003945A</b>             |                    |          | MANUFACTURING NUMBER<br><b>32290006</b> |                        |
| TITLE<br><b>SP ROLL, END ASSY, 1500</b> |                    |          |                                         | SHEET OF<br><b>1 1</b> |
| INDEX                                   | ITEM NO.           | QTY      | DESCRIPTION                             | DIMENSION              |
| <b>1</b>                                | <b>308484D.IPT</b> | <b>2</b> | <b>BEARING, PILLOW BLOCK, Ø30</b>       |                        |
| 2                                       | 9003947A.IAM       | 1        | ROLL, 1500                              |                        |



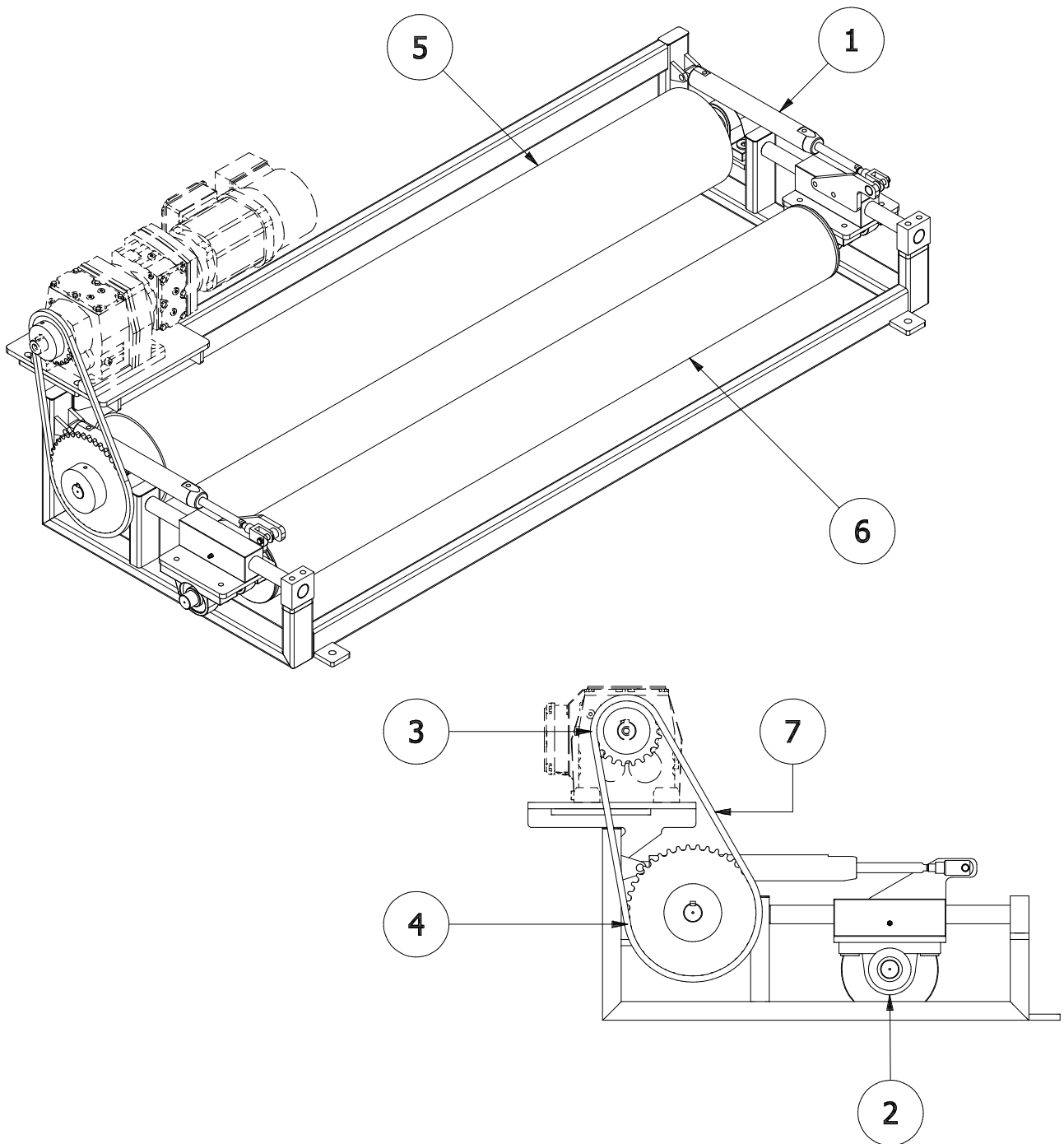


| SPARE PARTS           |              |     |                            |           |
|-----------------------|--------------|-----|----------------------------|-----------|
| ITEM NO.              |              |     | MANUFACTURING NUMBER       |           |
| 9004590A              |              |     | 32290006                   |           |
| TITLE                 |              |     |                            | SHEET OF  |
| SP BELT TRACKING ASSY |              |     |                            | 1 1       |
| INDEX                 | ITEM NO.     | QTY | DESCRIPTION                | DIMENSION |
| 1                     | 9004591A.IAM | 1   | ROLL, TRACKING, 1500       |           |
| 2                     | 308433Q.IPT  | 1   | AIR CYLINDER, STROKE=50    |           |
| 3                     | 308484E.IPT  | 4   | BEARING, PILLOW BLOCK, Ø20 |           |



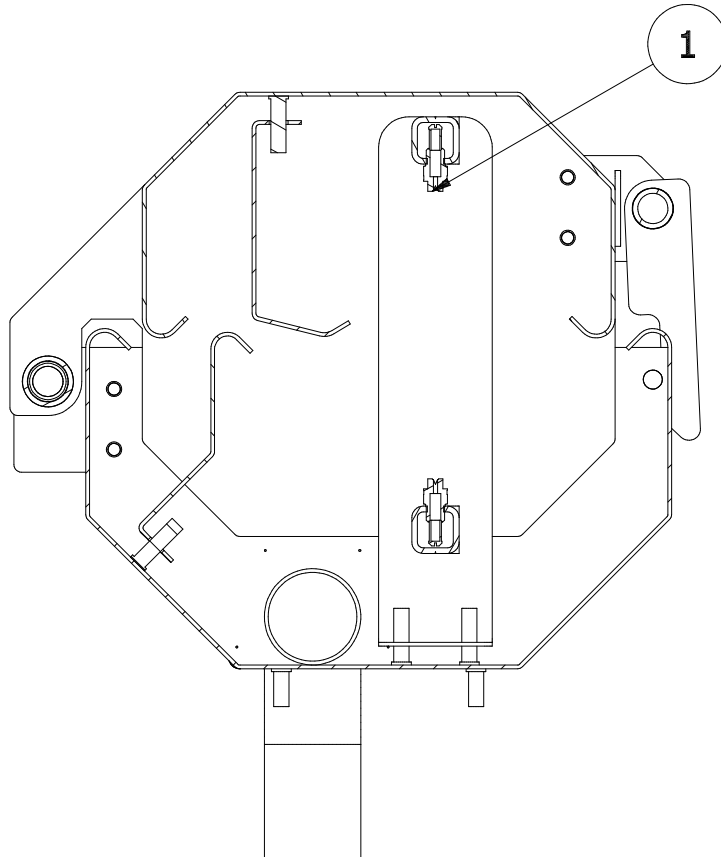


| <b>SPARE PARTS</b>                             |                    |          |                                         |                        |
|------------------------------------------------|--------------------|----------|-----------------------------------------|------------------------|
| ITEM NO. <b>9003948A</b>                       |                    |          | MANUFACTURING NUMBER<br><b>32290006</b> |                        |
| TITLE<br><b>SP BELT DRIVE UNIT UPPER, 1500</b> |                    |          |                                         | SHEET OF<br><b>1 1</b> |
| INDEX                                          | ITEM NO.           | QTY      | DESCRIPTION                             | DIMENSION              |
| <b>1</b>                                       | <b>308433N.IAM</b> | <b>2</b> | <b>AIR CYLINDER, STROKE=200</b>         |                        |
| 2                                              | 308484D.IPT        | 6        | BEARING, PILLOW BLOCK, Ø30              |                        |
| 3                                              | 9002513A.IPT       | 1        | SPROCKET 5/8" Z=21                      |                        |
| 4                                              | 9002514A.IPT       | 1        | SPROCKET 5/8" Z=42                      |                        |
| 5                                              | 9002573A.IAM       | 1        | ROLL, DRIVE, 1500                       |                        |
| 6                                              | 9003947B.IAM       | 1        | ROLL, 1500                              |                        |
| 7                                              | 308427C.IPT        | 1        | CHAIN ISO 10B-1 SS (5/8")               |                        |



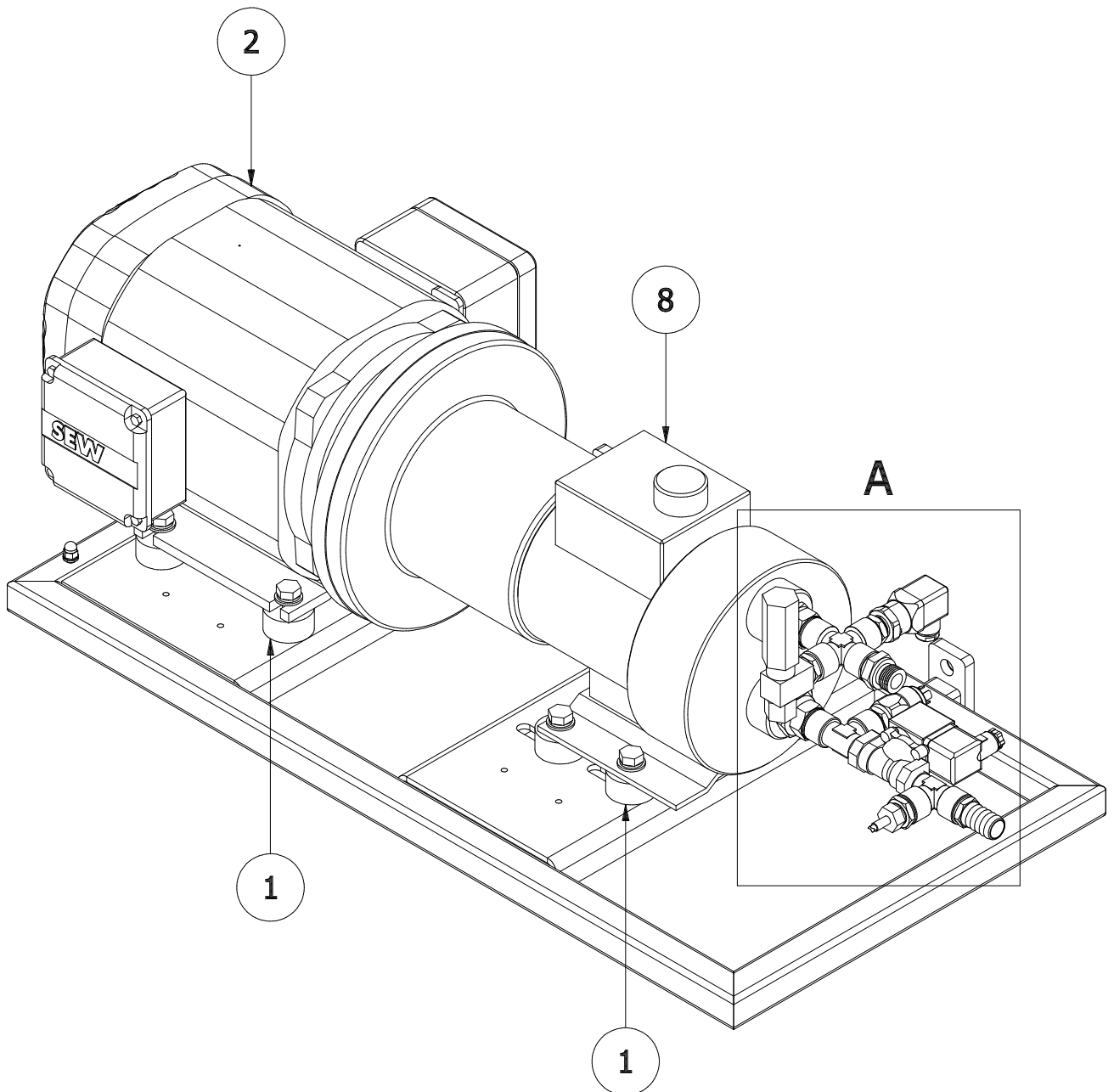


| SPARE PARTS       |              |     |                          |           |
|-------------------|--------------|-----|--------------------------|-----------|
| ITEM NO.          |              |     | MANUFACTURING NUMBER     |           |
| 9003940A          |              |     | 32290006                 |           |
| TITLE             |              |     |                          | SHEET OF  |
| SP BELT WASH UNIT |              |     |                          | 1 1       |
| INDEX             | ITEM NO.     | QTY | DESCRIPTION              | DIMENSION |
| 1                 | 308416BB.IPT | 38  | NOZZLE, SPRAY 1/8 650017 |           |



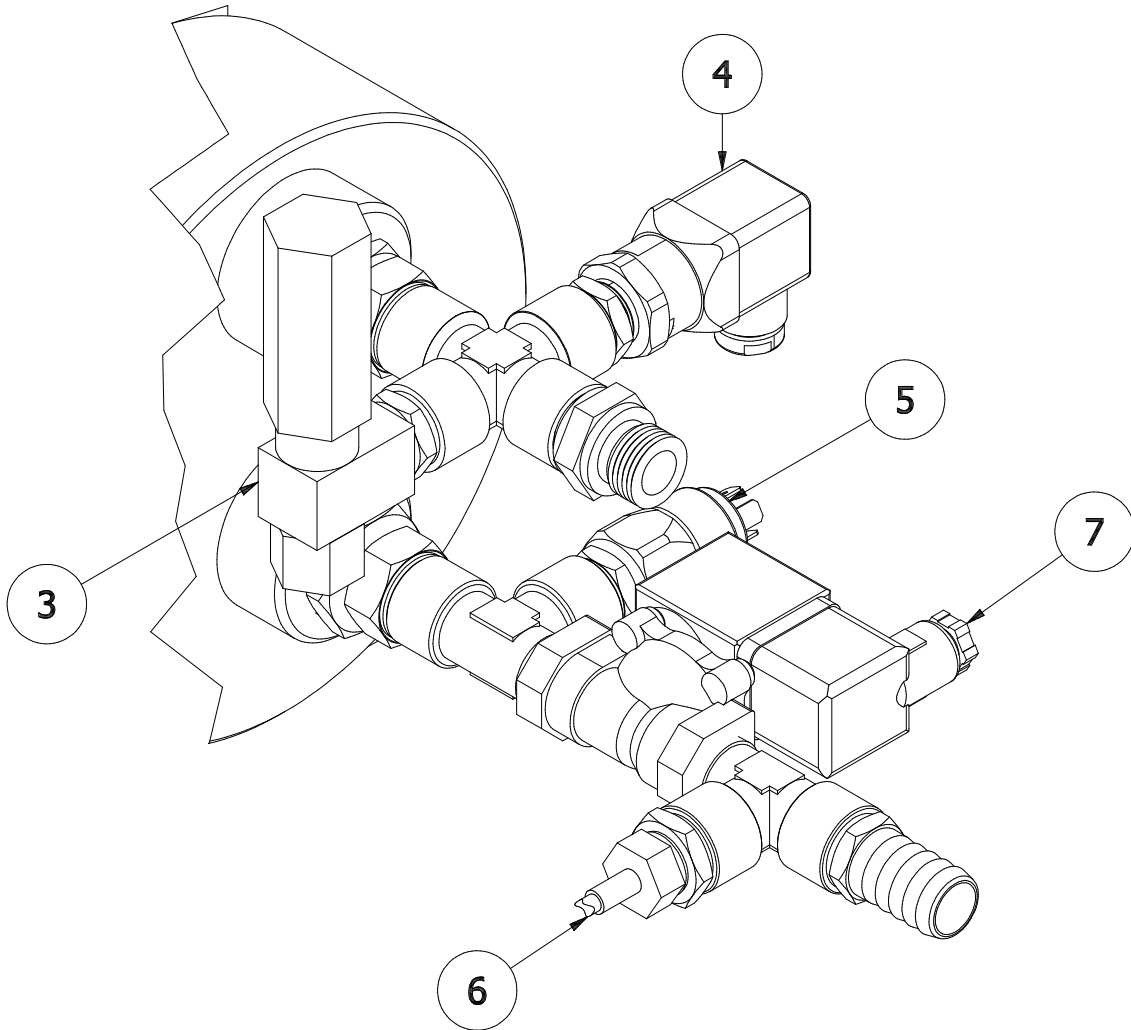


| <b>SPARE PARTS</b>       |                    |          |                            |            |
|--------------------------|--------------------|----------|----------------------------|------------|
| ITEM NO.                 |                    |          | MANUFACTURING NUMBER       |            |
| <b>9003692A</b>          |                    |          | <b>32290006</b>            |            |
| TITLE                    |                    |          |                            | SHEET OF   |
| <b>SP BELT WASH PUMP</b> |                    |          |                            | <b>1 2</b> |
| INDEX                    | ITEM NO.           | QTY      | DESCRIPTION                | DIMENSION  |
| <b>1</b>                 | <b>308439C.IPT</b> | <b>8</b> | <b>DAMPER, RUBBER</b>      |            |
| 2                        | 193361AAX.IPT      | 1        | MOTOR, DRE112              |            |
| 3                        | 308570D.IPT        | 1        | VALVE, UNLOADER            |            |
| 4                        | 308606H.IPT        | 1        | PRESSURE TRANSMITTER, G1/4 |            |
| 5                        | 308606J.IPT        | 1        | PRESSURE TRANSMITTER, G1/4 |            |
| 6                        | 308622P.IPT        | 1        | TEMP SENSOR, PT100, G1/2   |            |
| 7                        | 308626F.IPT        | 1        | VALVE, SOLENOID, G1/2      |            |
| 8                        | 308646A.IPT        | 1        | PUMP, BELT WASH            |            |





| SPARE PARTS       |          |          |             |                      |          |
|-------------------|----------|----------|-------------|----------------------|----------|
| ITEM NO.          |          | 9003692A |             | MANUFACTURING NUMBER | 32290006 |
| TITLE             |          |          |             | SHEET                | OF       |
| SP BELT WASH PUMP |          |          |             | 2                    | 2        |
| INDEX             | ITEM NO. | QTY      | DESCRIPTION | DIMENSION            |          |

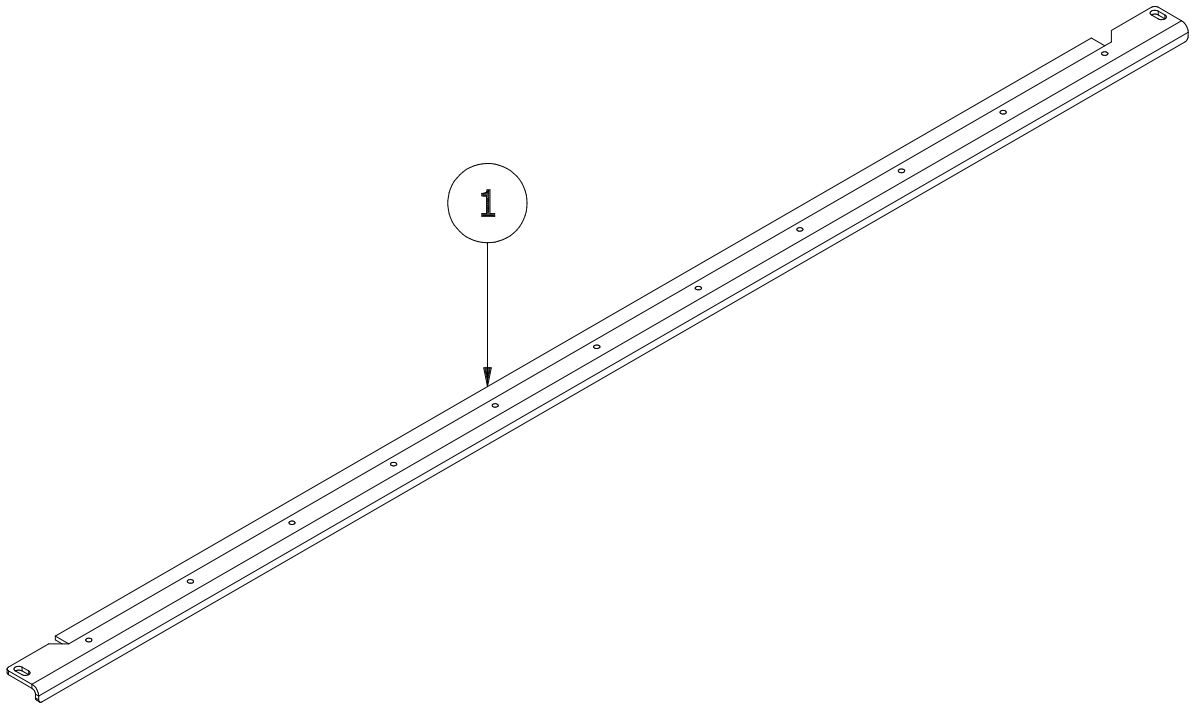


A(1:2)



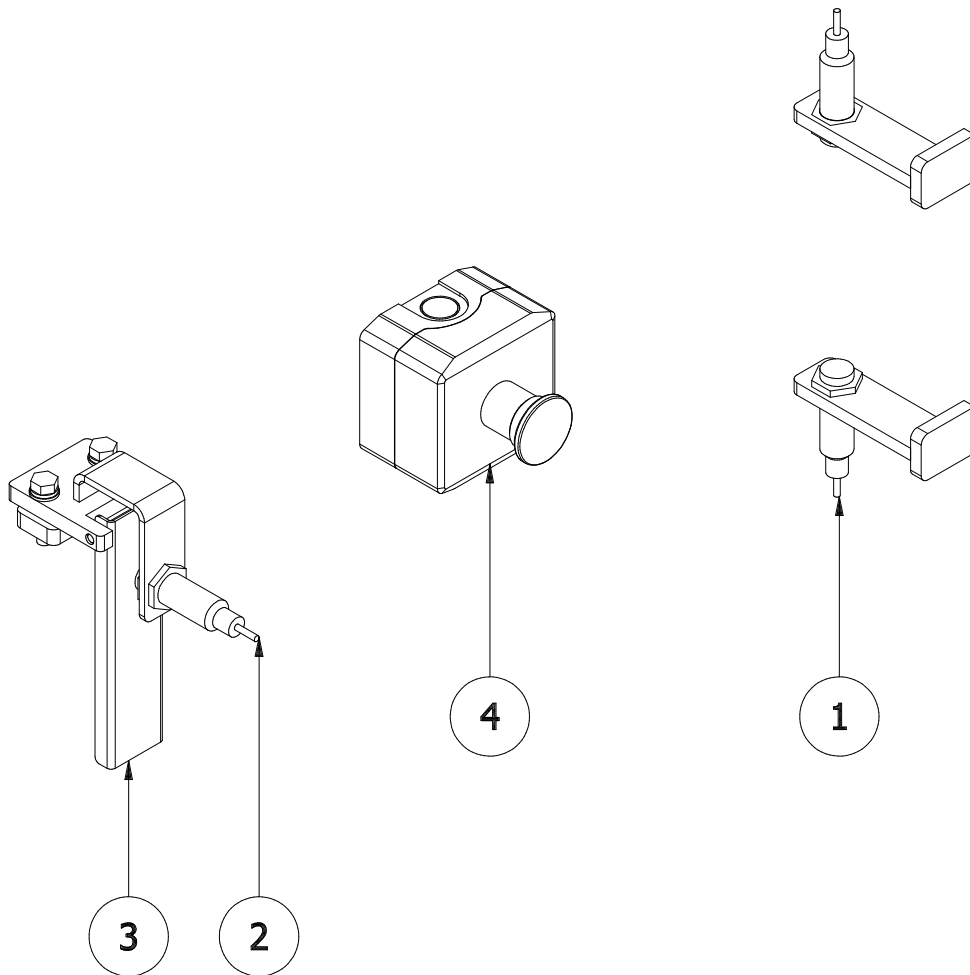


| SPARE PARTS     |              |     |                      |           |
|-----------------|--------------|-----|----------------------|-----------|
| ITEM NO.        |              |     | MANUFACTURING NUMBER |           |
| 9004595A        |              |     | 32290006             |           |
| TITLE           |              |     |                      | SHEET OF  |
| SP SCRAPER ASSY |              |     |                      | 1 1       |
| INDEX           | ITEM NO.     | QTY | DESCRIPTION          | DIMENSION |
| 1               | 9004594A.IPT | 1   | SCRAPER, PEEK        |           |

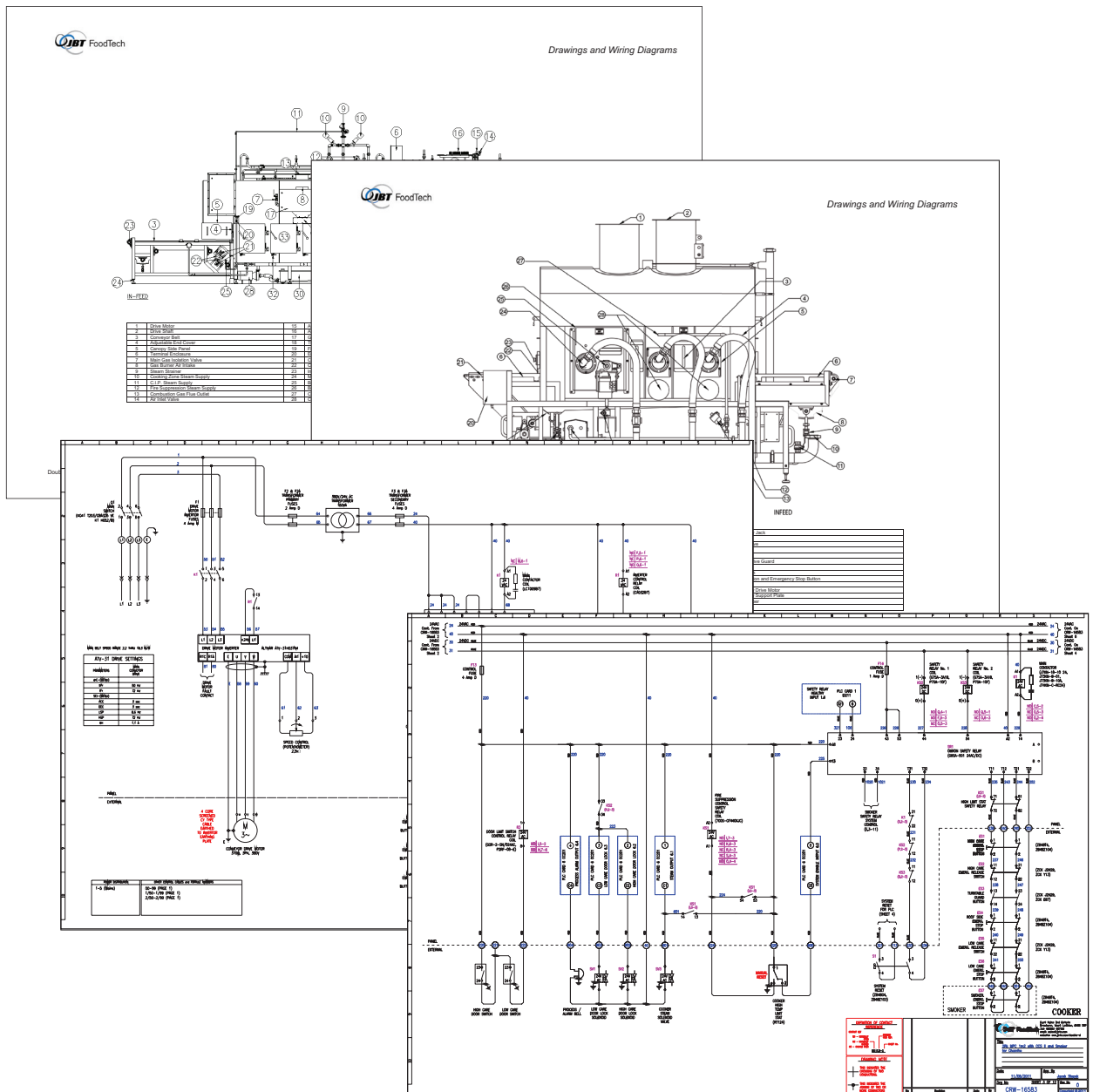




| SPARE PARTS      |              |     |                       |  |                      |           |          |  |
|------------------|--------------|-----|-----------------------|--|----------------------|-----------|----------|--|
| ITEM NO.         |              |     | 9003526A              |  | MANUFACTURING NUMBER |           | 32290006 |  |
| TITLE            |              |     |                       |  |                      |           | SHEET OF |  |
| SP ASSY, EL MECH |              |     |                       |  |                      |           | 1 1      |  |
| INDEX            | ITEM NO.     | QTY | DESCRIPTION           |  |                      | DIMENSION |          |  |
| 1                | 308613F.IPT  | 2   | PROXIMITY SENSOR, M18 |  |                      |           |          |  |
| 2                | 308613F.IPT  | 4   | PROXIMITY SENSOR, M18 |  |                      |           |          |  |
| 3                | 9002334A.IAM | 4   | BELT POSITIONER       |  |                      |           |          |  |
| 4                | 302604D.IPT  | 4   | EMERGENCYSTOPBOX A-B  |  |                      |           |          |  |



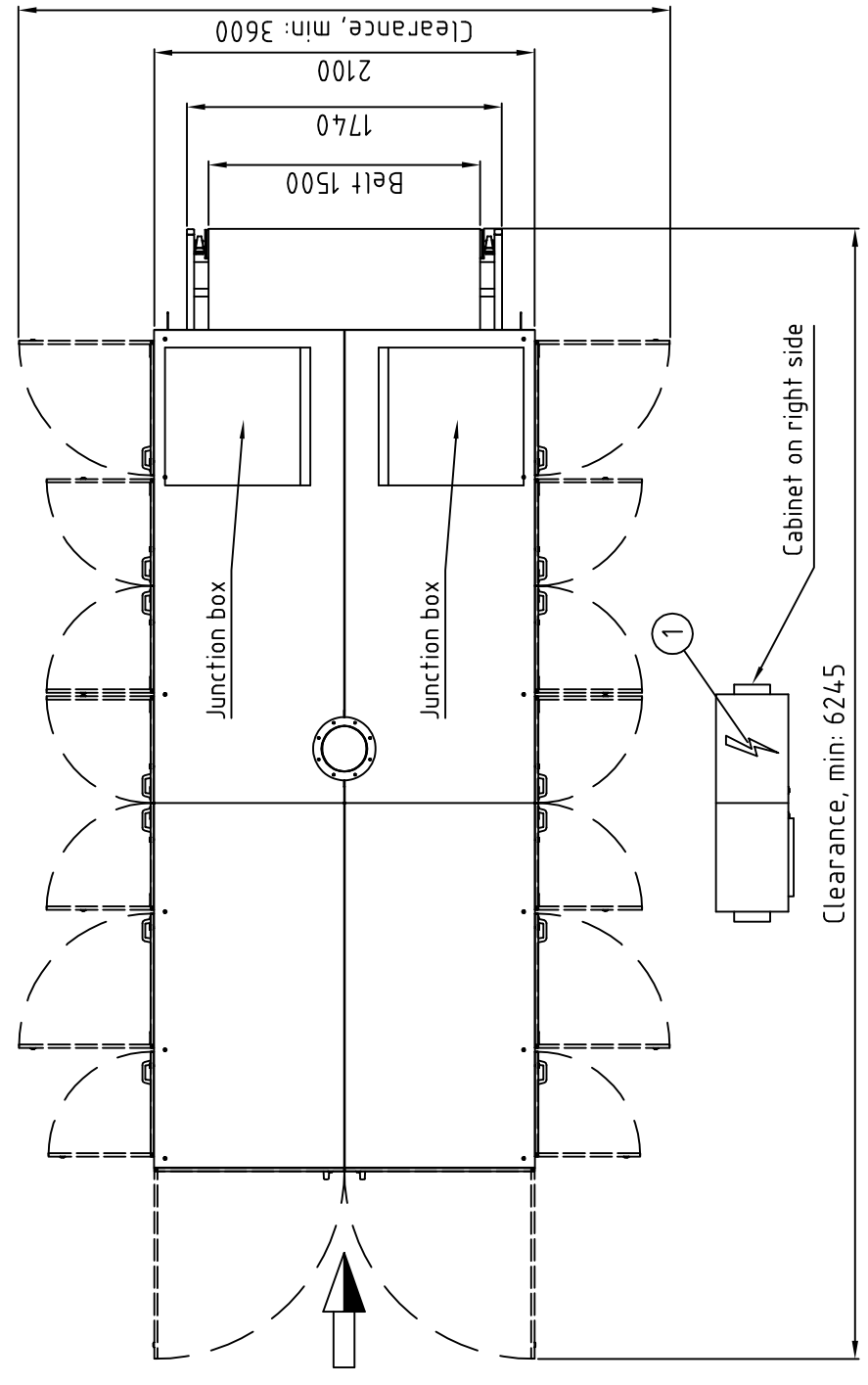
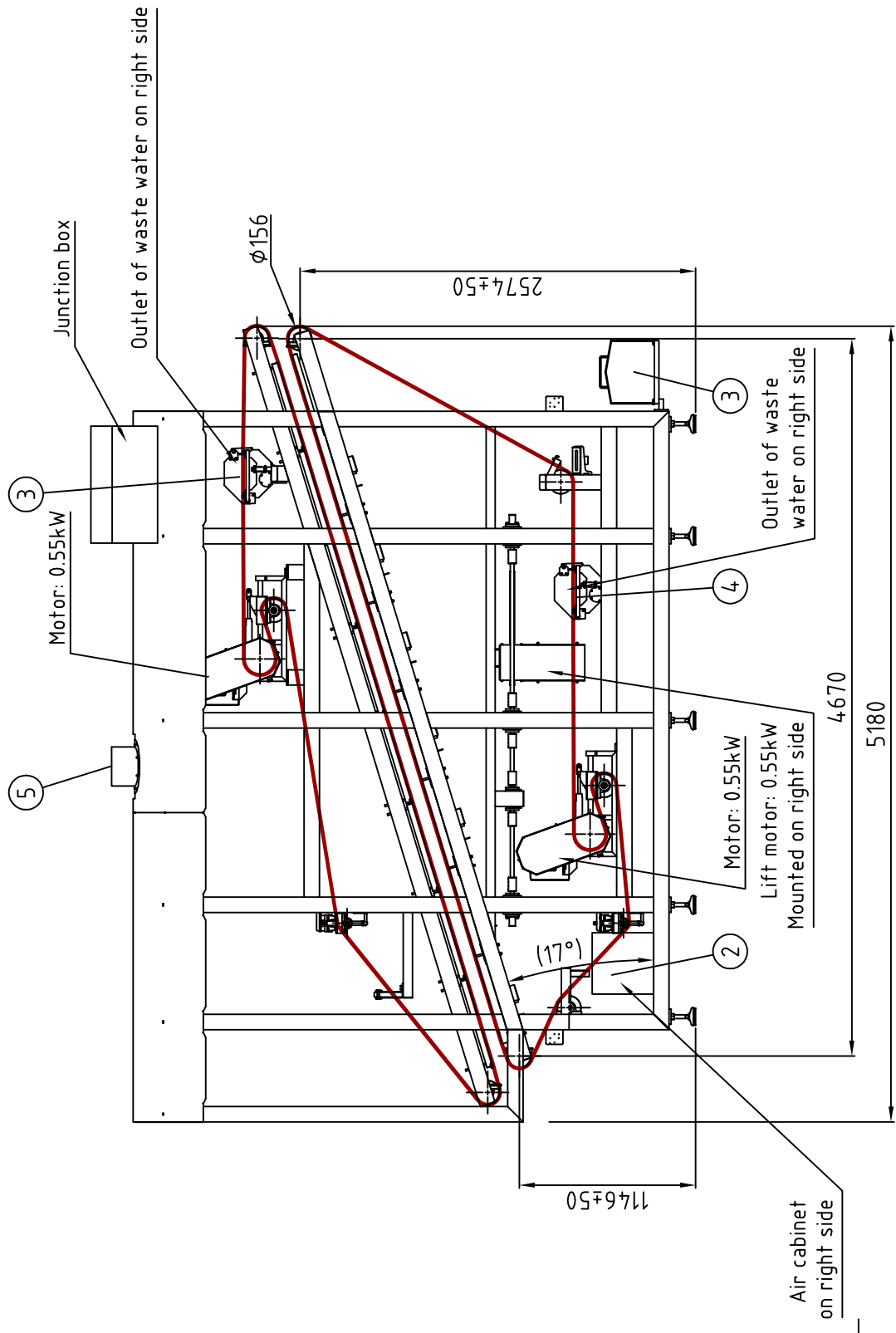
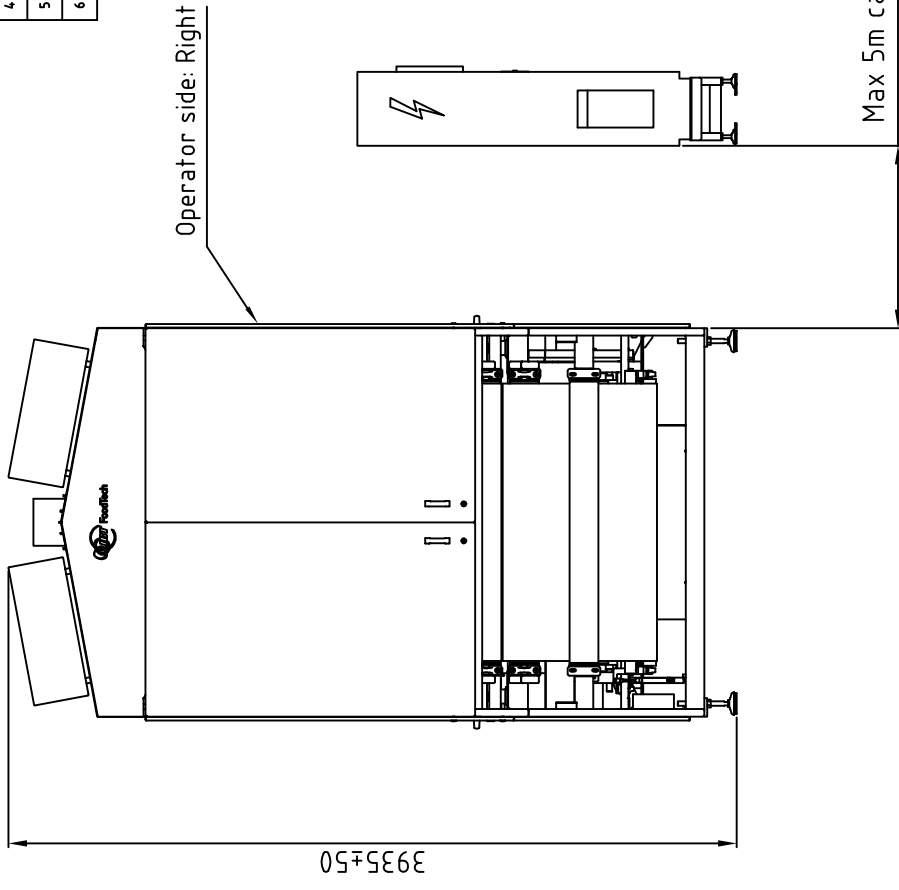
# DRAWINGS & WIRING DIAGRAMS



0000-12-01GB-00-00

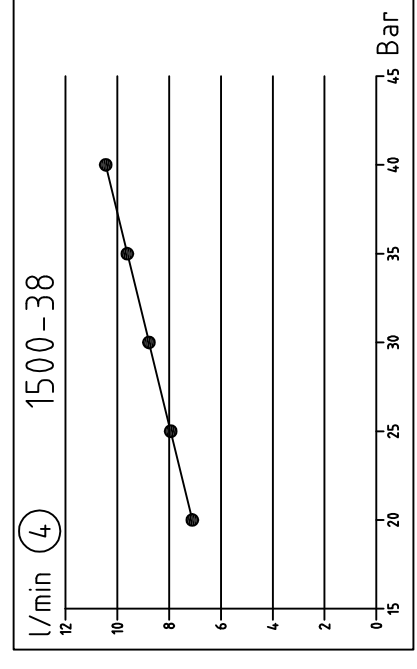


| Nr | Ändring                                | Datum      | Inf. | Godk. |
|----|----------------------------------------|------------|------|-------|
| 1  | Removed page 2, revised information    | 2014-08-12 | FS   | FS    |
| 2  | Added info: placement of drains etc    | 2014-08-25 | FS   | FS    |
| 3  | Edited info: placement of drains etc   | 2014-09-03 | FS   | FS    |
| 4  | Air cabinet now on right side          | 2014-09-05 | MB   | MB    |
| 5  | Added page 2 with electric information | 2014-10-03 | FS   | FS    |
| 6  | Added page 3 with lifting points       | 2014-10-29 | FS   | FS    |

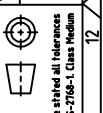


## Approval drawing

- ① Electrical cabinet  
3 x 460 V, 60 Hz  
260 kW, 380 A
- ② Air cabinet 6 bar  
5 l/min (1,3 gpm)  
Hose coupling G1/4" (female)
- ③ High pressure pump  
3 x 400 V, 3 kW  
Hot water 65°C (150°F) in, G 1/2" (female)  
Total at 40 bar 21 l/min (2 washers)
- ④ Belt wash  
Wash drain, hose coupling φ51 mm  
10.5 l/min per 1 washer
- ⑤ Exhaust φ250 mm  
1500 m<sup>3</sup>/h per 1 exhaust

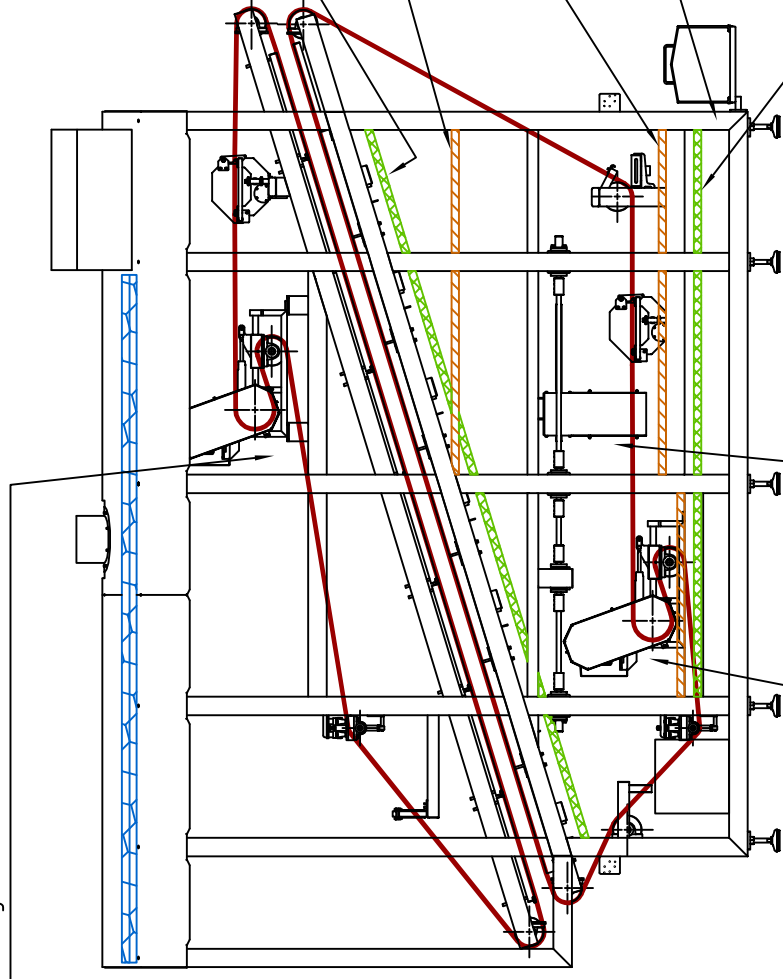


|         |       |           |            |         |             |
|---------|-------|-----------|------------|---------|-------------|
| Def. nr | Ant.  | Benämning | Material   | Mod. nr | Amnshörning |
| Konstr. | Ritad | Kont.     | Ål         | Skala   | Erställt av |
|         | FS    |           |            | 1:20    |             |
|         |       |           | Material   | Mod. nr | Amnshörning |
|         |       |           | Ål         | Skala   | Erställt av |
|         |       |           | PB 1542 E  |         |             |
|         |       |           | Layout     |         |             |
|         |       |           | Dagning    |         |             |
|         |       |           | 11/08/2014 |         |             |
|         |       |           | 99-2620    |         |             |
|         |       |           | 1:3        |         |             |
|         |       |           | 16         |         |             |



Unless otherwise stated all tolerances should be according to SS-2700-1: Class Medium

Apprx. position of local disconnect for motor  
On the right side of the machine



Apprx. position of local disconnect for motor  
On the right side of the machine

Apprx. position of local disconnect for motor  
On the right side of the machine

Ladder for thermocouple to the heating plates  
The cable goes through the roof via a gland and is then attached to the beam with cable ties.



Ladder for power to the heating plates  
The cable to the plates goes through the roof via a gland and is then attached to the beam with cable ties.



Ladder mounted on the left side, for control signals

Ladder mounted on right side, for power

Ladder mounted on right side, for power

Apprx. position of local disconnect for pump  
On the right side of the machine

Ladder mounted on left side, for control signals




Junction box for control

120mm wide ladder for control signals  
This will route the cables from the bottom of the machine to the junction box

120mm wide ladder for power  
This will route the cables from the bottom of the machine to the junction box

Junction box for power

## Suggested routing

-  120mm wide cable ladder, for power
-  240mm wide cable ladder, for power
-  120mm wide cable ladder, for control

|           |       |           |                  |         |             |
|-----------|-------|-----------|------------------|---------|-------------|
| Def.nr    | Ant.  | Benämning | Material         | Mod. nr | Amnshörning |
| Konstr.   | Ritad | Kont.     | Grupp            | Skala   | Erställt av |
|           | FS    |           | AI               | 1:20    |             |
| PB 1542 E |       |           | Datum 11/08/2014 |         |             |
| Layout    |       |           | Försk.           |         |             |
| 99-2620   |       |           | Ritad av 2.3.16  |         |             |

Utsnitt av ritning enligt SS-2700-1:1  
Utsnitt av ritning enligt SS-2700-1:1  
Utsnitt av ritning enligt SS-2700-1:1

| Nr | Ant | Ändring                                | Datum      | Inf. | Godk. |
|----|-----|----------------------------------------|------------|------|-------|
| 1  |     | Removed page 2, revised information    | 2014-08-12 | FS   |       |
| 2  |     | Added info: placement of drains etc    | 2014-08-25 | FS   |       |
| 3  |     | Edited info: placement of drains etc   | 2014-09-03 | FS   |       |
| 4  |     | Air cabinet now on right side          | 2014-09-05 | MB   |       |
| 5  |     | Added page 2 with electric information | 2014-10-03 | FS   |       |
| 6  |     | Added page 3 with lifting points       | 2014-10-29 | FS   |       |








|   |                                                                                                                                                                                                                                                                                                             |   |   |   |   |   |   |   |   |    |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| 0 | 1                                                                                                                                                                                                                                                                                                           | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | <p>IF ANYTHING ELSE IS NOT MEANTIONED<br/>PLEASE FOLLOW GENERAL MILLS OEM DESIGN STANDARD!</p>                                                                                                                                                                                                              |   |   |   |   |   |   |   |   |    |
| B | <p>3.8.2 WIRE SIZE</p> <p>FOR SINGLE-WIRE CONDUCTORS, USE STRANDED COPPER.<br/>USE THE FOLLOWING MINIMUM SIZES</p> <ul style="list-style-type: none"> <li>- FOR PANEL WIRING- 18 GAUGE THHN OR MTW</li> <li>- FOR FIELD CONTROL WIRING- 16 GAUGE THHN</li> <li>- FOR MOTOR WIRING- 14 GAUGE THHN</li> </ul> |   |   |   |   |   |   |   |   |    |
| C | <p>3.8.5 SHIELDED CABLES</p>                                                                                                                                                                                                                                                                                |   |   |   |   |   |   |   |   |    |
| D | <p>3.8.5.1 ANALOG SIGNAL CABLES</p> <p>ANALOG CABLES SHALL BE SHIELDED AT THE I/O CONNECTION END ONLY<br/>THE SHIELD SHALL BE TRIMMED AND TAPED ET THE DEVICE END.</p>                                                                                                                                      |   |   |   |   |   |   |   |   |    |
| E | <p>3.8.5.2 VFD MOTOR LEADS</p> <p>MOTOR LEAD SHIELD SHALL BE GROUNDED IN THE MOTOR JUNCTION BOX AND<br/>ON THE VFD GROUND TERMINAL STRIP POINT PER MANUFACTURE RECOMENDATIONS.</p>                                                                                                                          |   |   |   |   |   |   |   |   |    |
| F | <p>POWER SUPPLY VOLTAGE</p> <p>VOLTAGE 3x460V AC</p> <p>FREQUENCY 60HZ</p> <p>FULL LOAD AMPERE RATING 325A</p> <p>LARGEST MOTOR 3.0kW/4.0HP</p> <p>RECOMENDED FUZE 350A</p> <p>MAX FUZE 400A</p>                                                                                                            |   |   |   |   |   |   |   |   |    |
| G | <p>CONTROL SUPPLY VOLTAGE</p> <p>VOLTAGE 3x460V AC</p> <p>FREQUENCY 60HZ</p> <p>FULL LOAD AMPERE RATING 6A</p> <p>RECOMENDED FUZE 6A</p> <p>MAX FUZE 400A</p>                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| H | <p>LARGEST 0-NUMBER: <u>0272</u></p>                                                                                                                                                                                                                                                                        |   |   |   |   |   |   |   |   |    |


THE ELECTRICAL INSTALLATION SHALL FOLLOW "EN 60204-1 ISSUE 3" AND THE "ALLEN BRADLEY POWER FLEX 525 MANUAL"  
THIS IS THE INSTALLATION CONTRACTORS RESPONSIBILITY!



**QJBT FoodTech**

John Bean Technologies AB    Tel: +46 (0) 42 490 4000  
Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden

|                |                     |                  |
|----------------|---------------------|------------------|
| GENERAL MILLS  | Work nr./Arbets nr. | DWG. nr.         |
| PB 1542 1401E  | 140473              | 1101127 (P14012) |
| PROJECT BASICS | Design/Konstruktion | Drawn/Ritad      |
|                | VDT.                | VDT.             |
|                | Date/Datum          | Issue/Rev.       |
|                | 14-11-19            | -1-              |
|                |                     | Cont./Forts.bl   |
|                |                     | 002              |

|   |                                                                                                                                                                                                                                                                                                                        |               |   |   |   |   |   |   |   |   |       |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---|---|---|---|---|---|---|---|-------|
|   | 0                                                                                                                                                                                                                                                                                                                      | 1             | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10    |
| A | <p>Code Letter Electric Components:</p> <p>A = Electrical Units<br/> B = Transducers<br/> C = Capacitors<br/> D = Storage Devices<br/> E = Miscellaneous<br/> F = Protective Devices<br/> G = Generators. Power Supplies<br/> H = Indicators<br/> K = Relays. Contactors<br/> M = Motors<br/> N = Analogue Devices</p> |               |   |   |   |   |   |   |   |   |       |
| B | <p>Q = Switching Device<br/> R = Resistors<br/> S = Switches. Selectors<br/> T = Transformer<br/> U = Modulators<br/> V = Vacuum Tubes. Semiconductor<br/> W = Waveguides. Transmission Paths<br/> X = Terminals. Joins<br/> Y = Electrically Operated Mechanical Devices<br/> Z = Network devices</p>                 |               |   |   |   |   |   |   |   |   |       |
| C | <p>Documentaion Standard:</p> <p>The component letter code follows the International IEC standard IEC 204-2.</p>                                                                                                                                                                                                       |               |   |   |   |   |   |   |   |   |       |
| D | <p>Component Number:</p> <p>A 1      Consecutive Number<br/> └───┬───┘<br/> Code Letter</p>                                                                                                                                                                                                                            |               |   |   |   |   |   |   |   |   |       |
| E | <p>Work nr./Arbets nr. 14,0473<br/> Design/Konstruktion VOT.<br/> Date/Datum 14-11-19</p>                                                                                                                                                                                                                              |               |   |   |   |   |   |   |   |   |       |
| F | <p>DWG. nr. 1101127 (P14012)<br/> Drawn/Ritad Sheet/Blad 002<br/> Issue/Rev. -1<br/> Cont./Fortsbl 003</p>                                                                                                                                                                                                             |               |   |   |   |   |   |   |   |   |       |
| G | <p>GENERALL MILLS<br/> PB 1542 1401E<br/> PROJECT BASICS</p>                                                                                                                                                                                                                                                           |               |   |   |   |   |   |   |   |   |       |
| H | <p><br/> John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br/> Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden</p>                                                                                                 |               |   |   |   |   |   |   |   |   |       |
|   | Issue                                                                                                                                                                                                                                                                                                                  | Design Change |   |   |   |   |   |   |   |   | Issue |
|   | SIGN.                                                                                                                                                                                                                                                                                                                  | Date          |   |   |   |   |   |   |   |   | Date  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                           |   |   |   |   |   |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | B                                                                                                                                                         | C | D | E | F | G | H |
| <p>Terminal number system:</p> <p>1-99 Power circuits</p> <p>100-199 Control circuits 230V AC - General</p> <p>200-299 Control circuits 24V DC - Digital inputs</p> <p>300-399 Control circuits 24V DC - Digital outputs</p> <p>400-449 Control circuits - Analog inputs</p> <p>450-499 Control circuits - Analog outputs</p> <p>500-699 Control circuits 24V DC - Safety circuits</p> <p>700-799 Control circuits - Temperature sensors</p> <p>800-899 Control circuits - Encoder position signals</p> <p>900-999 Control circuits 24V DC - External signals from/to customer</p> | <p>Colour codes:</p> <p>Bk Black Gn Green Pu Purple</p> <p>Bn Brown Gy Grey Rd Red</p> <p>Bu Blue Or Orange Yw Yellow</p> <p>Cu Cyan Pn Pink Wh White</p> |   |   |   |   |   |   |
| <p>Controller Type Number System:</p> <p>As:0m CPU/Accessories As:5m Analog Output</p> <p>As:1m Digital Input As:6m Analog In/Output</p> <p>As:2m Digital Output As:7m Tech Modules</p> <p>As:3m Digital In/Output As:8m Com Modules</p> <p>As:4m Analog Input</p>                                                                                                                                                                                                                                                                                                                 | <p>Controller Number:</p> <p>As:0m</p> <p>└┬ Module Number (1-9)</p> <p>└┬ System Number (1-9)</p>                                                        |   |   |   |   |   |   |



John Bean Technologies AB    Tel: +46 (0) 42 490 4000  
Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden

GENERAL MILLS

PB 1542 1401E

PROJECT BASICS

Work nr./Arbets nr.  
**14,0473**

Design/Konstruktion  
VDT.

Date/Datum  
**14-11-19**

DWG. nr.  
**1101127 (P14012)**

Drawn/Ritad  
Sheet/Blad  
003

Issue/Rev.  
-1-

Cont./Fortsbl  
004

Issue

Design Change

SIGN.

Date

Internal Wire Colors:

|                                    |                                                                                                                                                                       |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wire Color                         | Use                                                                                                                                                                   |
| Green or green with yellow stripes | Grounding Conductor                                                                                                                                                   |
| Black                              | Ungrounded conductor at line voltage                                                                                                                                  |
| Red                                | Ungrounded AC control conductor at less than line voltage including PLC I/O                                                                                           |
| Blue                               | Ungrounded DC control conductor                                                                                                                                       |
| Blue w/ red stripe                 | Safety circuit conductors                                                                                                                                             |
| Orange                             | Ungrounded control circuit conductors that remain energized when the disconnect is off (such as external interlocks) Note this is a recent NFPA 79 change from yellow |
| White                              | Grounded circuit conductor                                                                                                                                            |
| White w/ blue stripe               | Grounded (current-carrying) DC circuit conductors                                                                                                                     |
| Striping and tracer colors         | Requires prior GMI Engineering approval if different from above.                                                                                                      |
| Pre-manufactured wiring systems    | Requires prior GMI Engineering approval                                                                                                                               |
| Yellow                             | See Orange                                                                                                                                                            |

Use the wire colors as described in the following table (refer to NFPA 79, and IEC)




John Bean Technologies AB  
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Tel: +46 (0) 42 490 4000

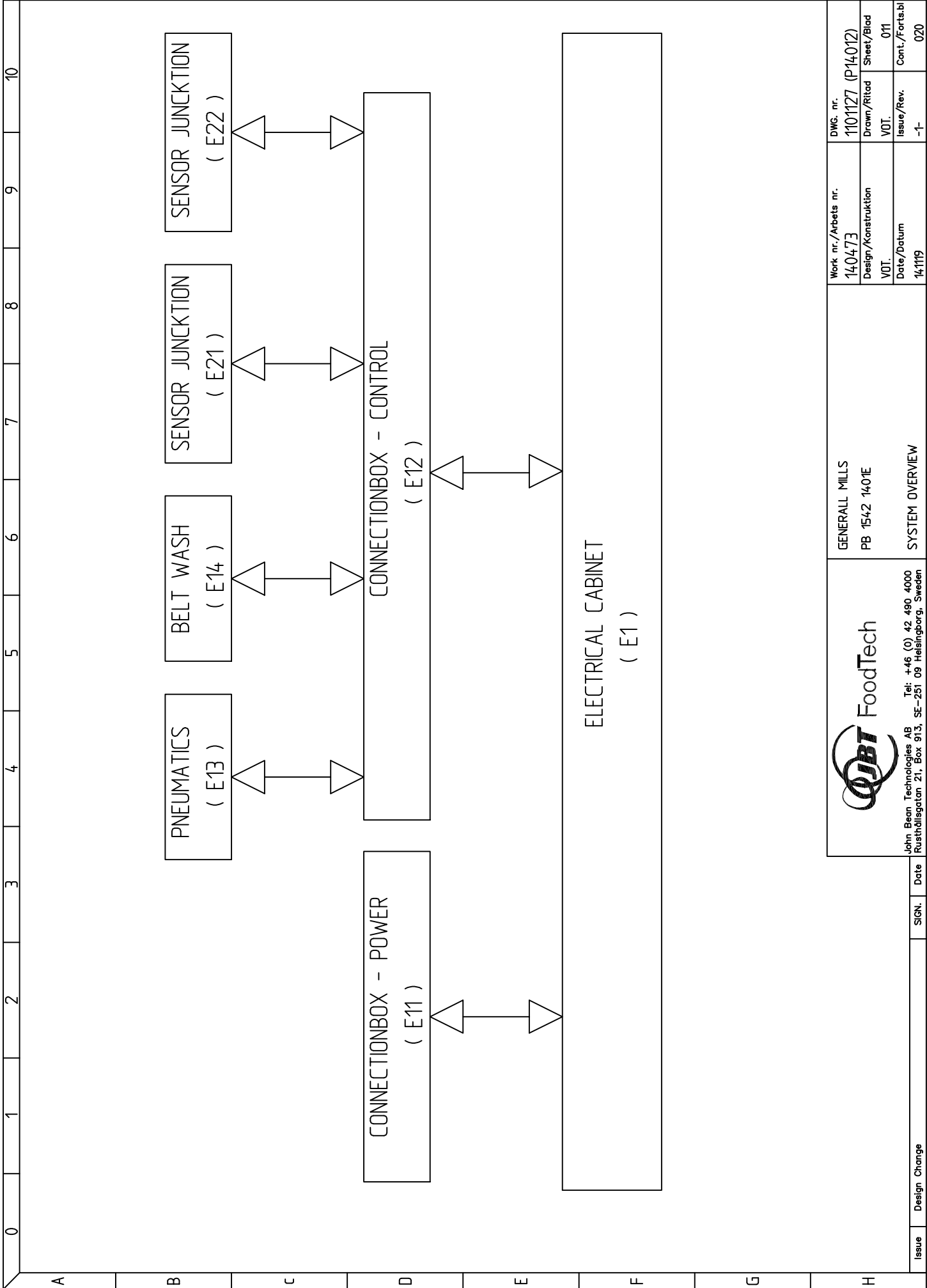
GENERAL MILLS  
PB 1542 1401E

PROJECT BASICS

|                     |                  |
|---------------------|------------------|
| Work nr./Arbets nr. | 1101127 (P14012) |
| Design/Konstruktion | Drawn/Ritad      |
| VDI.                | 004              |
| Date/Datum          | 14-11-19         |
| Issue/Rev.          | -1-              |
| Cont./Fortsbl       | 010              |

| PAGE | PAGE DESIGNATION                           | CHANGED    | EDITOR |
|------|--------------------------------------------|------------|--------|
| 001  | PROJECT BASICS                             | 2014-11-19 | VOT.   |
| 010  | TABLE OF CONTENTS                          | 2014-11-19 | VOT.   |
| 020  | LABELS                                     | 2014-11-19 | VOT.   |
| 050  | LAYOUT                                     | 2014-11-19 | VOT.   |
| 100  | PARTS LIST                                 | 2014-11-19 | VOT.   |
| 200  | POWER CIRCUIT DIAGRAM PLATES (460V AC)     | 2014-11-19 | VOT.   |
| 250  | POWER CIRCUIT DIAGRAM AIR HEATER (460V AC) | -          | -      |
| 300  | POWER CIRCUIT DIAGRAM DRIVES (460V AC)     | 2014-11-19 | VOT.   |
| 350  | POWER CIRCUIT DIAGRAM (115V AC)            | 2014-11-19 | VOT.   |
| 400  | SAFETY CIRCUIT                             | 2014-11-19 | VOT.   |
| 450  | CONTROL CIRCUIT DIAGRAM (115V AC)          | 2014-11-19 | VOT.   |
| 500  | CONTROL CIRCUIT DIAGRAM (24V DC)           | 2014-11-19 | VOT.   |
| 550  | PLC CONFIGURATION                          | 2014-11-19 | VOT.   |
| 560  | PLC CPU                                    | 2014-11-19 | VOT.   |
| 600  | PLC DIGITAL INPUT                          | 2014-11-19 | VOT.   |
| 650  | PLC DIGITAL OUTPUT                         | 2014-11-19 | VOT.   |
| 700  | PLC ANALOG INPUT                           | 2014-11-19 | VOT.   |
| 750  | PLC ANALOG OUTPUT                          | 2014-11-19 | VOT.   |
| 800  | PLC POSITION MODULES                       | 2014-11-19 | VOT.   |
| 850  | FREQUENCY INVERTER CONFIGURATION           | 2014-11-19 | VOT.   |
| 900  | CABLE DIAGRAM                              | 2014-11-19 | VOT.   |
| 1000 | FREQUENCY CONVERTER SETTINGS               | -          | -      |


|                                                                                                                    |                               |                   |                                  |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------|----------------------------------|
| <br><b>QJBT FoodTech</b>      | Work nr./Arbets nr.<br>140473 |                   | DWG. nr.<br>1101127 (P14012)     |
|                                                                                                                    | Design/Konstruktion<br>VOT.   |                   | Drawn/Ritad<br>Sheet/Blad<br>010 |
| Date/Datum<br>14/11/19                                                                                             |                               | Issue/Rev.<br>-1- |                                  |
| GENERAL MILLS<br>PB 1542 1401E                                                                                     |                               | TABLE OF CONTENTS |                                  |
| John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br>Rustrållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden |                               |                   |                                  |
| Issue                                                                                                              | Design Change                 | SIGN.             | Date                             |

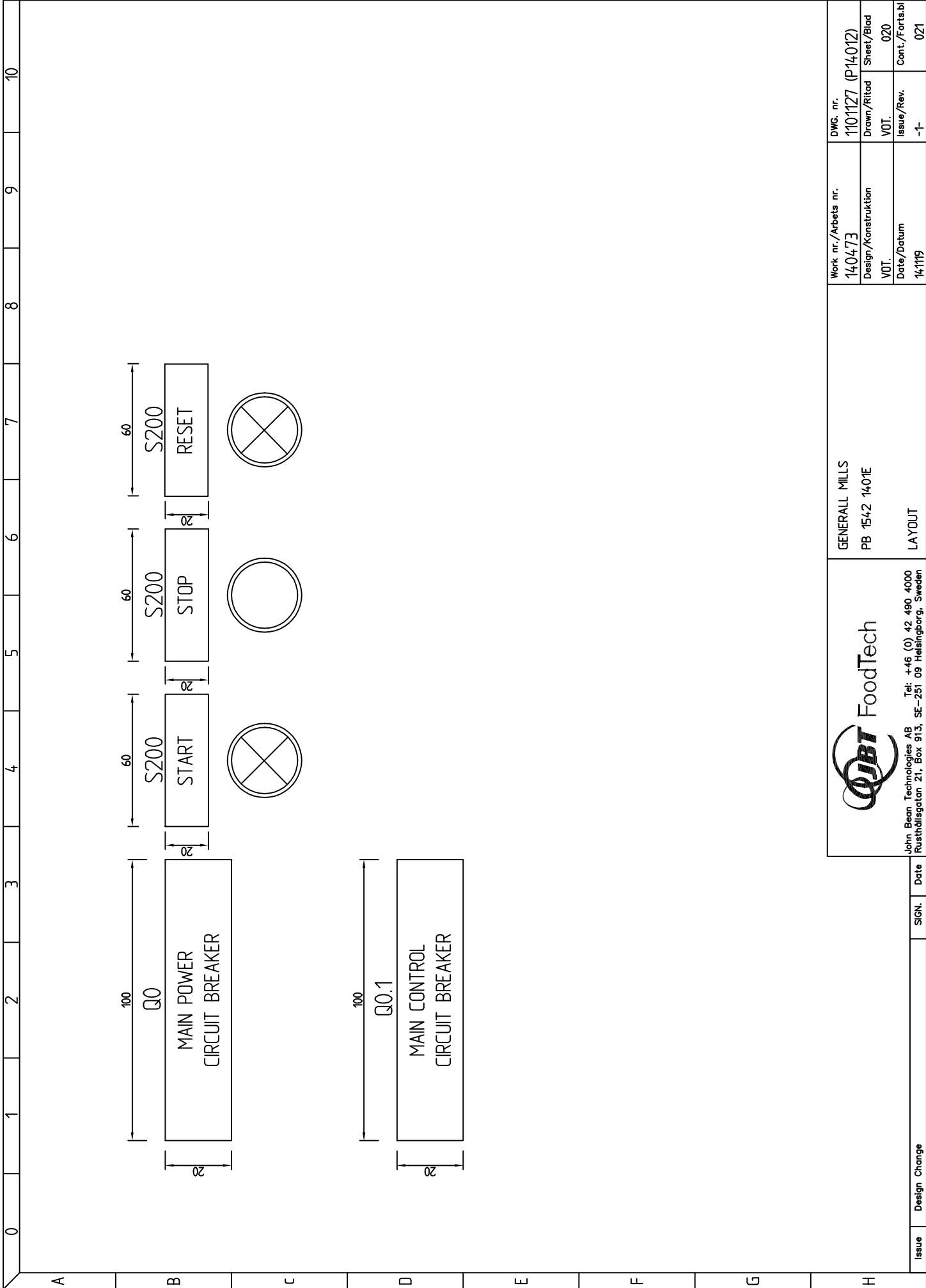


0 1 2 3 4 5 6 7 8 9 10

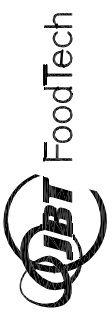
A B C D E F G H

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|                                 |               |                 |      |                                                                                                                                                                                                             |                                |                              |
|---------------------------------|---------------|-----------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------|
| Issue                           | Design Change | SIGN.           | Date | <br>John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br>Rustrållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden | Work nr./Arbets nr.<br>14,0473 | DWG. nr.<br>1101127 (P14012) |
|                                 |               |                 |      |                                                                                                                                                                                                             | Design/Konstruktion<br>VDT.    | Drawn/Ritad<br>VDT. 011      |
|                                 |               |                 |      | Date/Datum<br>14-11-19                                                                                                                                                                                      | Issue/Rev.<br>-1-              | Cont./Fortsbl<br>020         |
| GENERALL MILLS<br>PB 1542 1401E |               | SYSTEM OVERVIEW |      |                                                                                                                                                                                                             |                                |                              |



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| Issue                                                                                                              | Design Change | SIGN.                          | Date                             |
|                               |               |                                |                                  |
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| GENERALL MILLS<br>PB 1542 1401E<br>LAYOUT                                                                          |               | Work nr./Arbets nr.<br>14.0473 | DWG. nr.<br>1101127 (P14012)     |
|                                                                                                                    |               | Design/Konstruktion<br>VOT.    | Drawn/Ritad<br>Sheet/Blad<br>020 |
|                                                                                                                    |               | Date/Datum<br>14-11-19         | Issue/Rev.<br>-1-                |
|                                                                                                                    |               |                                | Cont./Fortsbl<br>021             |

100

MANUFACTURER:  
ELBE AUTOMATIC AB

MANUFACTURER NO:  
140473

DRAWING NO:  
140473

VOLTAGE RATING:  
3x460V 60HZ

FULL LOAD AMPERE RATING:  
331A

LARGEST MOTOR:  
3.0kW/4.0HP

RATING:  
TYPE 4X

SHORT CIRCUIT CURRENT  
36kA

WHITE MATERIAL  
BLACK TEXT

150

80

TIGHTENING TORQUE  
0.6 – 0.8 Nm

RED MATERIAL  
WHITE TEXT

PLACE LABEL ABOVE  
DIGITAL OUT TERMINALS

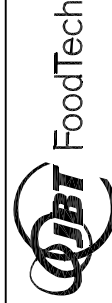
20

TIGHTENING TORQUE  
2.5 – 3.5 Nm

RED MATERIAL  
WHITE TEXT

PLACE LABEL ABOVE  
HEATING POWER CONNECTIONS

20



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GENERALL MILLS  
PB 1542 1401E

LAYOUT

Work nr./Arbets nr.

140473

DWG. nr.

1101127 (P14012)

Design/Konstruktion

Drawn/Ritad

Sheet/Blad

VDT.

VDT.

021

Date/Datum

Issue/Rev.

Cont./Fortsbl

14-11-19

-1-

022

Issue

Design Change

SIGN.

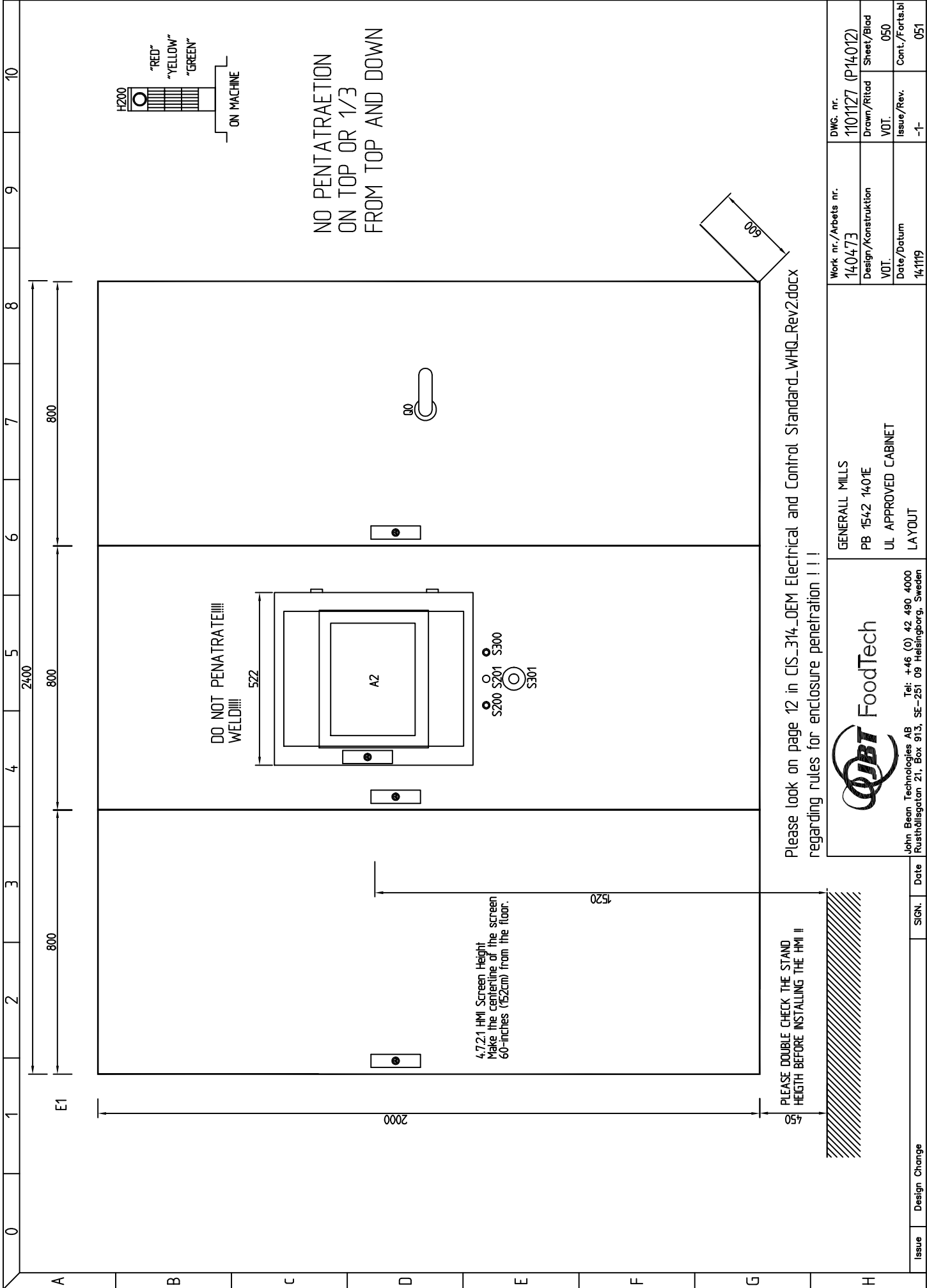
Date



|   |                                                                                                                                                                                                                                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|
| 0 | 1                                                                                                                                                                                                                                                                                                                                                                                             | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | <div style="text-align: center;"> <p>110</p> </div>                                                                                                                                                                                                                                                                                                                                           |   |   |   |   |   |   |   |   |    |
| B | <div style="text-align: center;"> <p>For use on a solid grounded wire source only</p> </div>                                                                                                                                                                                                                                                                                                  |   |   |   |   |   |   |   |   |    |
| C | <div style="text-align: center;"> <p>WARNING - To maintain overcurrent, short circuit, and ground fault protection, the manufacturer's instructions for selection of overload and short circuit protection must be followed to reduce the risk of fire or electric shock</p> </div>                                                                                                           |   |   |   |   |   |   |   |   |    |
| D | <div style="text-align: center;"> <p>WARNING - If an overload or a fault current interruption occurs, circuits must be checked to determine the cause of the interruption. If a fault condition exists, the current-carrying components should be examined and replaced if damaged, and the integral current sensors must be replaced to reduce the risk of fire or electric shock</p> </div> |   |   |   |   |   |   |   |   |    |
| E | <p>RED MATERIAL<br/>WHITE TEXT</p>                                                                                                                                                                                                                                                                                                                                                            |   |   |   |   |   |   |   |   |    |
| F |                                                                                                                                                                                                                                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| G |                                                                                                                                                                                                                                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |
| H |                                                                                                                                                                                                                                                                                                                                                                                               |   |   |   |   |   |   |   |   |    |

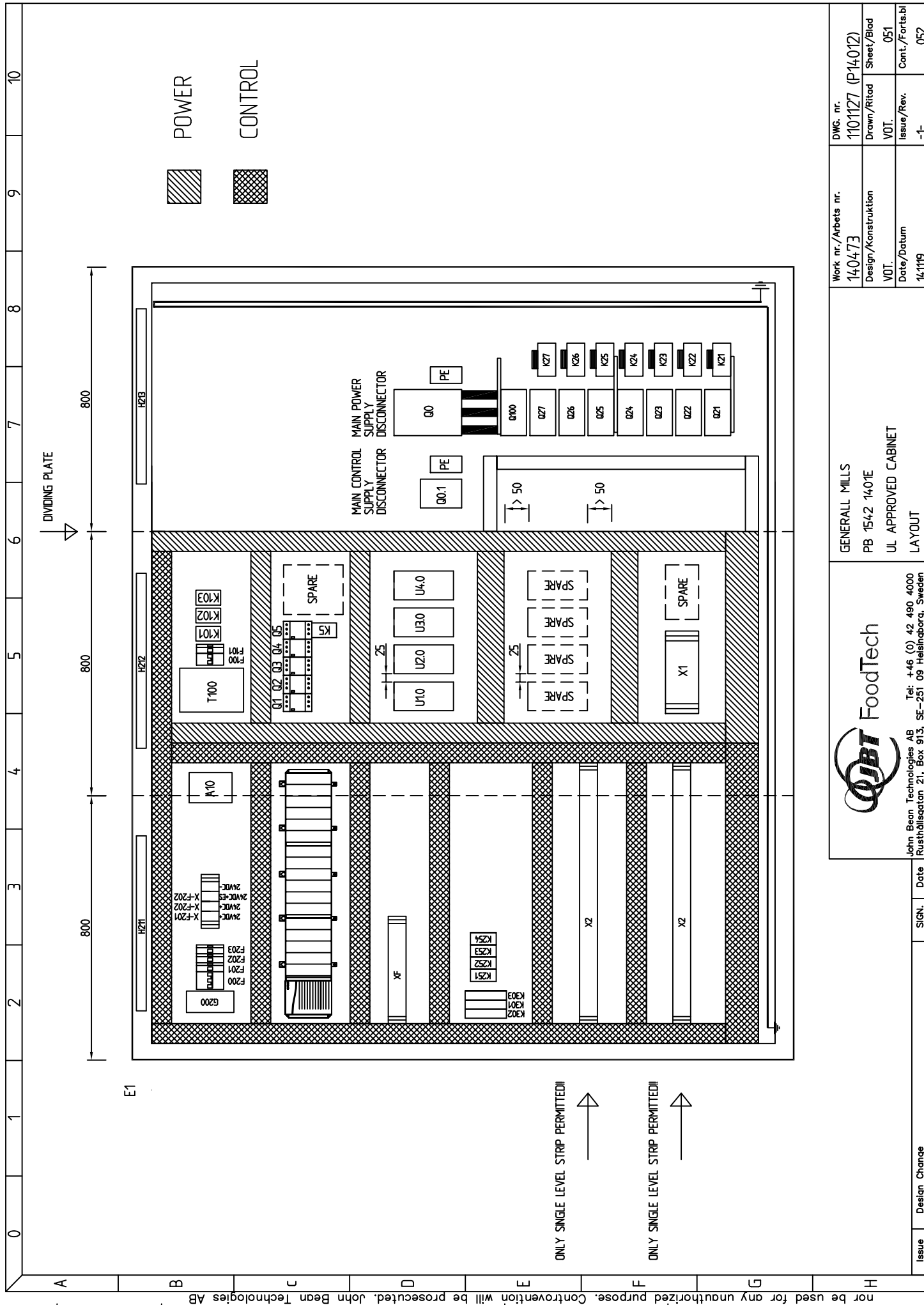
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| <br>John Bean Technologies AB<br>Ruströdlingsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 | Work nr./Arbets nr.<br>140473 |  | DWG. nr.<br>1101127 (P14012) |  |
|                                                                                                                           | Design/Konstruktion<br>VDT.   |  | Drawn/Ritad<br>VDT.          |  |
|                                                                                                                           | Date/Datum<br>14-11-19        |  | Issue/Rev.<br>-1-            |  |
|                                                                                                                           | PROJECT BASICS                |  | Cont./Fortsbl<br>050         |  |
| GENERAL MILLS<br>PB 1542 1401E                                                                                            |                               |  |                              |  |



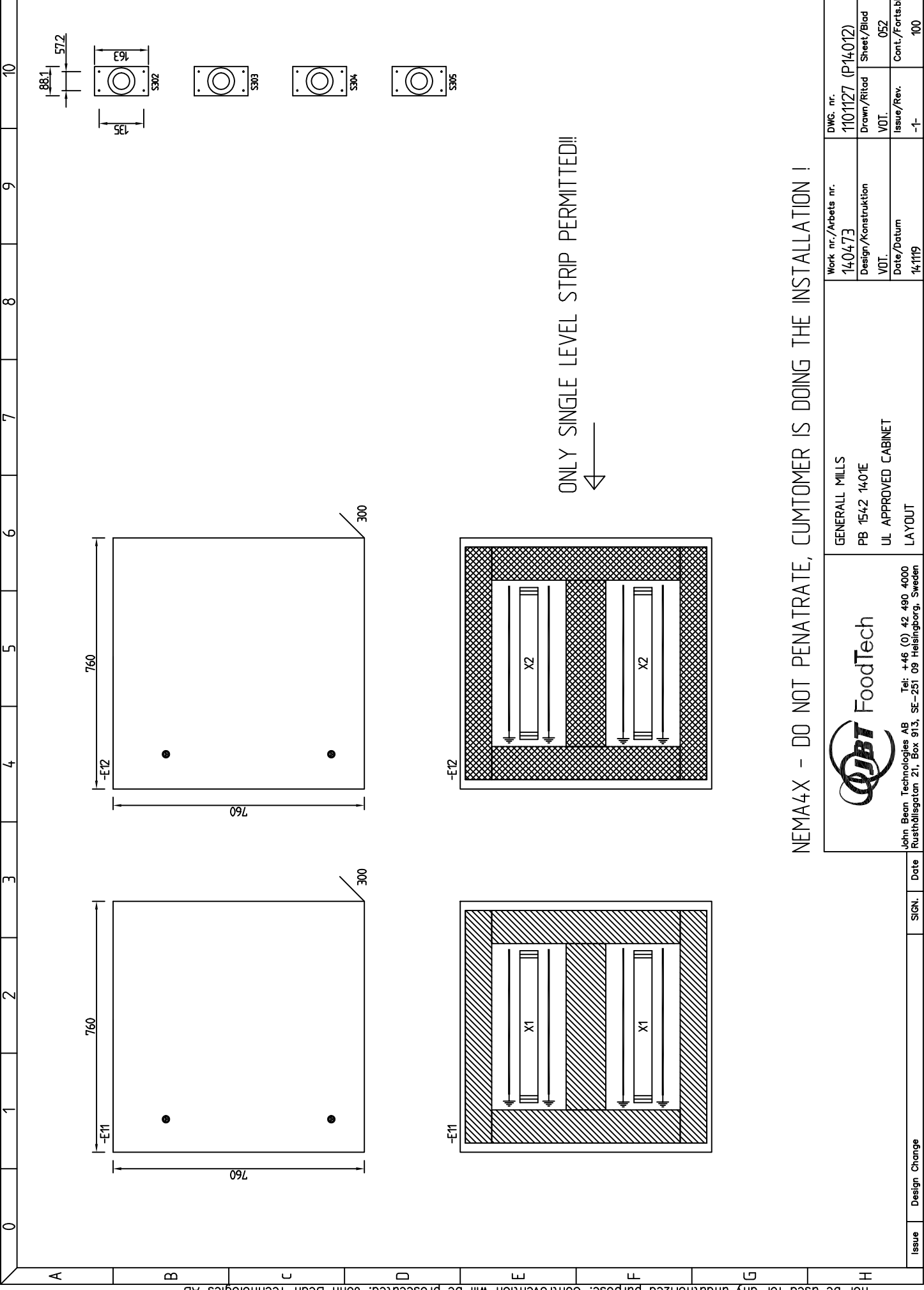
Please look on page 12 in CIS-314\_OEM Electrical and Control Standard\_WHQ\_Rev2.docx regarding rules for enclosure penetration !!!

|                                                                                                                             |                                       |      |                              |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------|------------------------------|
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|                                                                                                                             | <p>Design/Konstruktion<br/>VOT.</p>   |      | Drawn/Ritad<br>Sheet/Blad    |
|                                                                                                                             | <p>Date/Datum<br/>14/11/19</p>        |      | VOT.<br>050                  |
|                                                                                                                             | <p>UL APPROVED CABINET<br/>LAYOUT</p> |      | Issue/Rev.<br>-1-            |
| Issue                                                                                                                       | Design Change                         |      |                              |
|                                                                                                                             | SIGN.                                 | Date |                              |



|       |               |       |      |  |  |                                                                  |                                                                                      |                                                                                                               |
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| Issue | Design Change | SIGN. | Date |  |  | GENERALL MILLS<br>PB 1542 1401E<br>UL APPROVED CABINET<br>LAYOUT | Work nr./Arbets nr.<br>140473<br>Design/Konstruktion<br>VOT.<br>Date/Datum<br>141119 | DWG. nr.<br>1101127 (P14012)<br>Drawn/Ritad<br>Sheet/Blad<br>051<br>Issue/Rev.<br>-1-<br>Cont./Fortsbl<br>052 |
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NEMA4X - DO NOT PENETRATE, CUMTOMER IS DOING THE INSTALLATION !


|                                                                                                                             |                                       |                      |                                           |
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|                                                                                                                             | <p>Design/Konstruktion<br/>VDT.</p>   |                      | <p>Drawn/Ritad<br/>Sheet/Blad<br/>052</p> |
|                                                                                                                             | <p>Date/Datum<br/>14-11-19</p>        |                      | <p>Issue/Rev.<br/>-1-</p>                 |
|                                                                                                                             | <p>UL APPROVED CABINET<br/>LAYOUT</p> |                      | <p>Cont./Fortsbl<br/>100</p>              |
| <p>GENERAL MILLS<br/>PB 1542 140E</p>                                                                                       | <p>Issue</p>                          | <p>Design Change</p> | <p>Issue</p>                              |
| <p>SIGN.</p>                                                                                                                | <p>Date</p>                           | <p>Issue</p>         | <p>Issue</p>                              |

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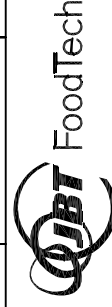
| REV. | ITEM DESIGNATION | QTY | DESCRIPTION                              | MANUFACTURE   | TYPE        | DATA                                                   | REMARKS             |
|------|------------------|-----|------------------------------------------|---------------|-------------|--------------------------------------------------------|---------------------|
| E1   |                  | 3   | CABINET                                  | RITTAL        | TS 8450.680 | WxHxD = 800x2000x600mm                                 | STAINLESS / NEMA 4X |
|      |                  | 1   | SIDE PANELS                              | RITTAL        | TS 8700.060 | WxH = 600x2000, IP55 + NEMA4X KIT --> NEMA4X           | STAINLESS / NEMA 4X |
|      |                  | 2   | NEMA 4X BANG FRAME                       | RITTAL        | TS 8700.010 |                                                        | NEMA 4X             |
|      |                  | 3   | MOUNTING PLATE INFILL                    | RITTAL        | TS 4591700  | HEIGHT = 2000mm                                        |                     |
|      |                  | 1   | DIVIDER PANEL                            | RITTAL        | TS 8609.060 | HEIGHT = 2000mm                                        |                     |
|      |                  | 2x4 | MOUNTING FLANGE                          | RITTAL        | TS 8612.060 | WIDTH = 600mm                                          |                     |
|      |                  | 2x4 | ANGULAR BAYING BRACKET                   | RITTAL        | TS 8800.430 |                                                        |                     |
|      |                  | 1   | BAYING CONNECTOR                         | RITTAL        | TS 8700.000 |                                                        |                     |
|      |                  | 1   | PROTECTIVE WINDOW                        | RITTAL        | FT2793560   | STAINLESS STEEL                                        |                     |
|      | H211-H213        | 3   | CABINET SYSTEM LIGHT                     | RITTAL        | 4440.840    | WIDTH = 530mm, 0.16A, 40 LEDs, POLYCARBONATE           | 24V DC              |
|      |                  | 3   | SUPPLY CABLE                             | RITTAL        | 4315.800    | CONNECTION CABLE                                       | 24V DC              |
|      | S211             | 1   | DOOR SWITCH                              | RITTAL        | 4315.810    | 3000mm CABLE                                           | 24V DC              |
|      | S212-S213        | 2   | DOOR SWITCH                              | RITTAL        | 4315.820    | 1000mm CABLE                                           | 24V DC              |
|      |                  | 1   | PLC - POWER SUPPLY                       | ALLEN BRADLEY | 1756-PB72   |                                                        | 18...32V DC         |
|      |                  | 1   | PLC CHASSI                               | ALLEN BRADLEY | 1756-A17    | 17 SLOTS                                               |                     |
|      |                  | 4   | PLC EMPTY SLOT COVER                     | ALLEN BRADLEY | 1756-N2     |                                                        |                     |
|      |                  | 1   | PLC - CPU CONTROLLER                     | ALLEN BRADLEY | 1756-L73    | 8nb                                                    |                     |
|      |                  | 1   | PLC - COMMUNICATION MODULE ETHERNET      | ALLEN BRADLEY | 1756-EN2T   | ETHERNET TCP/IP                                        |                     |
|      |                  | 1   | SHIELDED ETHERNET PATCH CABLE FTP CAT 5E |               | 018100097   | 2M                                                     |                     |
|      |                  | 1   | HIGH SPEED COUNTER MODULE                | ALLEN BRADLEY | 1756-HSC    | 2 HIGH SPEED COUNTERS                                  |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBS6H  | 36 (P) SPRING CLAMP                                    |                     |
|      |                  | 1   | PLC-DIGITAL INPUT MODULE ( 16 )          | ALLEN BRADLEY | 1756-IB16   | 10-30VDC                                               |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH   | 20 (P) SPRING CLAMP                                    |                     |
|      |                  | 1   | PLC-DIGITAL INPUT MODULE ( 16 )          | ALLEN BRADLEY | 1756-IB16   | 10-30VDC                                               |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH   | 20 (P) SPRING CLAMP                                    |                     |
|      |                  | 1   | PLC-DIGITAL INPUT MODULE ( 16 )          | ALLEN BRADLEY | 1756-IB16   | 10-30VDC                                               |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH   | 20 (P) SPRING CLAMP                                    |                     |
|      |                  | 1   | PLC-DIGITAL OUTPUT MODULE ( 16 )         | ALLEN BRADLEY | 1756-OB16E  | 10-312V DC 16-point electronically-fused output module |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH   | 20 (P) SPRING CLAMP                                    |                     |
|      |                  | 1   | PLC-DIGITAL OUTPUT MODULE ( 16 )         | ALLEN BRADLEY | 1756-OB16E  | 10-312V DC 16-point electronically-fused output module |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH   | 20 (P) SPRING CLAMP                                    |                     |
|      |                  | 1   | PLC-DIGITAL OUTPUT MODULE ( 16 )         | ALLEN BRADLEY | 1756-OB16E  | 10-312V DC 16-point electronically-fused output module |                     |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH   | 20 (P) SPRING CLAMP                                    |                     |

|       |               |       |      |                                                                                                                                                                                                                   |                                                                                |                                                                                                   |                              |                   |                      |
|-------|---------------|-------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------|-------------------|----------------------|
| Issue | Design Change | SIGN. | Date |  <p>John Bean Technologies AB<br/>Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br/>Tel: +46 (0) 42 490 4000</p> | <p>GENERALL MILLS<br/>PB 1542 1401E<br/>UL APPROVED CABINET<br/>PARTS LIST</p> | <p>Work nr./Arbets nr.<br/>14.0473<br/>Design/Konstruktion<br/>VOT<br/>Date/Datum<br/>14-1119</p> | DWG. nr.<br>1101127 (P14012) | Sheet/Blod<br>100 | Cont./Fortsbl<br>101 |
|       |               |       |      |                                                                                                                                                                                                                   |                                                                                |                                                                                                   | Issue/Rev.<br>-1-            |                   |                      |

| REV. | ITEM DESIGNATION | QTY | DESCRIPTION                              | MANUFACTURE   | TYPE           | DATA                                   | REMARKS    |
|------|------------------|-----|------------------------------------------|---------------|----------------|----------------------------------------|------------|
|      | A141             | 1   | PLC - ANALOG INPUT MODULE (6)            | ALLEN BRADLEY | 1756-IF6I      | RTD                                    |            |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH      | 20 (P) SPRING CLAMP                    |            |
|      | A142             | 1   | PLC - ANALOG INPUT MODULE (6)            | ALLEN BRADLEY | 1756-IT6I      | THERMOCOUPLE                           |            |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH      | 20 (P) SPRING CLAMP                    |            |
|      | A143             | 1   | PLC - ANALOG INPUT MODULE (6)            | ALLEN BRADLEY | 1756-IT6I      | THERMOCOUPLE                           |            |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH      | 20 (P) SPRING CLAMP                    |            |
|      | A144             | 1   | PLC - ANALOG INPUT MODULE (6)            | ALLEN BRADLEY | 1756-IF6I      | CURRENT                                |            |
|      |                  | 1   | TERMINAL BLOCK                           | ALLEN BRADLEY | 1756-TBSH      | 20 (P) SPRING CLAMP                    |            |
|      | A10              | 1   | ETHERNET SWITCH STRATIX 5700             | ALLEN BRADLEY | 1783-BMS10CA   | 10 PORT MANAGED SWITCH                 |            |
|      |                  | 1   | SHIELDED ETHERNET PATCH CABLE FTP CAT 5E | 018100095     |                | 0.5M                                   |            |
|      | F100             | 1   | MCB                                      | ALLEN BRADLEY | 1489-M2D060    | 2P/D/6A/UL489                          |            |
|      |                  | 1   | AUX CONTACT                              | ALLEN BRADLEY | 1489-AMRA3     |                                        |            |
|      | F101             | 1   | MCB                                      | ALLEN BRADLEY | 1489-M1C060    | 1P/C/6A/UL489                          |            |
|      |                  | 1   | AUX CONTACT                              | ALLEN BRADLEY | 1489-AMRA3     |                                        |            |
|      | F200             | 1   | MCB                                      | ALLEN BRADLEY | 1492-SPM3C060  | 3P/C/6A/10KA                           |            |
|      | F201             | 1   | MCB                                      | ALLEN BRADLEY | 1492-SPM1C040  | 1P/C/4A/10KA                           |            |
|      |                  | 1   | AUX CONTACT                              | ALLEN BRADLEY | 189-ASCR3      | 1 SWITCH                               |            |
|      | F202             | 1   | MCB                                      | ALLEN BRADLEY | 1492-SPM1C040  | 1P/C/4A/10KA                           |            |
|      |                  | 1   | AUX CONTACT                              | ALLEN BRADLEY | 189-ASCR3      | 1 SWITCH                               |            |
|      | F202             | 1   | MCB                                      | ALLEN BRADLEY | 1492-SPM1C040  | 1P/C/4A/10KA                           |            |
|      |                  | 1   | AUX CONTACT                              | ALLEN BRADLEY | 189-ASCR3      | 1 SWITCH                               |            |
|      | G200             | 1   | POWER SUPPLY                             | ALLEN BRADLEY | 1606-XLS480E-3 | 480VA 24.28VDC-20A                     | 380.480VAC |
|      | K21-K27          | 7   | CONTACTOR                                | ALLEN BRADLEY | 100-L43EJ00    | ACT-85A/AC3-43A                        | 24VDC      |
|      |                  | 7   | AUX CONTACT                              | ALLEN BRADLEY | 100-FA22       |                                        |            |
|      | K201K202K5       | 3   | CONTACTOR                                | ALLEN BRADLEY | 100-L09E310    |                                        | 24VDC      |
|      | K251-K254        | 4   | AUX RELAY                                | ALLEN BRADLEY | 700-HF34224    | 4-POL                                  | 24VDC      |
|      |                  | 4   | SOCKET                                   | ALLEN BRADLEY | 700-HN264      |                                        |            |
|      | K301             | 1   | EMERGENCY STOP RELAY                     | ALLEN BRADLEY | 440R-W23219    | SAFETY RELAY BASE MODULE / MSR-310P    | 24VDC      |
|      | K302             | 1   | SAFETY INPUT MODULE                      | ALLEN BRADLEY | 440R-W23218    | SAFETY DIGITAL INPUT MODULE / MSR-320P |            |
|      | K303             | 1   | SAFETY OUTPUT MODULE                     | ALLEN BRADLEY | 440R-W23221    | SAFETY DIGITAL OUTPUT MODULE / MSR330P |            |

|                                                                                       |               |                                                |      |                                  |
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|  |               | Work nr./Arbets nr.<br><b>1101127</b> (P14012) |      | DWG. nr.                         |
|                                                                                       |               | Design/Konstruktion<br>VOT                     |      | Drawn/Ritad<br>Sheet/Blad<br>101 |
| GENERAL MILLS<br>PB 1542 1401E<br>UL APPROVED CABINET<br>PARTS LIST                   |               | Date/Datum<br>14-11-19                         |      | Issue/Rev.<br>-1-                |
| Issue                                                                                 | Design Change | SIGN.                                          | Date |                                  |

| REV. | ITEM DESIGNATION           | QTY | DESCRIPTION                      | MANUFACTURE   | TYPE                         | DATA                                                                                       | REMARKS      |
|------|----------------------------|-----|----------------------------------|---------------|------------------------------|--------------------------------------------------------------------------------------------|--------------|
|      | Q0 (MAIN POWER SWITCH)     | 1   | MOLDED CASE CIRCUIT BREAKER      | ABB           | 15SJL400PR221DS-LS/In=400.3p | FSFACE Tmax I5, Icu 500 VAC = 36kA, Size Iu = 400A<br>(1) Auxiliary (1) Alarm Contact Z50V | 1SDA058157R1 |
|      |                            | 1   | AUX CONTACT BLOCK                | ABB           | AUX 1Q 1SY 250 V AC/DC       |                                                                                            | 1SDA051369R1 |
|      |                            | 1   | ROTATING HANDLE DOOR MOUNTED     | ABB           | CONNECTION KIT               |                                                                                            | 1SDA069395R1 |
|      |                            | 1   | INSULATING TERMINAL COVERS       | ABB           | HTC A3-A3-T5-3p              |                                                                                            | 1SDA054960R1 |
|      |                            | 1   | PHASE BARRIERS                   | ABB           | PB100 T4-T5-3P               | 100mm PHASE BARRIERS                                                                       | 1SDA054970R1 |
|      | Q0.1 (MAIN CONTROL SWITCH) | 1   | MOLDED CASE CIRCUIT BREAKER      | ABB           | T2H100JL/CSAMCP;100-1200.3p  | FFSFACE Tmax I2, Icu 480 VAC = 65kA, Size Iu = 100A                                        | 1SDA055172R1 |
|      |                            | 1   | ROTATING HANDLE DIRECT           | ABB           | RHD DIRECT T1-T3             | DIRECT INSTALLATION                                                                        | 1SDA051381R1 |
|      |                            | 1   | INSULATING TERMINAL COVERS       | ABB           | HTC A3-A3-T5-3p              |                                                                                            | 1SDA051417R1 |
|      |                            | 1   | PHASE BARRIERS                   | ABB           | PB100 T1-T3-3P               | 100mm PHASE BARRIERS                                                                       | 1SDA051427R1 |
|      | Q1                         | 1   | MOTOR PROTECTION CIRCUIT BREAKER | ALLEN BRADLEY | 140M-CZE-B63                 | 4.0-6.3A                                                                                   |              |
|      |                            | 1   | AUX CONTACT                      | ALLEN BRADLEY | 140M-C-AFA11                 |                                                                                            |              |
|      |                            | 1   | BUS BAR                          | ALLEN BRADLEY | 140M-C-WTE                   |                                                                                            |              |
|      | Q2                         | 1   | MOTOR PROTECTION CIRCUIT BREAKER | ALLEN BRADLEY | 140M-CZE-B63                 | 4.0-6.3A                                                                                   |              |
|      |                            | 1   | AUX CONTACT                      | ALLEN BRADLEY | 140M-C-AFA11                 |                                                                                            |              |
|      | Q3                         | 1   | MOTOR PROTECTION CIRCUIT BREAKER | ALLEN BRADLEY | 140M-CZE-B63                 | 4.0-6.3A                                                                                   |              |
|      |                            | 1   | AUX CONTACT                      | ALLEN BRADLEY | 140M-C-AFA11                 |                                                                                            |              |
|      | Q4                         | 1   | MOTOR PROTECTION CIRCUIT BREAKER | ALLEN BRADLEY | 140M-CZE-C16                 | 10.0-16.0A                                                                                 |              |
|      |                            | 1   | AUX CONTACT                      | ALLEN BRADLEY | 140M-C-AFA11                 |                                                                                            |              |
|      | Q5                         | 1   | MOTOR PROTECTION CIRCUIT BREAKER | ALLEN BRADLEY | 140M-CZE-C10                 | 6.3-10A                                                                                    |              |
|      |                            | 1   | AUX CONTACT                      | ALLEN BRADLEY | 140M-C-AFA11                 |                                                                                            |              |
|      | Q21-27                     | 7   | MOLDED CASE CIRCUIT BREAKER      | ALLEN BRADLEY | 140U-H2C3-C45                | T/M - Fixed Thermal / Fixed Magnetic, Rated Current 45A                                    |              |
|      |                            | 7   | AUXILIARY SWITCH                 | ALLEN BRADLEY | 140U-H-EA1R1                 |                                                                                            |              |
|      |                            | 7   | PHASE BARRIERS                   | ALLEN BRADLEY | 140U-H-PB                    |                                                                                            |              |
|      |                            | 7   | DN RAIL ADAPTER                  | ALLEN BRADLEY | 140U-H-DRA                   |                                                                                            |              |
|      | Q100                       | 1   | MOLDED CASE CIRCUIT BREAKER      | ALLEN BRADLEY | 140E-H2C3-C30                | 30A                                                                                        |              |
|      |                            | 1   | AUXILIARY SWITCH                 | ALLEN BRADLEY | 140U-H-EA1R1                 |                                                                                            |              |
|      |                            | 1   | PHASE BARRIERS                   | ALLEN BRADLEY | 140U-H-PB                    |                                                                                            |              |
|      |                            | 1   | DN RAIL ADAPTER                  | ALLEN BRADLEY | 140U-H-DRA                   |                                                                                            |              |
|      | T100                       | 1   | TRANSFORMATOR                    | ALLEN BRADLEY | 1497A-A10-M6-0-N             | 460V/115V - 750VA                                                                          |              |



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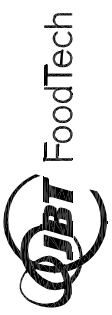
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14-11-19

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103

GENERAL MILLS  
PB 1542 1401E  
UL APPROVED CABINET  
PARTS LIST

Issue Design Change  
SIGN. Date

| REV. | ITEM DESIGNATION | QTY | DESCRIPTION                              | MANUFACTURE   | TYPE               | DATA    | REMARKS |
|------|------------------|-----|------------------------------------------|---------------|--------------------|---------|---------|
|      | U10              | 1   | FREQUENCY CONVERTER                      | ALLEN BRADLEY | 25B-D4P0N114       | 15kW    |         |
|      | U11              | 1   | EMC FILTER                               | ALLEN BRADLEY | 25-RF7P5-AL        |         |         |
|      |                  | 1   | SHIELDED ETHERNET PATCH CABLE FTP CAT 5E |               | 0118100099         | 5M      |         |
|      |                  | 1   | ADVANCED PANEL                           | ALLEN BRADLEY | 22-HIM-A3          |         |         |
|      | U20              | 1   | FREQUENCY CONVERTER                      | ALLEN BRADLEY | 25B-D4P0N114       | 15kW    |         |
|      | U21              | 1   | EMC FILTER                               | ALLEN BRADLEY | 25-RF7P5-AL        |         |         |
|      |                  | 1   | SHIELDED ETHERNET PATCH CABLE FTP CAT 5E |               | 0118100099         | 5M      |         |
|      |                  |     |                                          |               |                    |         |         |
|      | U30              | 1   | FREQUENCY CONVERTER                      | ALLEN BRADLEY | 25B-D4P0N114       | 15kW    |         |
|      | U31              | 1   | EMC FILTER                               | ALLEN BRADLEY | 25-RF7P5-AL        |         |         |
|      |                  | 1   | SHIELDED ETHERNET PATCH CABLE FTP CAT 5E |               | 0118100099         | 5M      |         |
|      |                  |     |                                          |               |                    |         |         |
|      | U4,0             | 1   | FREQUENCY CONVERTER                      | ALLEN BRADLEY | 25B-D010N114       | 4kW     |         |
|      | U4,1             | 1   | EMC FILTER                               | ALLEN BRADLEY | 25-RF014-BL        |         |         |
|      |                  | 1   | SHIELDED ETHERNET PATCH CABLE FTP CAT 5E |               | 0118100099         | 5M      |         |
|      |                  |     |                                          |               |                    |         |         |
|      | W0               | 8   | BUSBAR ADAPTER 63 A                      | WÖNER         | 32459              | 63A     |         |
|      |                  | 6   | BUSBAR SUPPORT                           | WÖNER         | 01495              |         |         |
|      |                  | 4   | BUSBAR END COVER                         | WÖNER         | 01573              |         |         |
|      |                  | 6m  | CLIPPER BUSBAR                           |               | CU                 | 20X10MM |         |
|      |                  | 2   | BASE PLATE UL                            | WÖNER         | 01518              |         |         |
|      |                  |     |                                          |               |                    |         |         |
|      | W1-4             | 3   | CONNECTION BAR                           | ALLEN BRADLEY | 140M-C-WTE N       |         |         |
|      |                  | 1   | CONNECTION BAR                           | ALLEN BRADLEY | 140M-C-W454 N      |         |         |
|      |                  | 1   | CONNECTION BAR                           | ALLEN BRADLEY | 140M-C-W542        |         |         |
|      |                  |     |                                          |               |                    |         |         |
|      | XF               |     | TERMINAL                                 | WEDMULLER     |                    |         |         |
|      |                  | 48  | TERMINAL FOR DIGITAL INPUTS              | WEDMULLER     | WEDMULLER WSI 6/LD | LED     |         |
|      |                  | 48  | FUSE 5x20mm                              | SCHURTER      | 500mA              |         |         |
|      |                  |     |                                          |               |                    |         |         |
|      |                  |     |                                          |               |                    |         |         |
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|--------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------|-------------------------------------|
|                               | Work nr./Arbets nr.<br><b>14,0473</b> |                   | DWG. nr.<br><b>1101127 (P14012)</b> |
|                                                                                                                    | Design/Konstruktion<br>VOT            |                   | Drawn/Ritad<br>Sheet/Blad<br>103    |
| Date/Datum<br><b>14-11-19</b>                                                                                      |                                       | Issue/Rev.<br>-1- | Cont./Fortsbl<br>104                |
| GENERAL MILLS<br>PB 1542 1401E<br>UL APPROVED CABINET<br>UL APPROVED CABINET                                       |                                       |                   |                                     |
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| Issue                                                                                                              | Design Change                         | Sign              | Date                                |

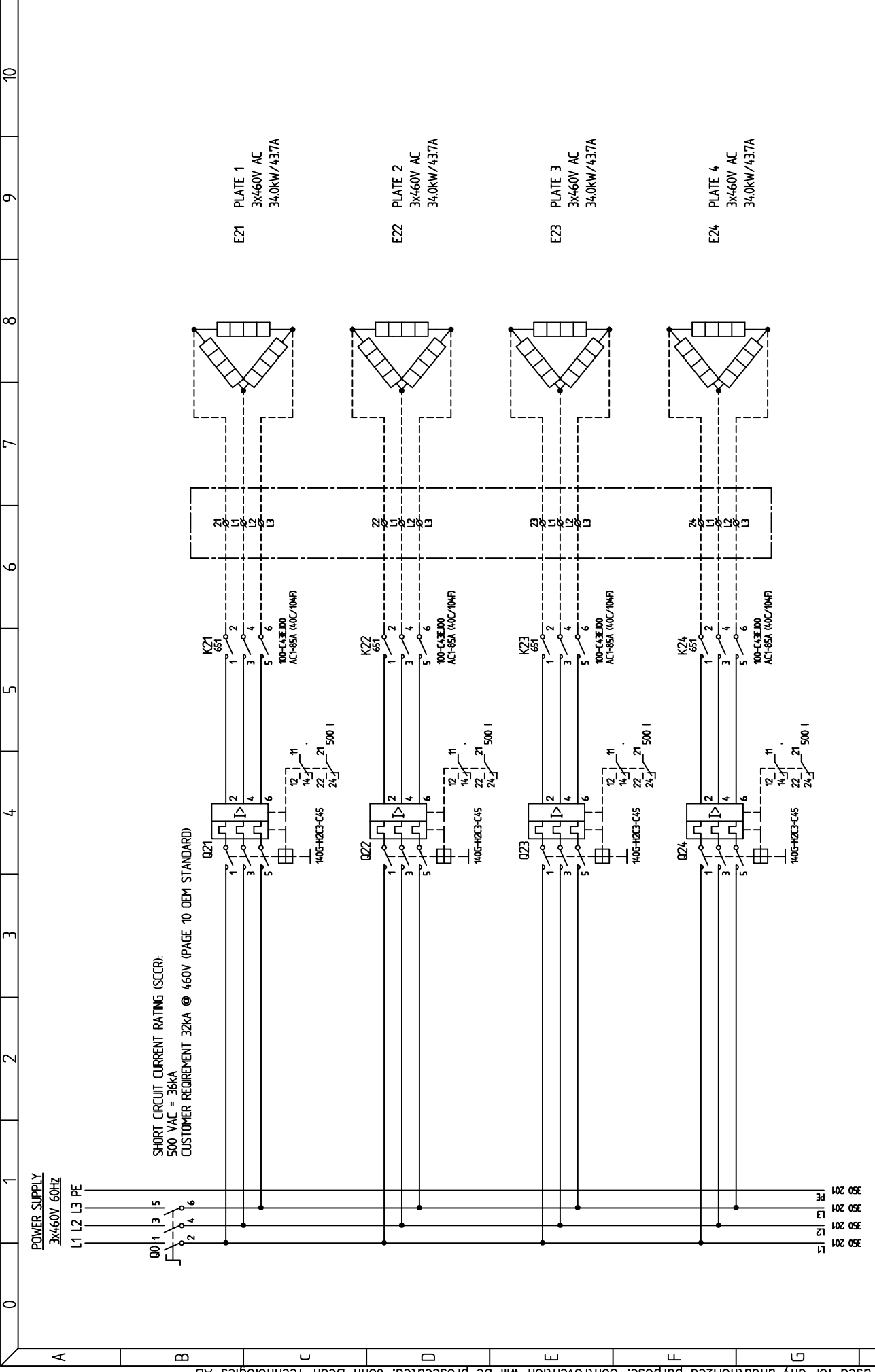
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| REV.                | ITEM DESIGNATION | QTY | DESCRIPTION                     | MANUFACTURE   | TYPE                | DATA                                                 | REMARKS       |
|---------------------|------------------|-----|---------------------------------|---------------|---------------------|------------------------------------------------------|---------------|
| -E11                |                  | 1   | CONNECTIONBOX (POWER)           | TRITAL        | AE 1014.600         | (WxHxD): 760x760x300                                 | NEMA4X        |
| -E12                |                  | 1   | CONNECTIONBOX (CONTROL)         | TRITAL        | AE 1014.600         | (WxHxD): 760x760x300                                 | NEMA4X        |
| B201-B204-B231-B232 |                  | 6   | PROXIMITY SWITCH                | EGE SPECIAL   | IGMF 05 GSP         | 15M CABEL ( FORMCOOK )                               | 24VDC         |
| B2                  |                  | 1   | NV PROXIMITY SWITCH COMPLETE    | SEW           | NV11/12/16/21/22/26 | ( FORMCOOK )                                         | 24VDC         |
|                     |                  | 1   | CABEL                           | EM            | E12008              | ( FORMCOOK )                                         |               |
| B21-B27             |                  | 7   | TEMPERATURE SENSOR              | JUMO          |                     | TYP J ( FORMCOOK )                                   |               |
| S302-S305           |                  | 4   | EMRGNCYSTOP                     | ALLEN BRADLEY | 800H-FRXTQH2ARA     | 800H 2 Position Push-Pull/Twist Release, Illuminated | 10..130VAC/DC |
|                     |                  | 4   | SELF MONITORING CONTACT BLOCK   | ALLEN BRADLEY | 800TC-XD4S          |                                                      |               |
|                     |                  | 4   | STAINLESS STEEL BOX             | ALLEN BRADLEY | 800R-WH74           | Push Button Enclosure,Surface,1 Hole,Type 4/4X/13    | NEMA4X        |
|                     |                  | 1   | YELLOW IEC RING                 | ALLEN BRADLEY | 800H-W690           |                                                      |               |
| H200                |                  | 1   | BASE-MODULE                     | ALLEN BRADLEY | 855T-BSBC           |                                                      |               |
|                     |                  | 1   | LAMP-MODULE                     | ALLEN BRADLEY | 855T-B24TL4         | "RED" LED INDICATION                                 | 24VDC         |
|                     |                  | 1   | LAMP-MODULE                     | ALLEN BRADLEY | 855T-B24TL3         | "GREEN" LED INDICATION                               | 24VDC         |
|                     |                  | 1   | SREN                            | ALLEN BRADLEY | 855T-B24SA1         |                                                      | 24VDC         |
|                     |                  | 1   | LAMP-MODULE                     | ALLEN BRADLEY | 855T-B24TL5         | "AMBER" LED INDICATION                               | 24VDC         |
|                     |                  | 1   | LAMP-MODULE                     | ALLEN BRADLEY | 855T-B24TL6         | "BLUE" LED INDICATION                                | 24VDC         |
| S1-S4               |                  | 4   | ENCLOSED DISCONNECT LOAD SWITCH | ALLEN BRADLEY | 194E-CA-20          | 20A                                                  | NEMA4X        |
|                     |                  | 4   | AUXILIARY CONTACT               | ALLEN BRADLEY | 194E-A-PD10         | 1 NO EB (EARLY BREAK)                                |               |

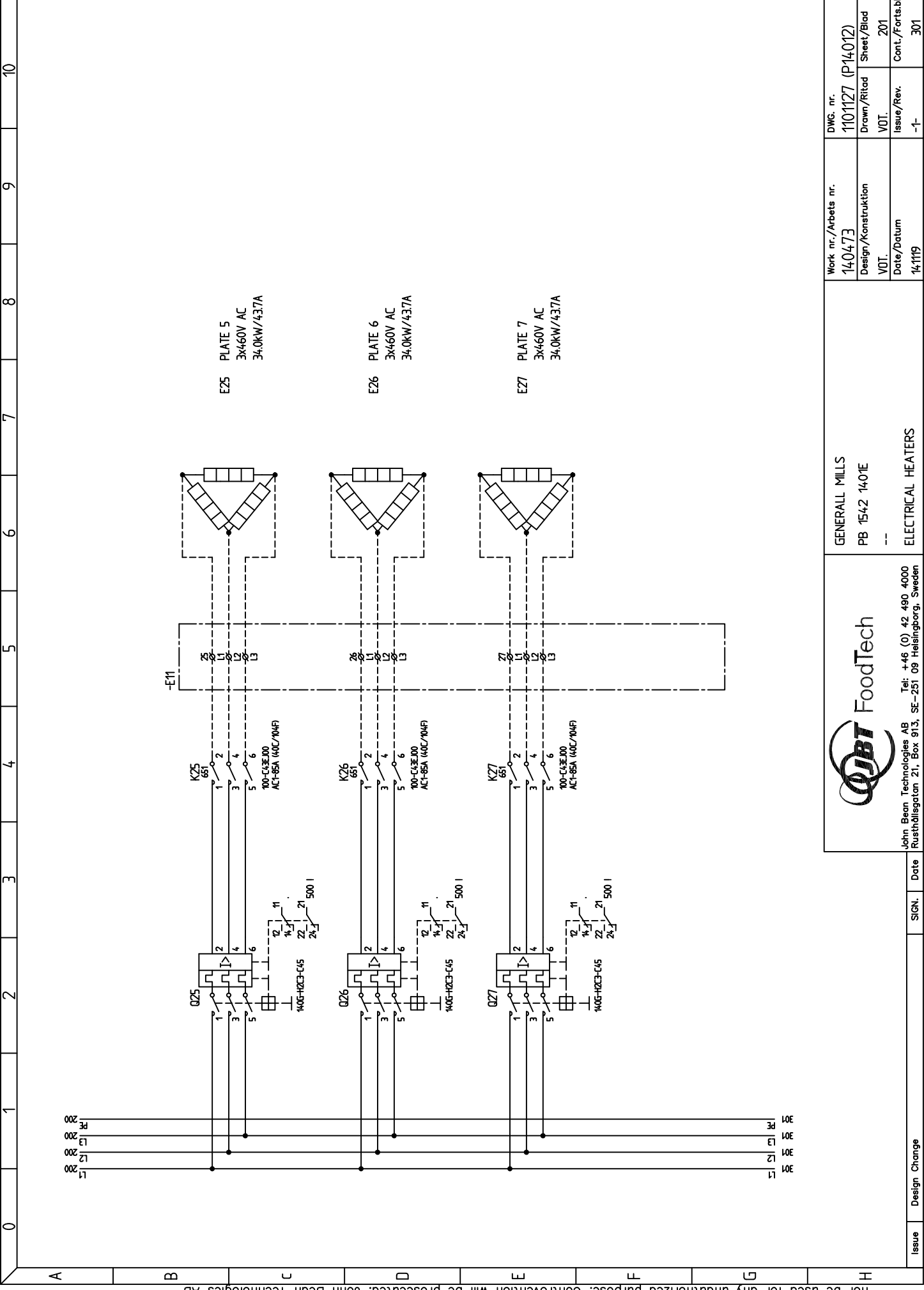
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|                                                                                                                                                                                                             | Design/Konstruktion<br>VOT           | Drawn/Ritad<br>Sheet/Blad<br>105    |
| GENERAL MILLS<br>PB 1542 1401E                                                                                                                                                                              | Date/Datum<br>14-11-19               | PARTS LIST                          |
| Issue    Design Change                                                                                                                                                                                      | SIGN.    Date                        |                                     |



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|   |   |   |   |   |   |   |   |       |               |       |      |                                                                                                                    |  |                                                                    |                     |                   |                                      |                                     |
|---|---|---|---|---|---|---|---|-------|---------------|-------|------|--------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------|---------------------|-------------------|--------------------------------------|-------------------------------------|
| A | B | C | D | E | F | G | H | Issue | Design Change | SIGN. | Date | John Bean Technologies AB<br>Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |  | <b>GENERALL MILLS</b><br>PB 1542 1401E<br>--<br>ELECTRICAL HEATERS |                     |                   | Work nr./Arbets nr.<br><b>140473</b> | DWG. nr.<br><b>1101127 (P14012)</b> |
|   |   |   |   |   |   |   |   |       |               |       |      |                                                                                                                    |  | Design/Konstruktion<br>VDT.                                        | Drawn/Ritad<br>VDT. | Issue/Rev.<br>-1- | Sheet/Blad<br>200                    | Cont./Fortsbl<br>201                |

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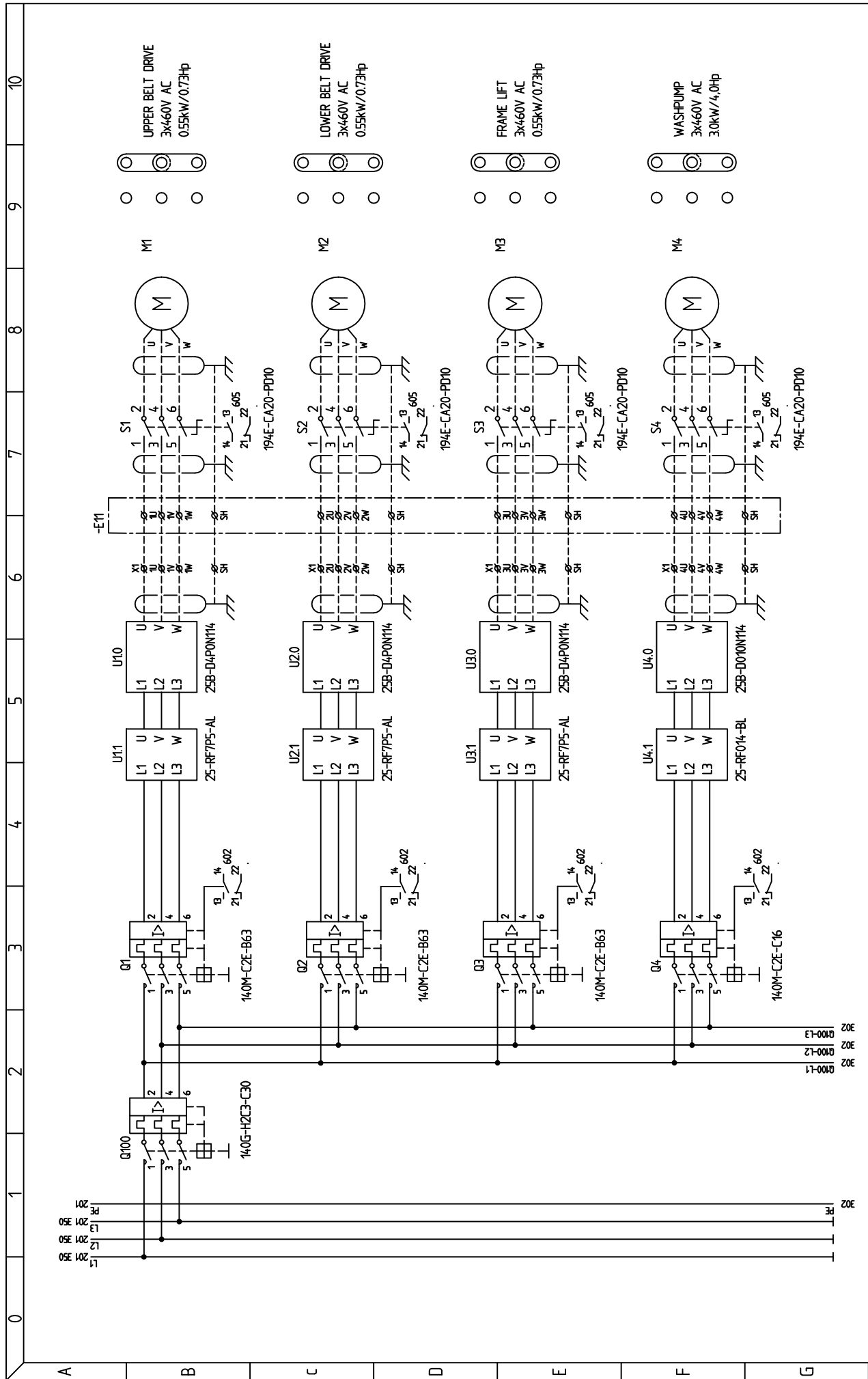
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| Design/Konstruktion<br>VOT.                                 |  | Drawn/Ritad<br>VOT.                       |
| Date/Datum<br>14/11/99                                      |  | Issue/Rev.<br>-1-                         |
| GENERALL MILLS<br>PB 1542 1401E<br>--<br>ELECTRICAL HEATERS |  | Sheet/Blad<br>201<br>Cont./Fortsbl<br>301 |

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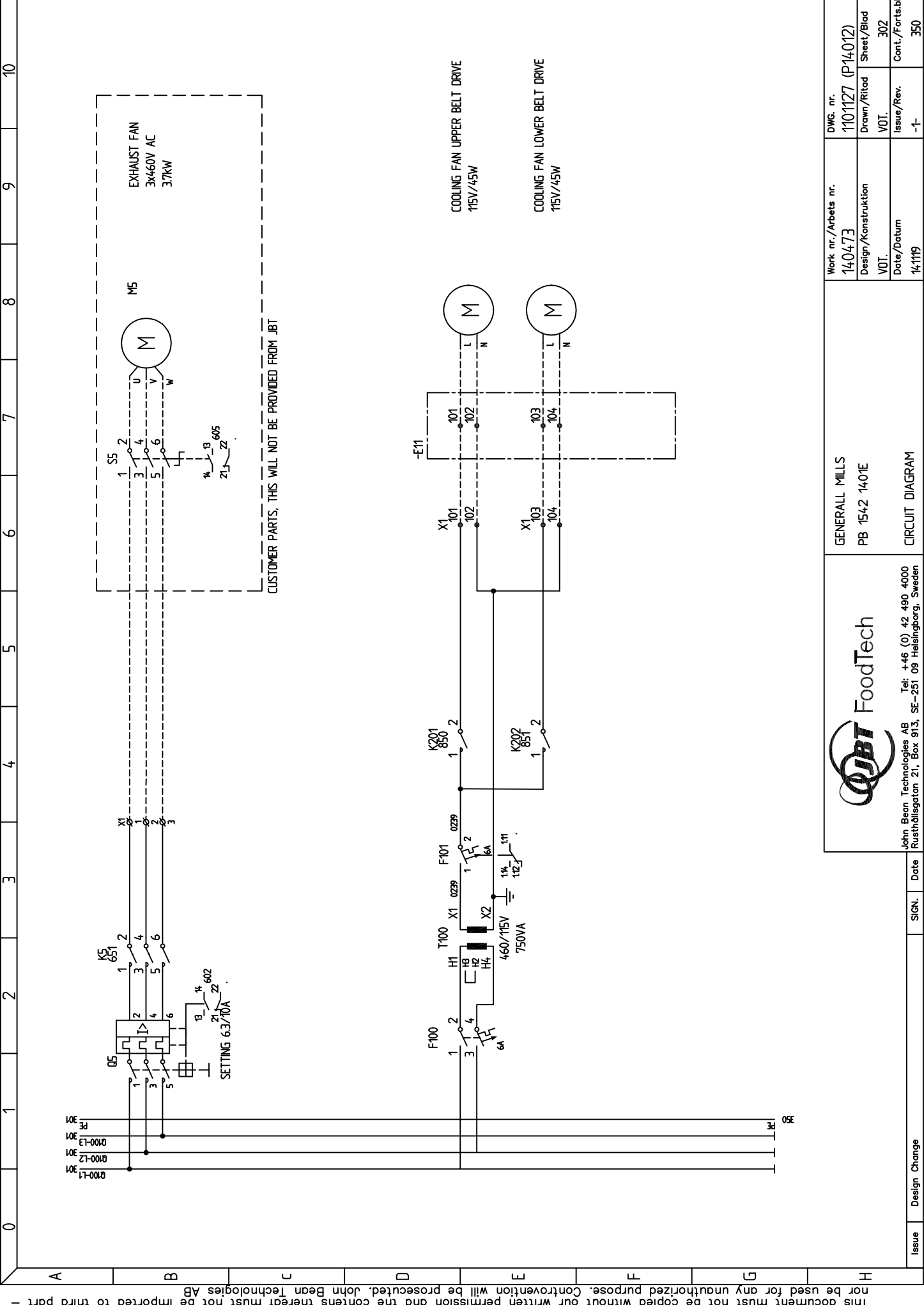


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| Issue               | Design Change    | Issue          | 302              |
| SIGN.               | Date             | SIGN.          | 302              |
| DRIVES              |                  | DRIVES         |                  |
| PB 1542 1401E       |                  | PB 1542 1401E  |                  |
| GENERALL MILLS      |                  | GENERALL MILLS |                  |
| 140473              |                  | 140473         |                  |
| Work nr./Arbets nr. | 1101127 (P14012) | DWG. nr.       | 1101127 (P14012) |
| Date/Datum          | 14-11-19         | Issue/Rev.     | -1-              |
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| 301                 | 301              | 301            | 302              |
| Cont./Forts.bl      | 302              | Cont./Forts.bl | 302              |



  
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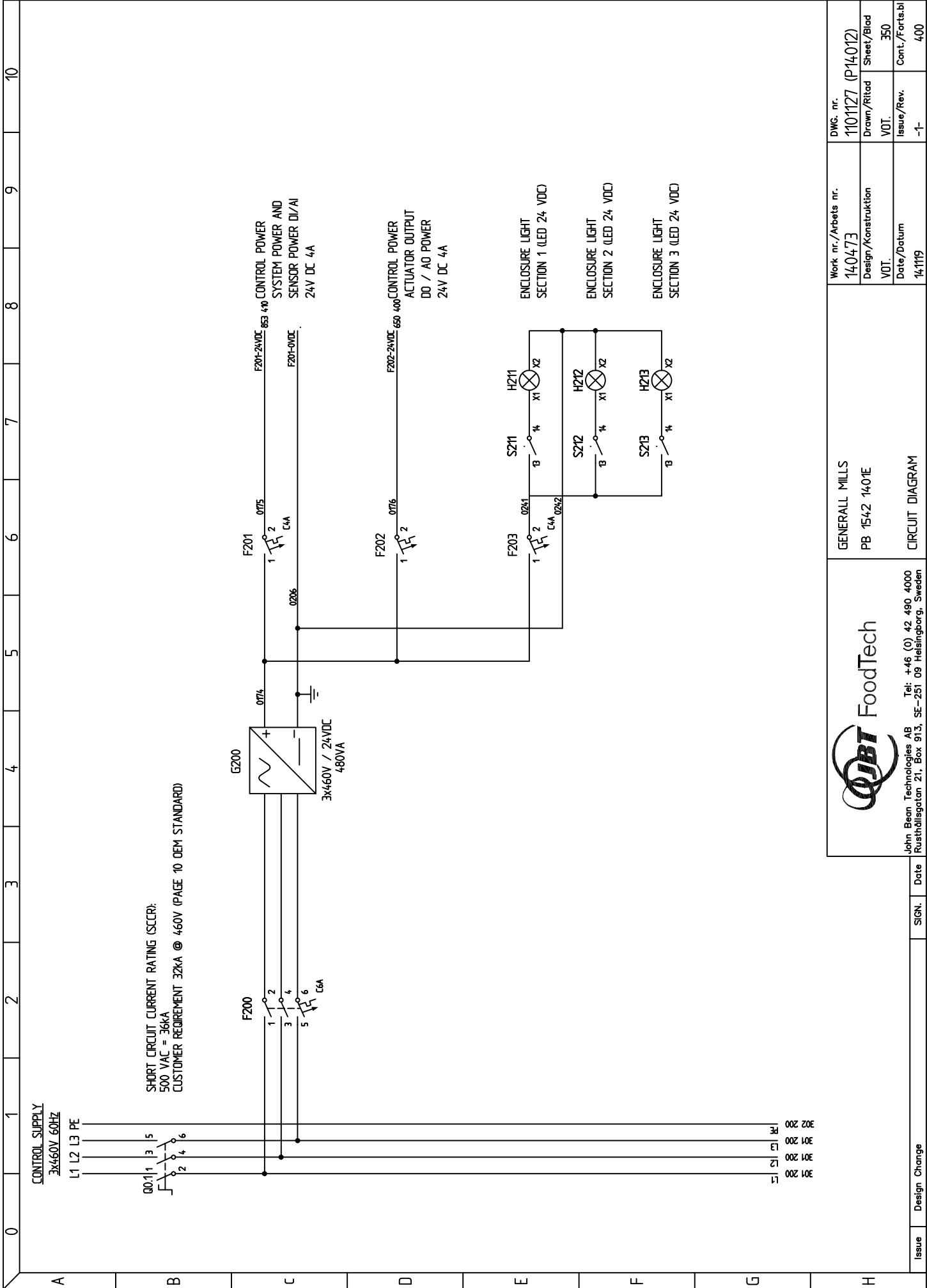
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| Issue | Design Change | SIGN. | Date | <br>John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br>Rustrållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden |  | GENERALL MILLS<br>PB 1542 1401E<br>CIRCUIT DIAGRAM |                      | Work nr./Arbets nr.<br>14.0473 | DWG. nr.<br>1101127 (P14012) |
|       |               |       |      |                                                                                                                                                                                                             |  | Issue/Rev.<br>-1-                                  | Cont./Fortsbl<br>350 | Date/Datum<br>14/11/19         | Design/Konstruktion<br>VOT.  |

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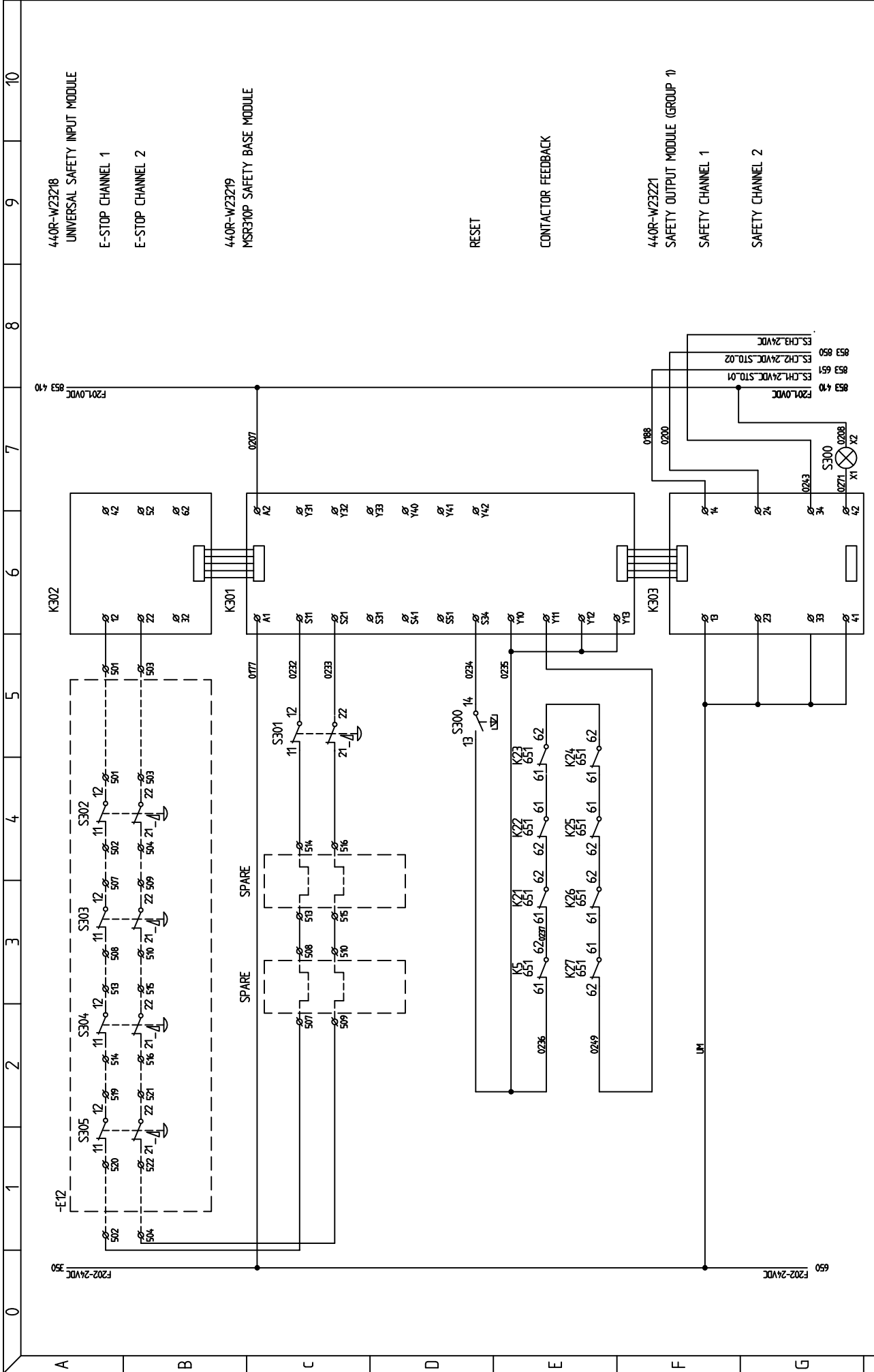
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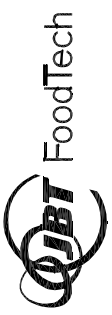
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| Date/Datum<br>14-11-19          |  | Issue/Rev.<br>-1-                |
| CIRCUIT DIAGRAM                 |  | Cont./Fortsbl<br>400             |
| GENERALL MILLS<br>PB 1542 1401E |  |                                  |

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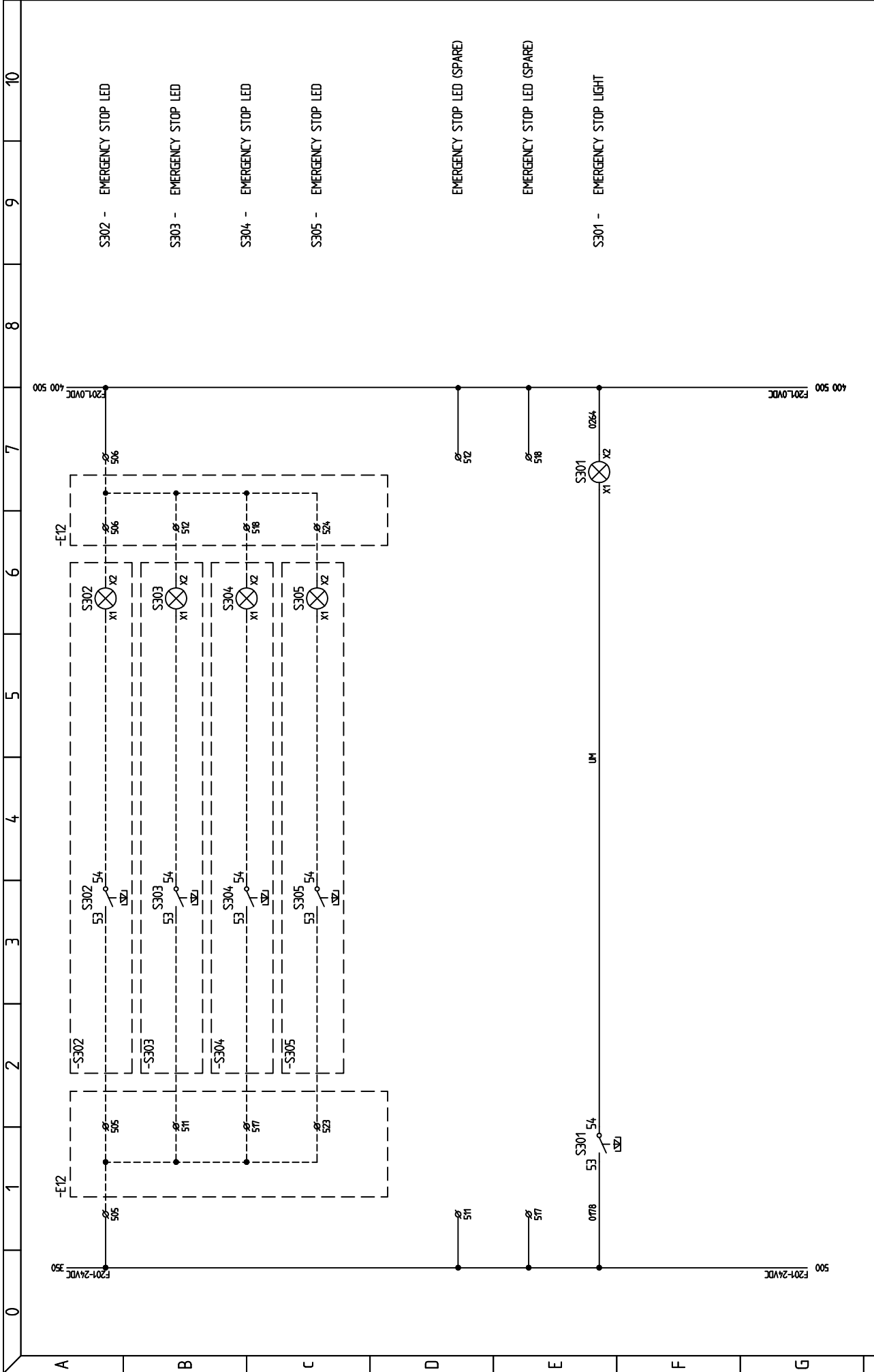
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| Issue | Design Change | SIGN. | Date |
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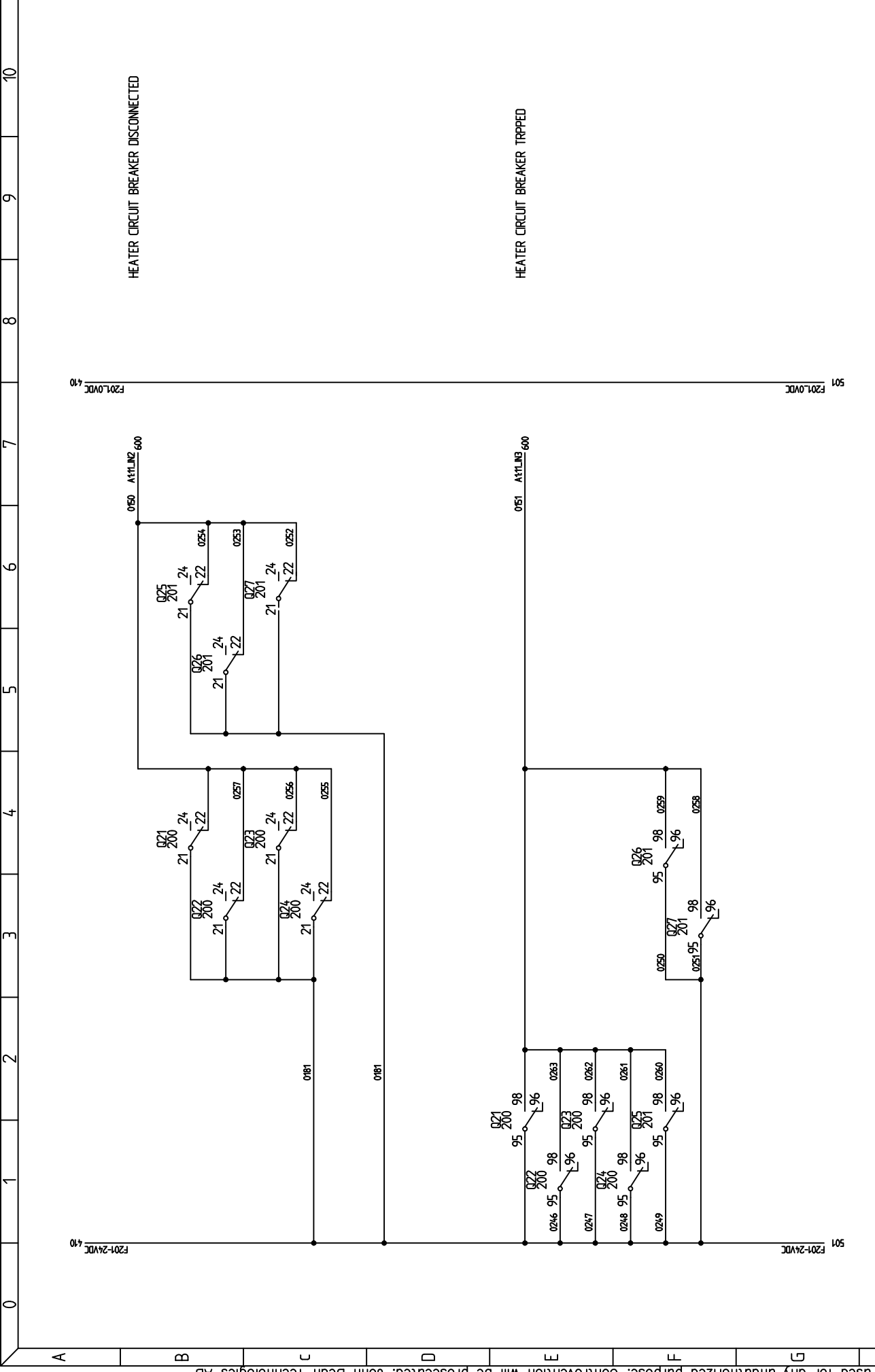


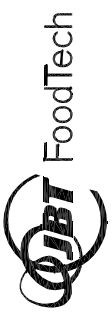
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| Issue | Design Change | SIGN. | Date |                               |  | GENERALL MILLS<br>PB 1542 1401E<br>SAFETY CONTROL SYSTEM<br>-- |  | Work nr./Arbets nr.<br>140473    |  | DWG. nr.<br>1101127 (P14012) |  |
|       |               |       |      | John Bean Technologies AB<br>Rustrållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |  | Design/Konstruktion<br>VDT.                                    |  | Drawn/Ritad<br>Sheet/Blad<br>400 |  | Cont./Fortsbl<br>410         |  |
|       |               |       |      |                                                                                                                    |  | Date/Datum<br>14-11-19                                         |  | Issue/Rev.<br>-1-                |  | Cont./Fortsbl<br>410         |  |



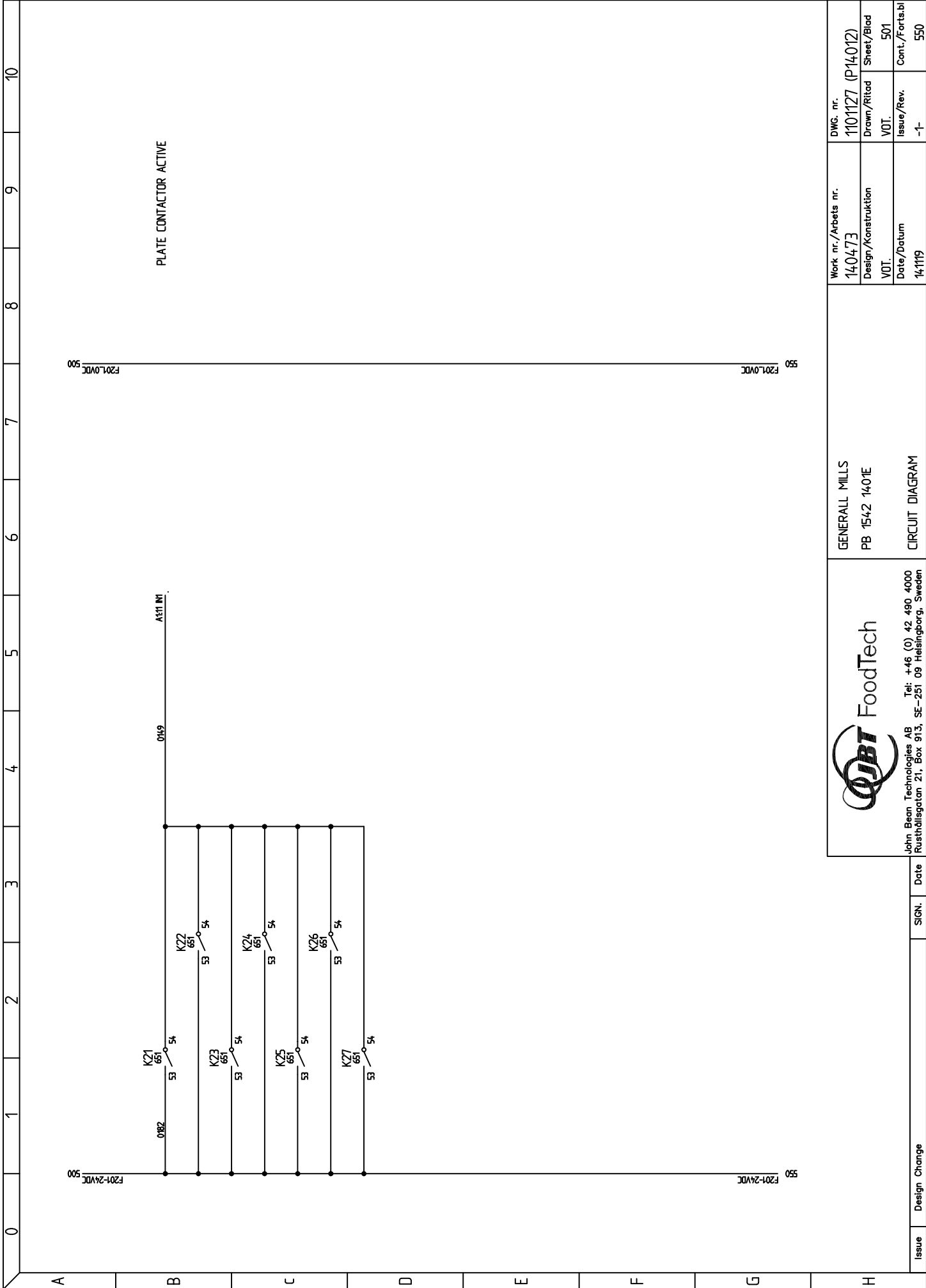


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|                                                                                                                    | Cont./Fortsbl<br>500         |
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| GENERAL MILLS                                                                                                      |                              |
| PB 1542 1401E                                                                                                      |                              |
| SAFETY CIRCUITS                                                                                                    |                              |
| CIRCUIT DIAGRAM                                                                                                    |                              |
| Issue                                                                                                              | Design Change                |
| SIGN.                                                                                                              | Date                         |




|       |               |       |      |                                                                                        |                                                                                       |                                                                       |                     |                  |
|-------|---------------|-------|------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------|------------------|
| Issue | Design Change | SIGN. | Date | John Bean Technologies AB<br>Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden |  | GENERALL MILLS<br>PB 1542 1401E<br>SAFETY CIRCUITS<br>CIRCUIT DIAGRAM | Work nr./Arbets nr. | DWG. nr.         |
|       |               |       |      |                                                                                        |                                                                                       |                                                                       | 14.0473             | 1101127 (P14012) |
|       |               |       |      |                                                                                        |                                                                                       |                                                                       | Design/Konstruktion | Drawn/Ritad      |
|       |               |       |      |                                                                                        |                                                                                       |                                                                       | VDT.                | VDT.             |
|       |               |       |      |                                                                                        |                                                                                       |                                                                       | Date/Datum          | Issue/Rev.       |
|       |               |       |      |                                                                                        |                                                                                       |                                                                       | 14-1119             | -1-              |
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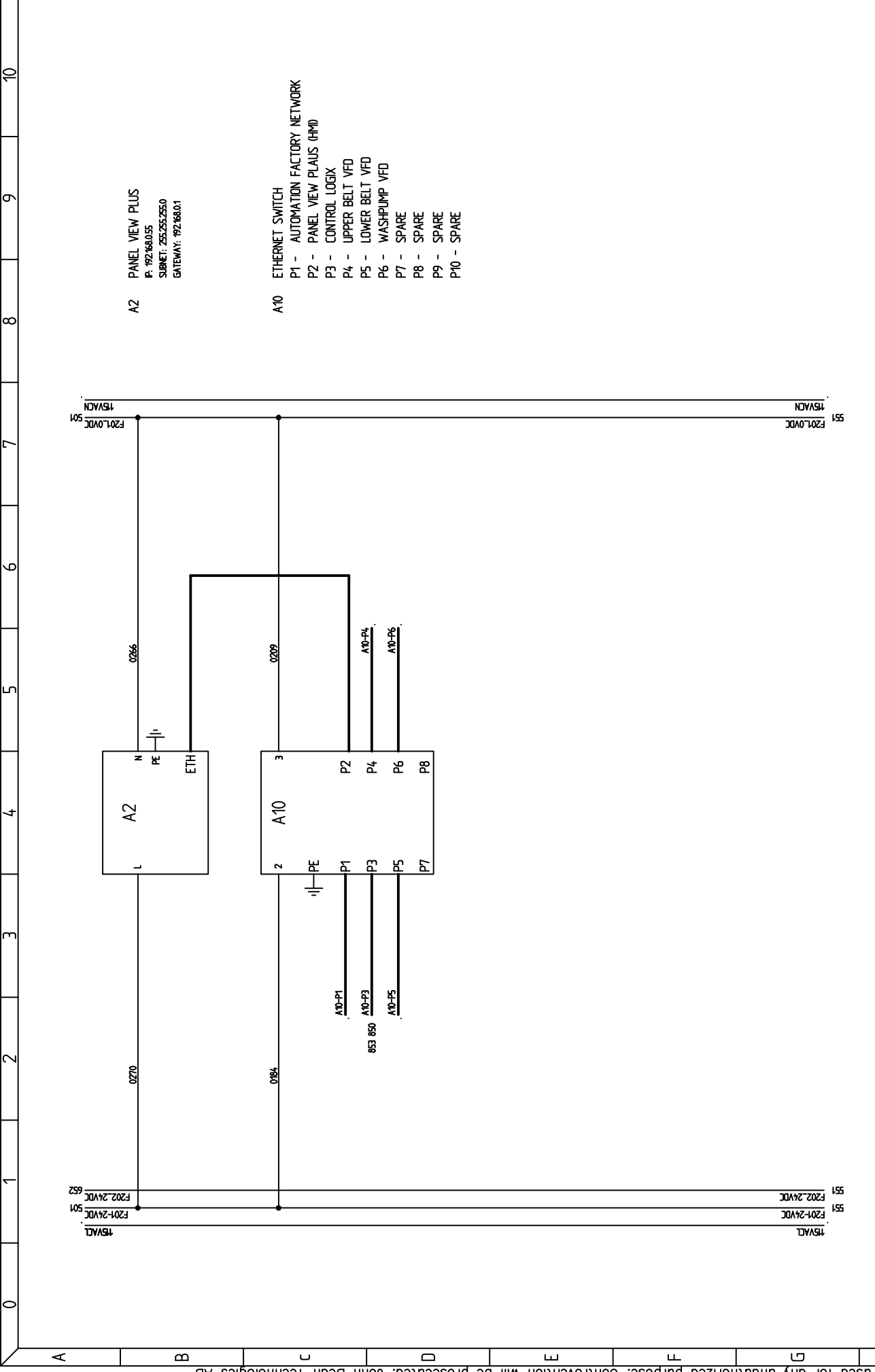
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|                                                                                                                       |                              |
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| Work nr./Arbets nr.<br>14.0473                                                                                        | DWG. nr.<br>1101127 (P14012) |
|                                                                                                                       | Drawn/Ritad<br>VOT.          |
| Date/Datum<br>14-11-19                                                                                                | Issue/Rev.<br>-1-            |
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| Work nr./Arbets nr.<br>14.0473                                                                                        | Design/Konstruktion<br>VOT.  |
| DATE/DATUM<br>14-11-19                                                                                                | ISSUE/REV.<br>-1-            |
| GENERAL MILLS<br>PB 1542 1401E                                                                                        | CIRCUIT DIAGRAM              |
|                                  |                              |
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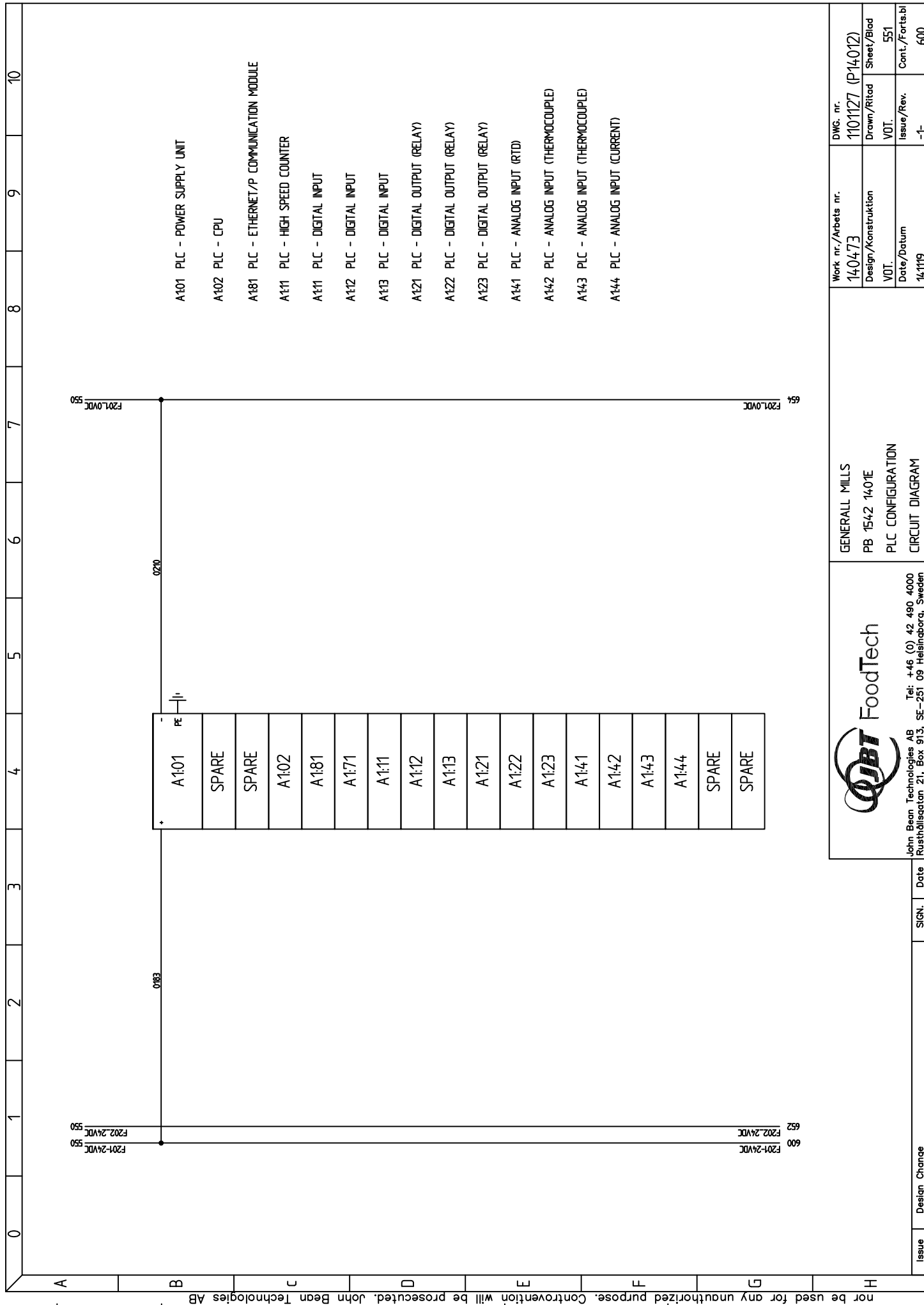


A2 PANEL VIEW PLUS  
 IP: 192.168.0.55  
 SUBNET: 255.255.255.0  
 GATEWAY: 192.168.0.1

A10 ETHERNET SWITCH  
 P1 - AUTOMATION FACTORY NETWORK  
 P2 - PANEL VIEW PLAUS (HMI)  
 P3 - CONTROL LOGIX  
 P4 - UPPER BELT VFD  
 P5 - LOWER BELT VFD  
 P6 - WASHPUMP VFD  
 P7 - SPARE  
 P8 - SPARE  
 P9 - SPARE  
 P10 - SPARE

10 9 8 7 6 5 4 3 2 1 0

|                                                                                                                                       |                                      |  |                                         |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--|-----------------------------------------|
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|                                                                                                                                       | Design/Konstruktion<br>VOT.          |  | Drawn/Ritad<br>Sheet/Blad<br><b>550</b> |
|                                                                                                                                       | Date/Datum<br><b>14/11/19</b>        |  | Issue/Rev.<br><b>-1-</b>                |
|                                                                                                                                       | PLC CONFIGURATION<br>CIRCUIT DIAGRAM |  | Cont./Fortsbl<br><b>551</b>             |
| GENERALL MILLS<br>PB 1542 1401E                                                                                                       |                                      |  |                                         |



- A:1:01 PLC - POWER SUPPLY UNIT
- A:1:02 PLC - CPU
- A:1:81 PLC - ETHERNET/P COMMUNICATION MODULE
- A:1:11 PLC - HIGH SPEED COUNTER
- A:1:11 PLC - DIGITAL INPUT
- A:1:12 PLC - DIGITAL INPUT
- A:1:13 PLC - DIGITAL INPUT
- A:1:21 PLC - DIGITAL OUTPUT (RELAY)
- A:1:22 PLC - DIGITAL OUTPUT (RELAY)
- A:1:23 PLC - DIGITAL OUTPUT (RELAY)
- A:1:41 PLC - ANALOG INPUT (RTD)
- A:1:42 PLC - ANALOG INPUT (THERMOCOUPLE)
- A:1:43 PLC - ANALOG INPUT (THERMOCOUPLE)
- A:1:44 PLC - ANALOG INPUT (CURRENT)

|   |        |    |
|---|--------|----|
| * | A:1:01 | PE |
|   | SPARE  |    |
|   | SPARE  |    |
|   | A:1:02 |    |
|   | A:1:81 |    |
|   | A:1:71 |    |
|   | A:1:11 |    |
|   | A:1:12 |    |
|   | A:1:13 |    |
|   | A:1:21 |    |
|   | A:1:22 |    |
|   | A:1:23 |    |
|   | A:1:41 |    |
|   | A:1:42 |    |
|   | A:1:43 |    |
|   | A:1:44 |    |
|   | SPARE  |    |
|   | SPARE  |    |

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GENERAL MILLS  
PB 1542 1401E  
PLC CONFIGURATION  
CIRCUIT DIAGRAM

Work nr./Arbets nr.  
140473

Design/Konstruktion  
VOT.

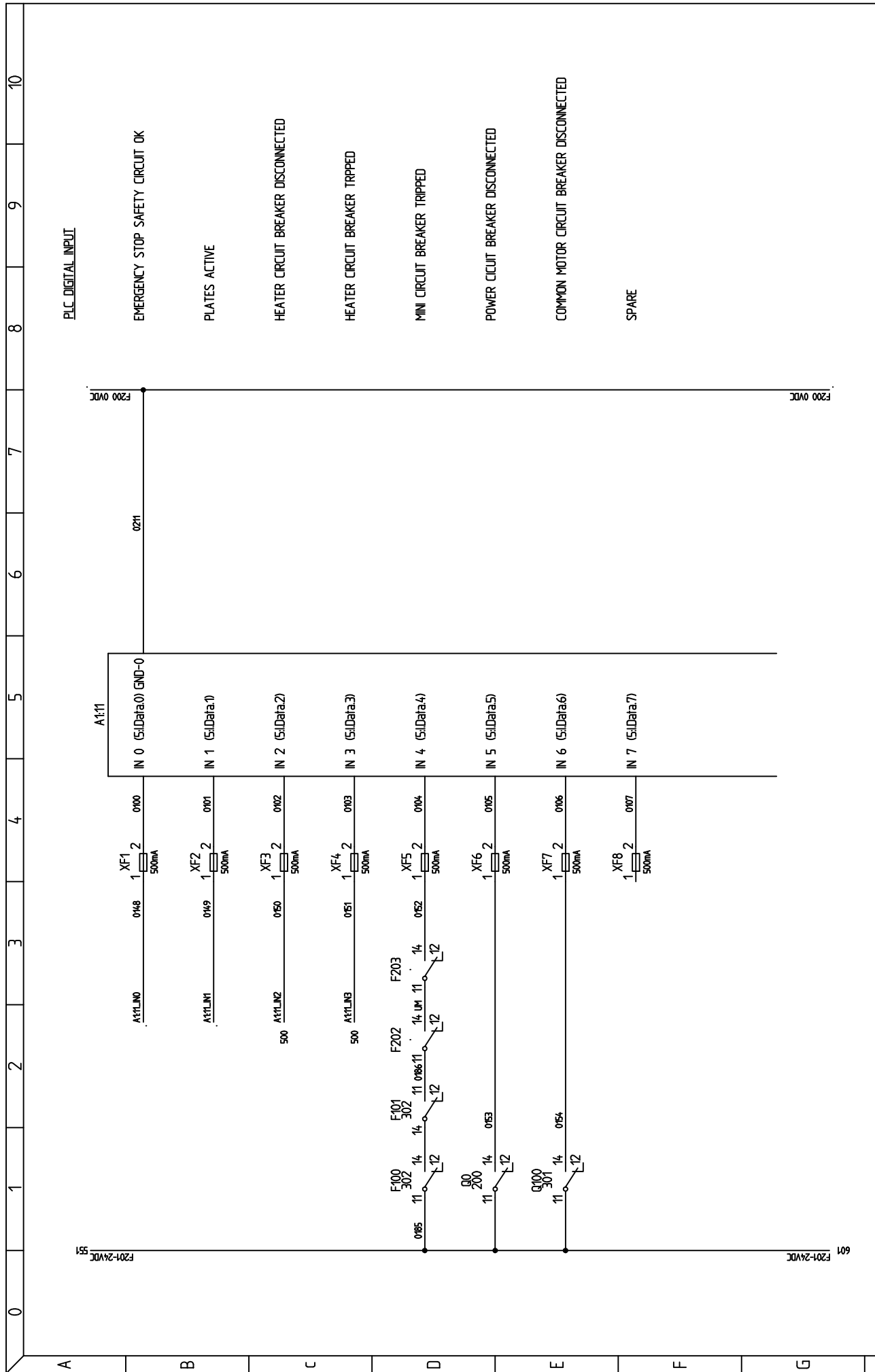
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DWG. nr.  
1101127 (P14012)

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Issue/Rev.  
-1

Cont./Fortsbl  
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| Date/Datum          | Issue/Rev.  | Cont./Forts.bl   |
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| GENERAL MILLS   |
| PB 1542 1401E   |
| DIGITAL INPUT   |
| CIRCUIT DIAGRAM |

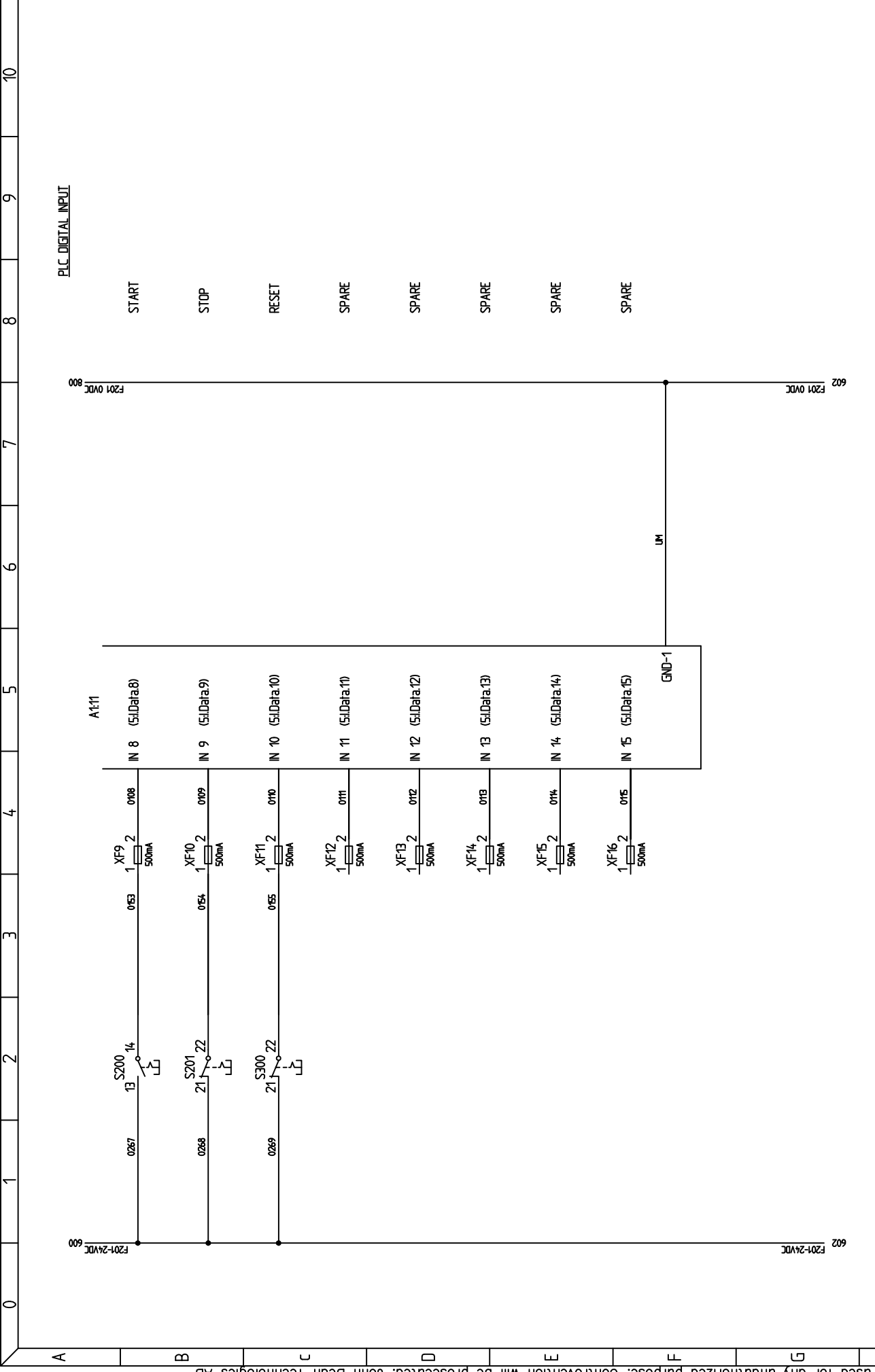
  

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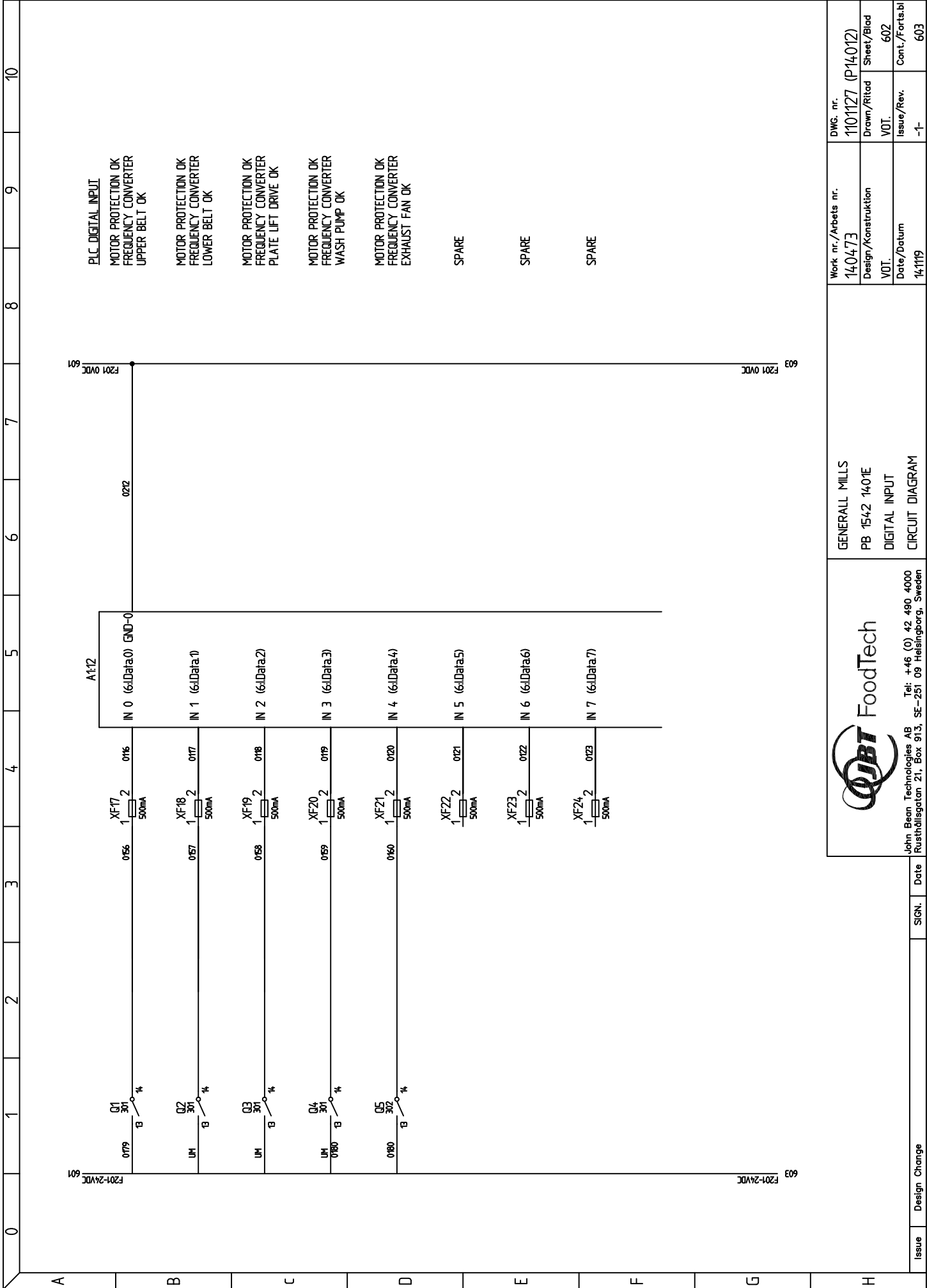
  

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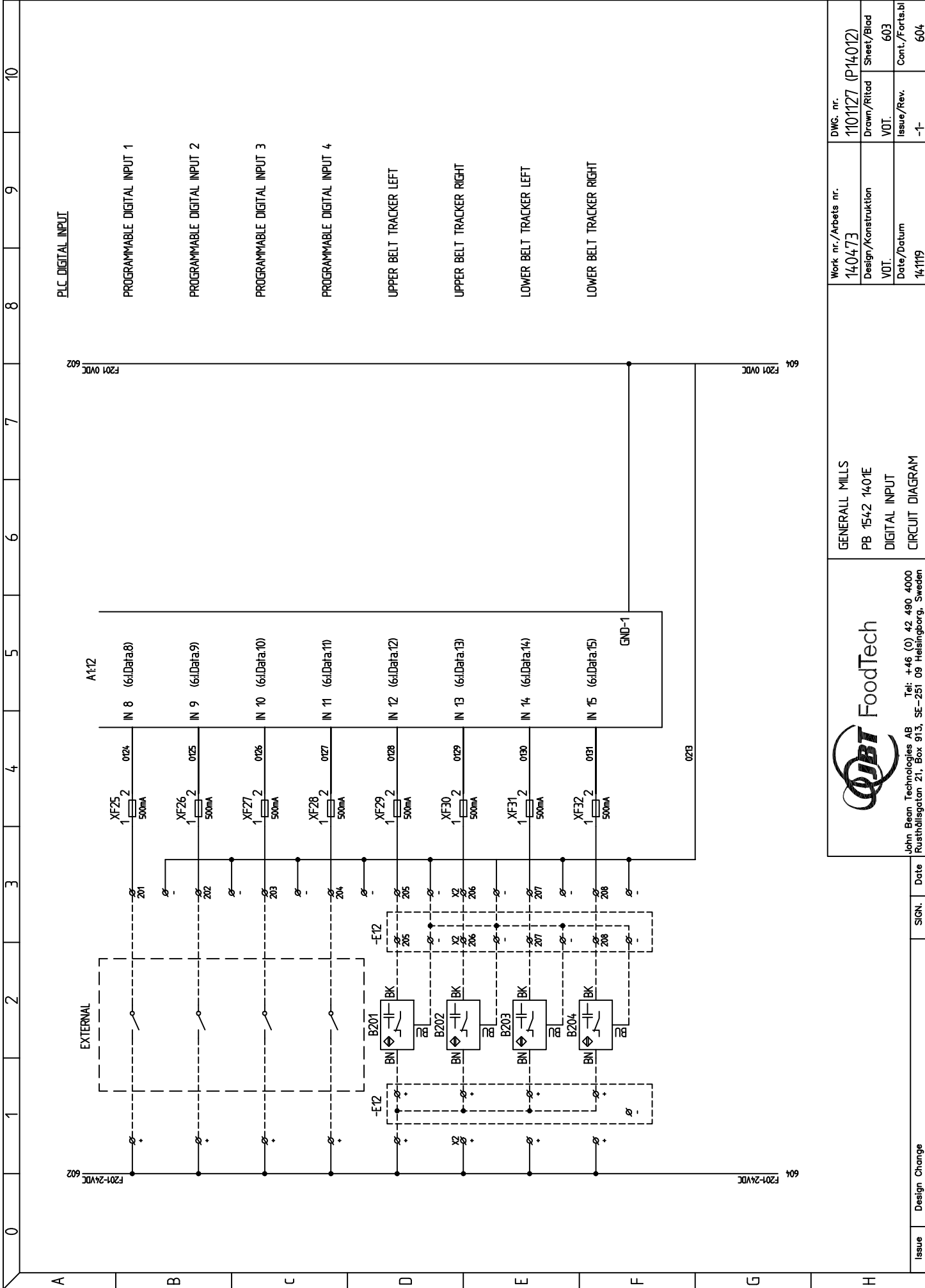
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| Issue                                                                                                                                                                               | Design Change | SIGN.                                     | Date |
| <p style="text-align: center;"><b>QJBT FoodTech</b></p> <p>John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br/> Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden</p> |               |                                           |      |
| <p>Work nr./Arbets nr.<br/>14.0473</p>                                                                                                                                              |               | <p>DWG. nr.<br/>1101127 (P14012)</p>      |      |
| <p>Design/Konstruktion<br/>VOT.</p>                                                                                                                                                 |               | <p>Drawn/Ritad<br/>Sheet/Blad<br/>601</p> |      |
| <p>Date/Datum<br/>14/11/19</p>                                                                                                                                                      |               | <p>Issue/Rev.<br/>-1-</p>                 |      |
| <p>GENERALL MILLS<br/>PB 1542 1401E<br/>DIGITAL INPUT<br/>CIRCUIT DIAGRAM</p>                                                                                                       |               |                                           |      |



PLC DIGITAL INPUT  
 MOTOR PROTECTION OK  
 FREQUENCY CONVERTER  
 UPPER BELT OK  
 MOTOR PROTECTION OK  
 FREQUENCY CONVERTER  
 LOWER BELT OK  
 MOTOR PROTECTION OK  
 FREQUENCY CONVERTER  
 PLATE LIFT DRIVE OK  
 MOTOR PROTECTION OK  
 FREQUENCY CONVERTER  
 WASH PUMP OK  
 MOTOR PROTECTION OK  
 FREQUENCY CONVERTER  
 EXHAUST FAN OK  
 SPARE  
 SPARE  
 SPARE

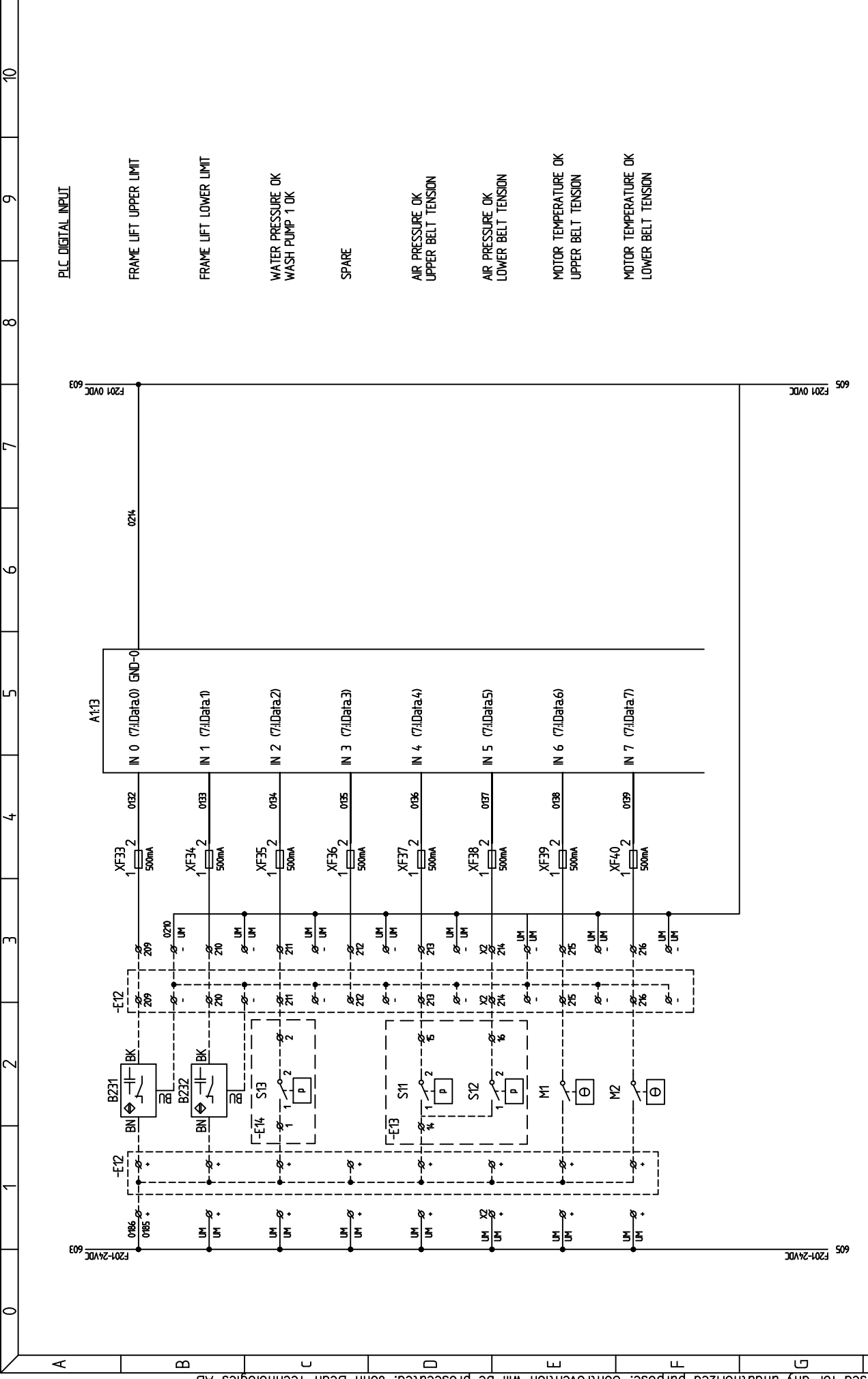
|                                                                                                                       |  |                                                                    |
|-----------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------|
| Work nr./Arbets nr.<br>14.0473                                                                                        |  | DWG. nr.<br>1101127 (P14012)                                       |
| Design/Konstruktion<br>VOT.                                                                                           |  | Drawn/Ritad<br>Sheet/Blad<br>602                                   |
| Date/Datum<br>14/11/19                                                                                                |  | Issue/Rev.<br>-1                                                   |
|                                                                                                                       |  | GENERAL MILLS<br>PB 1542 1401E<br>DIGITAL INPUT<br>CIRCUIT DIAGRAM |
| John Bean Technologies AB<br>Rustrindligsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |  | Cont./Fortsbl<br>603                                               |





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|-----------------------------------------------------------------------------------------------------------------------|---------------|-------|----------------------------------------------------------------------------|-------|---------------|----------------------------------|---------------|-------|------------------------------|-------|---------------|
| Issue                                                                                                                 | Design Change | Issue | Design Change                                                              | Issue | Design Change | Issue                            | Design Change | Issue | Design Change                | Issue | Design Change |
|                                                                                                                       |               |       |                                                                            |       |               |                                  |               |       |                              |       |               |
|                                                                                                                       |               |       | <b>GENERALL MILLS</b><br>PB 1542 1401E<br>DIGITAL INPUT<br>CIRCUIT DIAGRAM |       |               | Work nr./Arbets nr.<br>140473    |               |       | DWG. nr.<br>1101127 (P14012) |       |               |
| John Bean Technologies AB<br>Rustrindligsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |               |       | Design/Konstruktion<br>VOT.                                                |       |               | Drawn/Ritad<br>Sheet/Blad<br>603 |               |       | Issue/Rev.<br>-1-            |       |               |
| Date<br>14/11/19                                                                                                      |               |       | Date/Datum<br>14/11/19                                                     |       |               | Issue/Rev.<br>-1-                |               |       | Cont./Fortsbl<br>604         |       |               |



PLC DIGITAL INPUT

FRAME LIFT UPPER LIMIT

FRAME LIFT LOWER LIMIT

WATER PRESSURE OK  
WASH PUMP 1 OK

SPARE

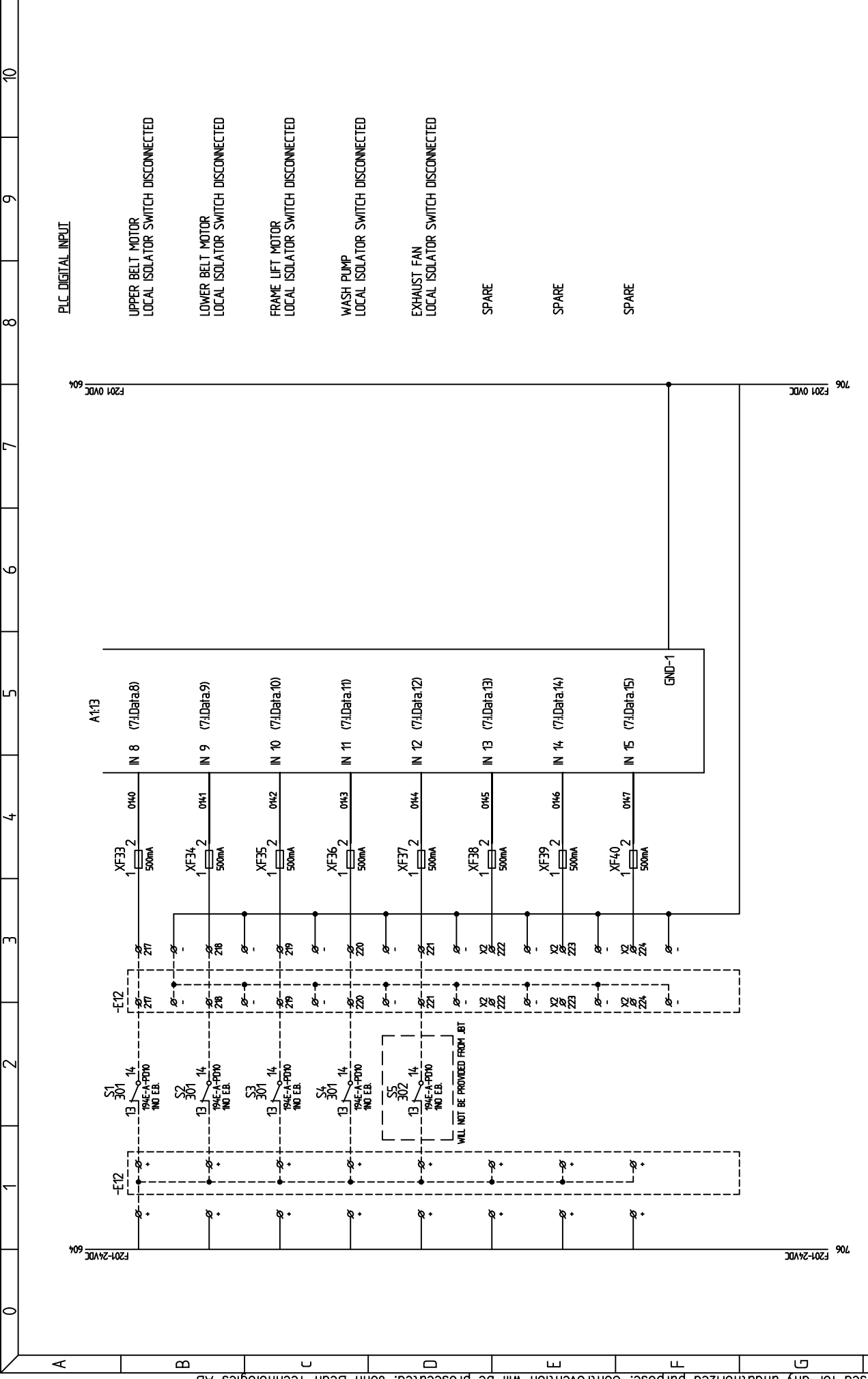
AIR PRESSURE OK  
UPPER BELT TENSION

AIR PRESSURE OK  
LOWER BELT TENSION


MOTOR TEMPERATURE OK  
UPPER BELT TENSION

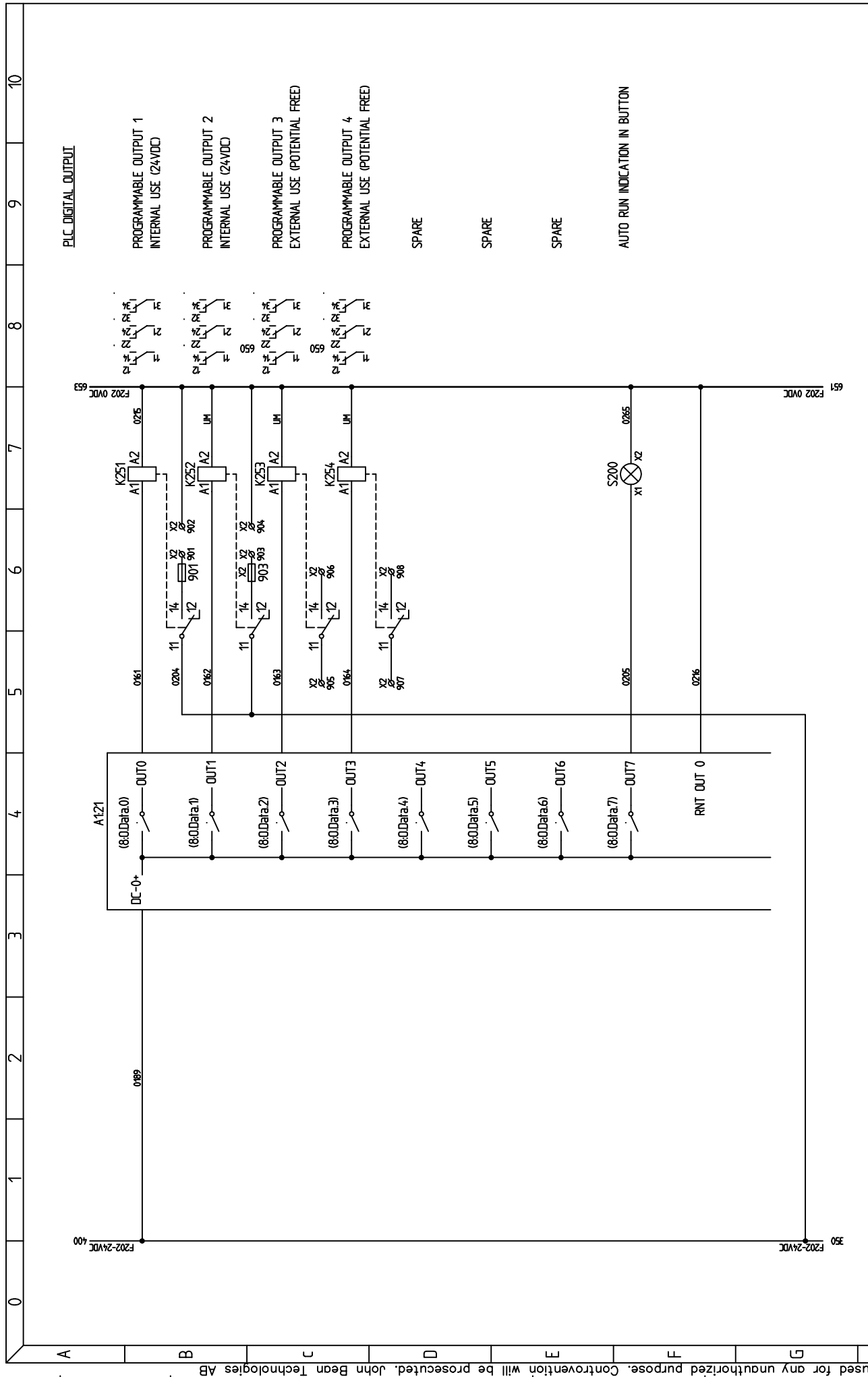
MOTOR TEMPERATURE OK  
LOWER BELT TENSION

|                                                                                                                       |               |                               |                                  |
|-----------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|----------------------------------|
| Issue                                                                                                                 | Design Change | SIGN.                         | Date                             |
|                                                                                                                       |               |                               |                                  |
|                                                                                                                       |               |                               |                                  |
| John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br>Rustrådgångsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden |               |                               |                                  |
| GENERALL MILLS<br>PB 1542 1401E<br>DIGITAL INPUT<br>CIRCUIT DIAGRAM                                                   |               | Work nr./Arbets nr.<br>140473 | DWG. nr.<br>1101127 (P14012)     |
|                                                                                                                       |               | Design/Konstruktion<br>VOT.   | Drawn/Ritad<br>Sheet/Blad<br>604 |
|                                                                                                                       |               | Date/Datum<br>14/11/19        | Issue/Rev.<br>-1-                |
|                                                                                                                       |               |                               | Cont./Fortsbl<br>605             |



- PLC DIGITAL INPUT
- UPPER BELT MOTOR LOCAL ISOLATOR SWITCH DISCONNECTED
- LOWER BELT MOTOR LOCAL ISOLATOR SWITCH DISCONNECTED
- FRAME LIFT MOTOR LOCAL ISOLATOR SWITCH DISCONNECTED
- WASH PUMP LOCAL ISOLATOR SWITCH DISCONNECTED
- EXHAUST FAN LOCAL ISOLATOR SWITCH DISCONNECTED
- SPARE
- SPARE
- SPARE

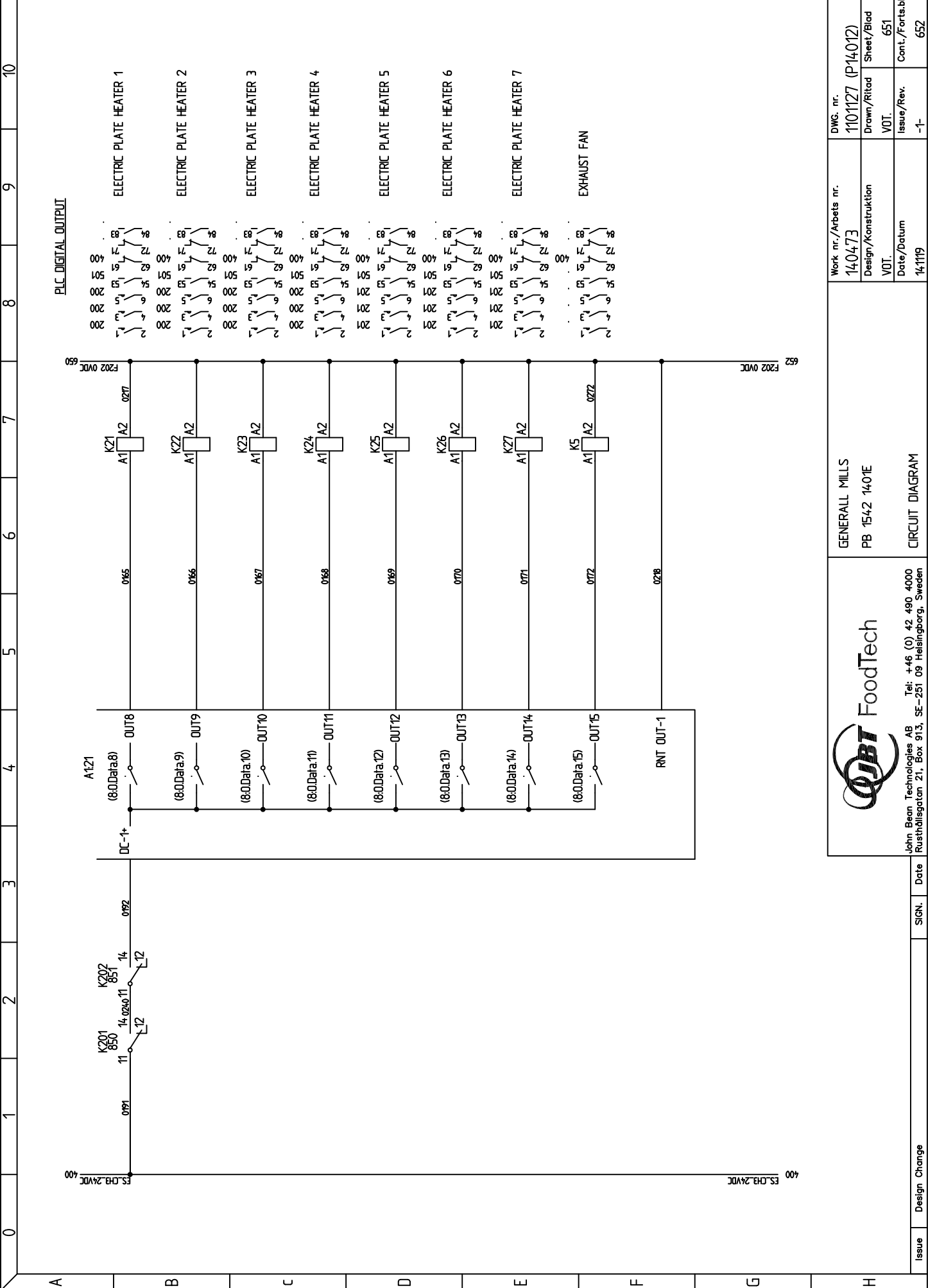
|                                                                                                                    |               |                                |                                            |
|--------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------|--------------------------------------------|
| Issue                                                                                                              | Design Change | SIGN.                          | Date                                       |
|                               |               |                                |                                            |
| John Bean Technologies AB<br>Rustrållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |               |                                |                                            |
| GENERALL MILLS<br>PB 1542 1401E<br>DIGITAL INPUT<br>CIRCUIT DIAGRAM                                                |               | Work nr./Arbets nr.<br>14.0473 | DWG. nr.<br>1101127 (P14012)               |
|                                                                                                                    |               | Design/Konstruktion<br>VOT.    | Drawn/Ritad<br>Sheet/Blad<br>605           |
|                                                                                                                    |               | Date/Datum<br>14-11-19         | Issue/Rev.<br>-1-<br>Cont./Forts.bl<br>650 |




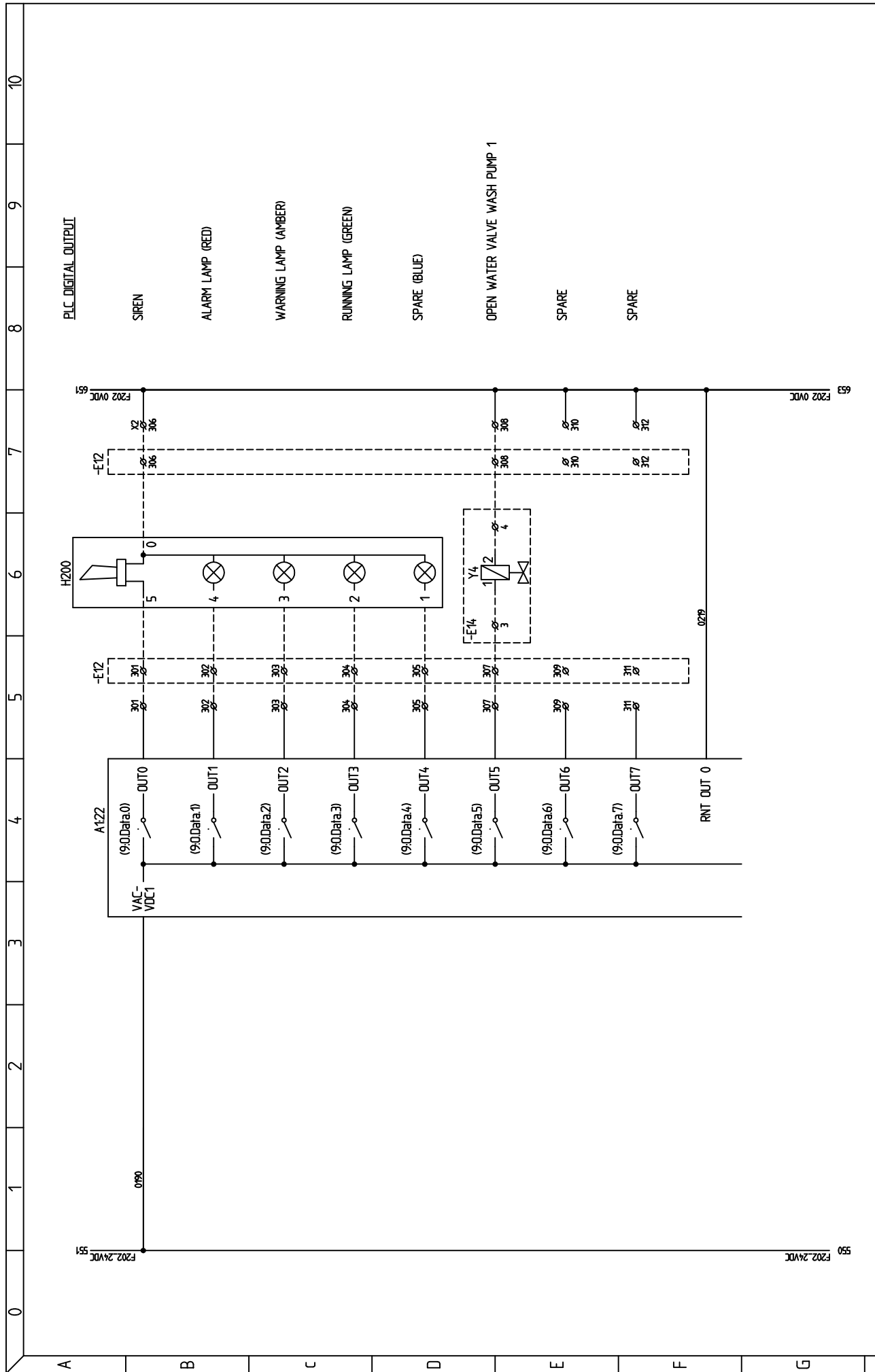
PLC DIGITAL OUTPUT

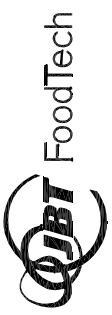
- PROGRAMMABLE OUTPUT 1  
INTERNAL USE (24VDC)
- PROGRAMMABLE OUTPUT 2  
INTERNAL USE (24VDC)
- PROGRAMMABLE OUTPUT 3  
EXTERNAL USE (POTENTIAL FREE)
- PROGRAMMABLE OUTPUT 4  
EXTERNAL USE (POTENTIAL FREE)
- SPARE
- SPARE
- SPARE
- AUTO RUN INDICATION IN BUTTON

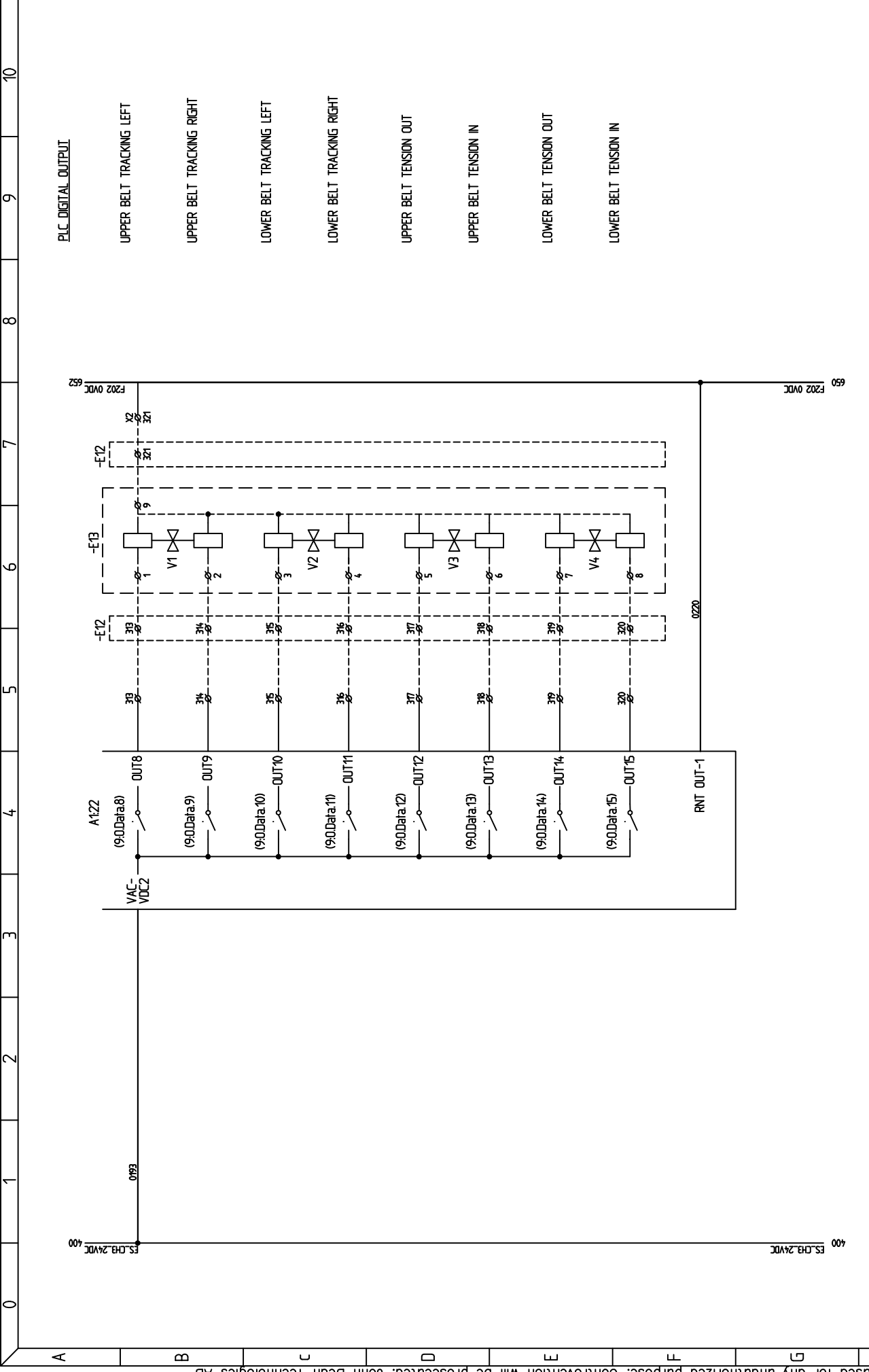
|                                                                                                                                                                                                 |                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Work nr./Arbets nr.<br>140473                                                                                                                                                                   | DWG. nr.<br>1101127 (P14012) |
|                                                                                                                                                                                                 | Design/Konstruktion<br>VOT.  |
| Date/Datum<br>14/11/19                                                                                                                                                                          | Issue/Rev.<br>-1-            |
| Drawn/Ritad<br>VOT.                                                                                                                                                                             | Sheet/Blad<br>650            |
| <p>GENERALL MILLS<br/>PB 1542 1401E</p> <p><b>QJBT FoodTech</b></p> <p>John Bean Technologies AB<br/>Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br/>Tel: +46 (0) 42 490 4000</p> |                              |
| Issue                                                                                                                                                                                           | Design Change                |
| SIGN.                                                                                                                                                                                           | Date                         |



|       |               |       |      |                                                                                                                                                                                                                |                                                   |                                                                                         |                                                                                        |                             |
|-------|---------------|-------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------|
| Issue | Design Change | SIGN. | Date | <br>John Bean Technologies AB<br>Ruströdlingsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 | GENERAL MILLS<br>PB 1542 1401E<br>CIRCUIT DIAGRAM | Work nr./Arbets nr.<br>14.0473<br>Design/Konstruktion<br>VDT.<br>Date/Datum<br>14/11/19 | DWG. nr.<br>1101127 (P14012)<br>Drawn/Ritad<br>Sheet/Blad<br>VDT.<br>Issue/Rev.<br>-1- | 652<br>651<br>Cont./Fortsbl |
|       |               |       |      |                                                                                                                                                                                                                |                                                   |                                                                                         |                                                                                        |                             |
|       |               |       |      |                                                                                                                                                                                                                |                                                   |                                                                                         |                                                                                        |                             |
|       |               |       |      |                                                                                                                                                                                                                |                                                   |                                                                                         |                                                                                        |                             |



|                                                                                                                                                                                                                   |                                           |       |                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------|-------------------------------------------|
|  <p>John Bean Technologies AB<br/>Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br/>Tel: +46 (0) 42 490 4000</p> | <p>Work nr./Arbets nr.<br/>140473</p>     |       | <p>DWG. nr.<br/>1101127 (P14012)</p>      |
|                                                                                                                                                                                                                   | <p>Design/Konstruktion<br/>VDT.</p>       |       | <p>Drawn/Ritad<br/>Sheet/Blad<br/>652</p> |
|                                                                                                                                                                                                                   | <p>Date/Datum<br/>14-11-19</p>            |       | <p>Issue/Rev.<br/>-1-</p>                 |
|                                                                                                                                                                                                                   | <p>DIGITAL OUTPUT<br/>CIRCUIT DIAGRAM</p> |       | <p>GENERALL MILLS<br/>PB 1542 1401E</p>   |
| Issue                                                                                                                                                                                                             | Design Change                             | SIGN. | Date                                      |



PLC DIGITAL OUTPUT

UPPER BELT TRACKING LEFT

UPPER BELT TRACKING RIGHT

LOWER BELT TRACKING LEFT

LOWER BELT TRACKING RIGHT

UPPER BELT TENSION OUT

UPPER BELT TENSION IN

LOWER BELT TENSION OUT

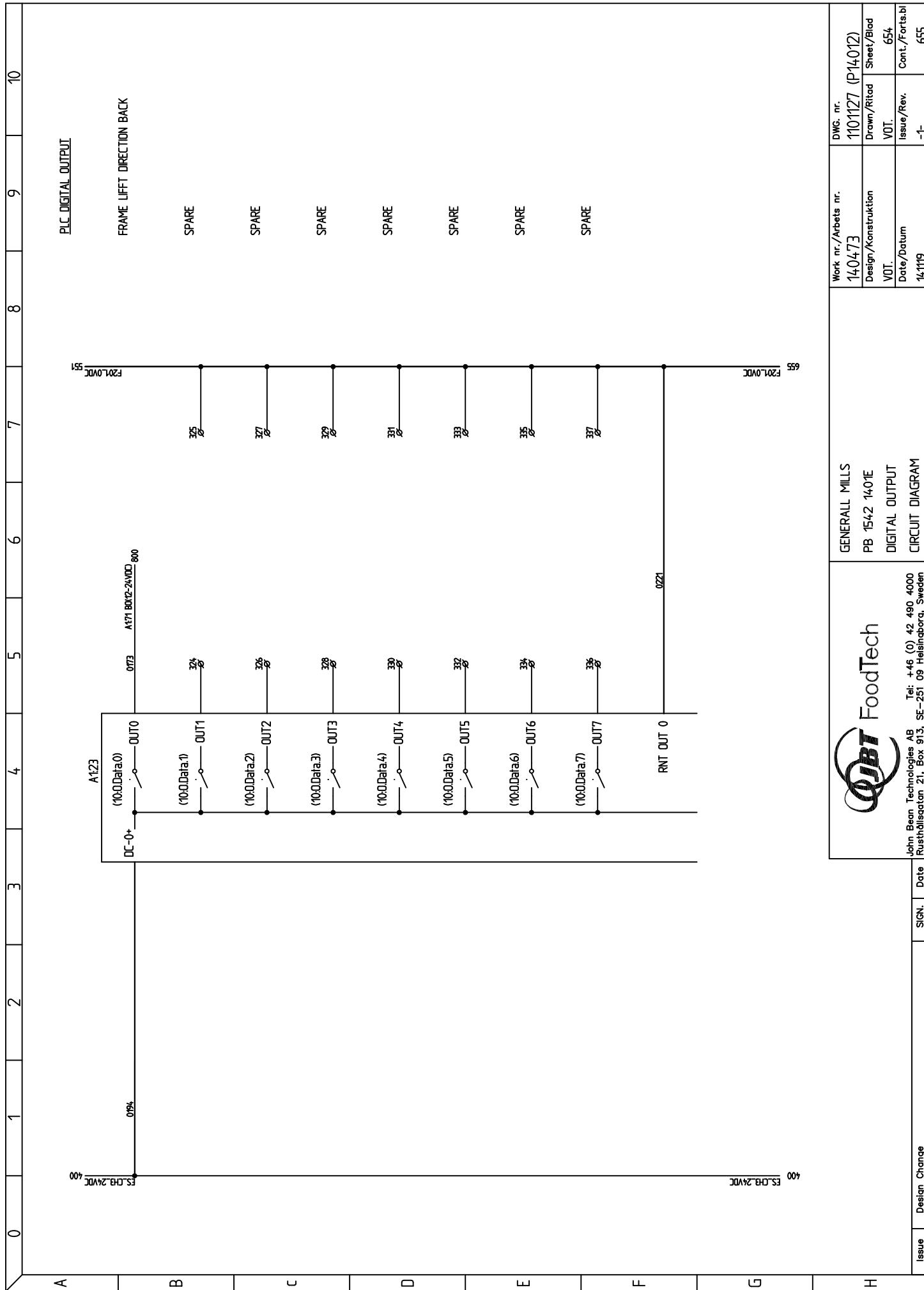
LOWER BELT TENSION IN

|                     |                  |
|---------------------|------------------|
| Work nr./Arbets nr. | DWG. nr.         |
| 14.0473             | 1101127 (P14012) |
| Design/Konstruktion | Drawn/Ritad      |
| VOT.                | Sheet/Blad       |
| Date/Datum          | VOT.             |
| 14-11-19            | 653              |
|                     | Issue/Rev.       |
|                     | -1-              |
|                     | Cont./Fortsbl    |
|                     | 654              |

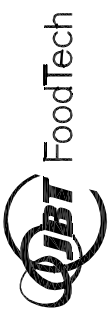
GENERALL MILLS  
PB 1542 1401E  
DIGITAL OUTPUT  
CIRCUIT DIAGRAM

John Bean Technologies AB  
Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden  
Tel: +46 (0) 42 490 4000

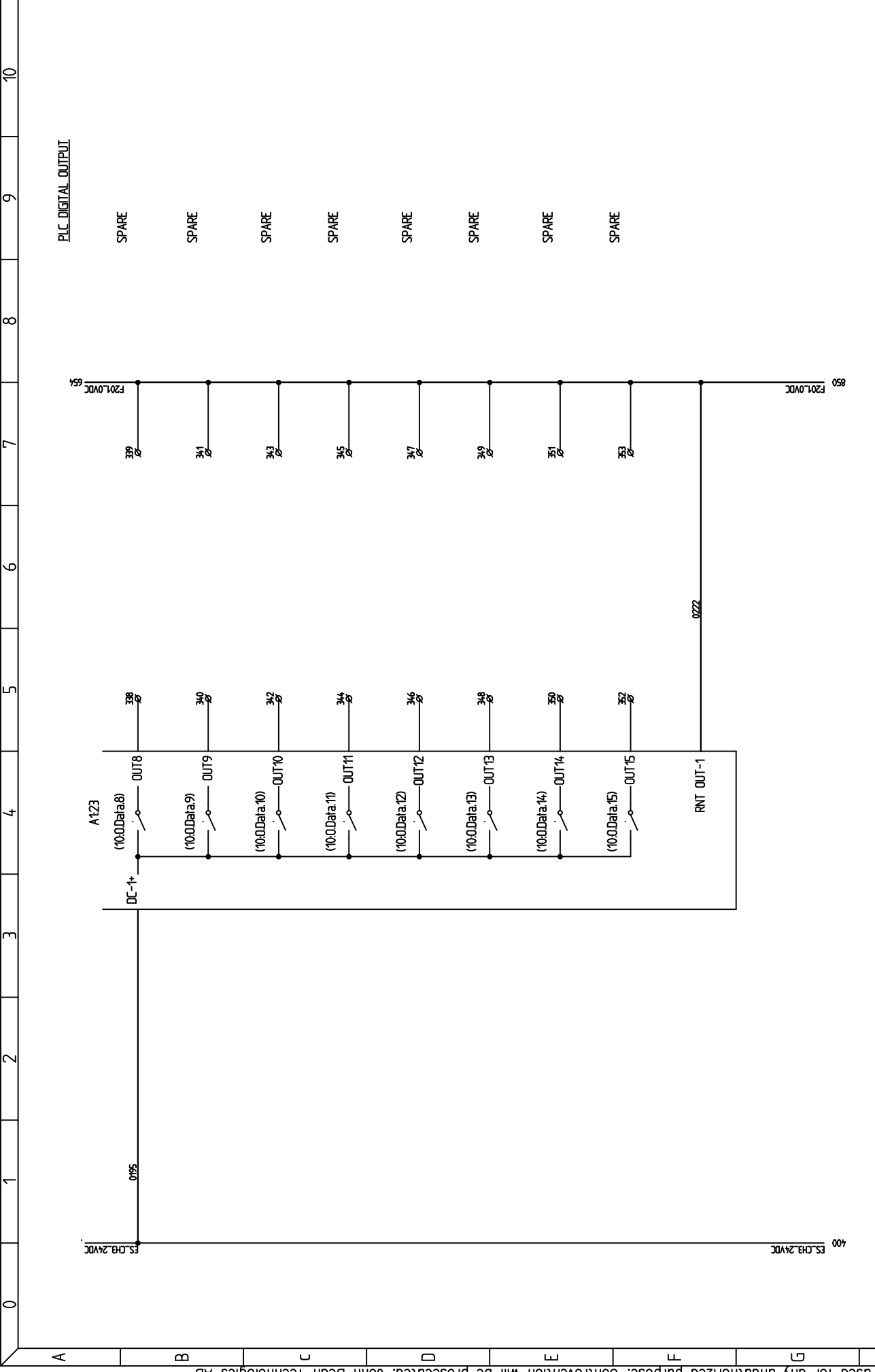
|       |               |
|-------|---------------|
| Issue | Design Change |
|       |               |
| SIGN. | Date          |
|       |               |



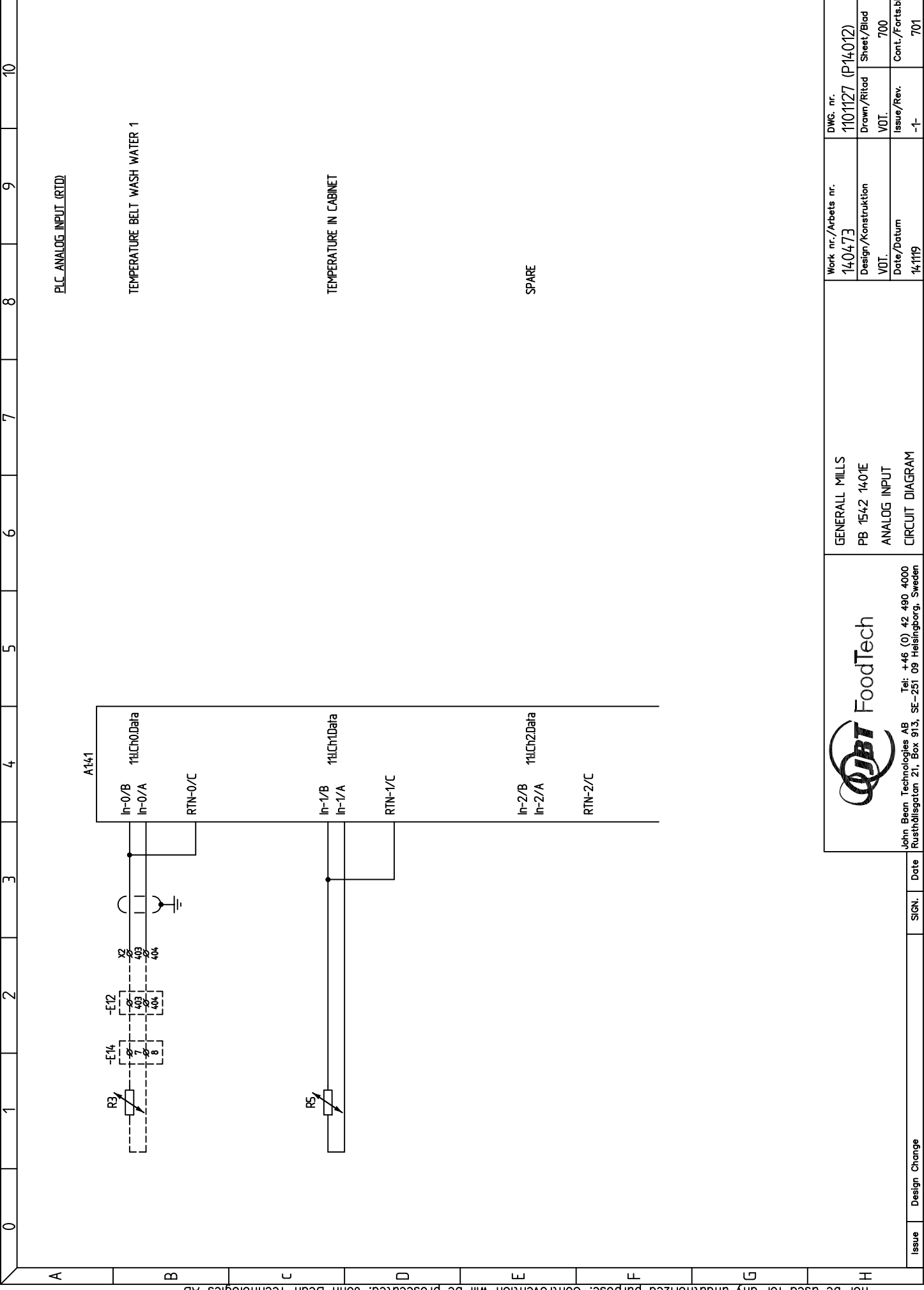
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|                                                                                                                       |               |                               |      |
|-----------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|------|
| Issue                                                                                                                 | Design Change | SIGN.                         | Date |
|                                                                                                                       |               |                               |      |
|                                  |               |                               |      |
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| GENERALL MILLS<br>PB 1542 1401E<br>DIGITAL OUTPUT<br>CIRCUIT DIAGRAM                                                  |               | Work nr./Arbets nr.<br>140473 |      |
| DWG. nr.<br>1101127 (P14012)                                                                                          |               | Design/Konstruktion<br>VOT.   |      |
| Drawn/Ritad<br>VOT.                                                                                                   |               | Issue/Rev.<br>-1-             |      |
| Date/Datum<br>14-11-19                                                                                                |               | Sheet/Blad<br>654             |      |
| 655                                                                                                                   |               | Cont./Fortsbl<br>655          |      |





|                                                                                                                                                      |                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Work nr./Arbets nr.<br>140473                                                                                                                        | DWG. nr.<br>1101127 (P14012) |
| Design/Konstruktion<br>VOT.                                                                                                                          | Drawn/Ritad<br>VOT.          |
| Date/Datum<br>14-11-19                                                                                                                               | Issue/Rev.<br>-1-            |
| <p>GENERALL MILLS<br/>PB 1542 1401E<br/>DIGITAL OUTPUT<br/>CIRCUIT DIAGRAM</p>                                                                       |                              |
| <p><b>QJBT FoodTech</b><br/>John Bean Technologies AB<br/>Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br/>Tel: +46 (0) 42 490 4000</p> |                              |
| Issue                                                                                                                                                | Design Change                |
| SIGN.                                                                                                                                                | Date                         |



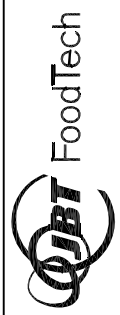
PLC ANALOG INPUT (RTD)

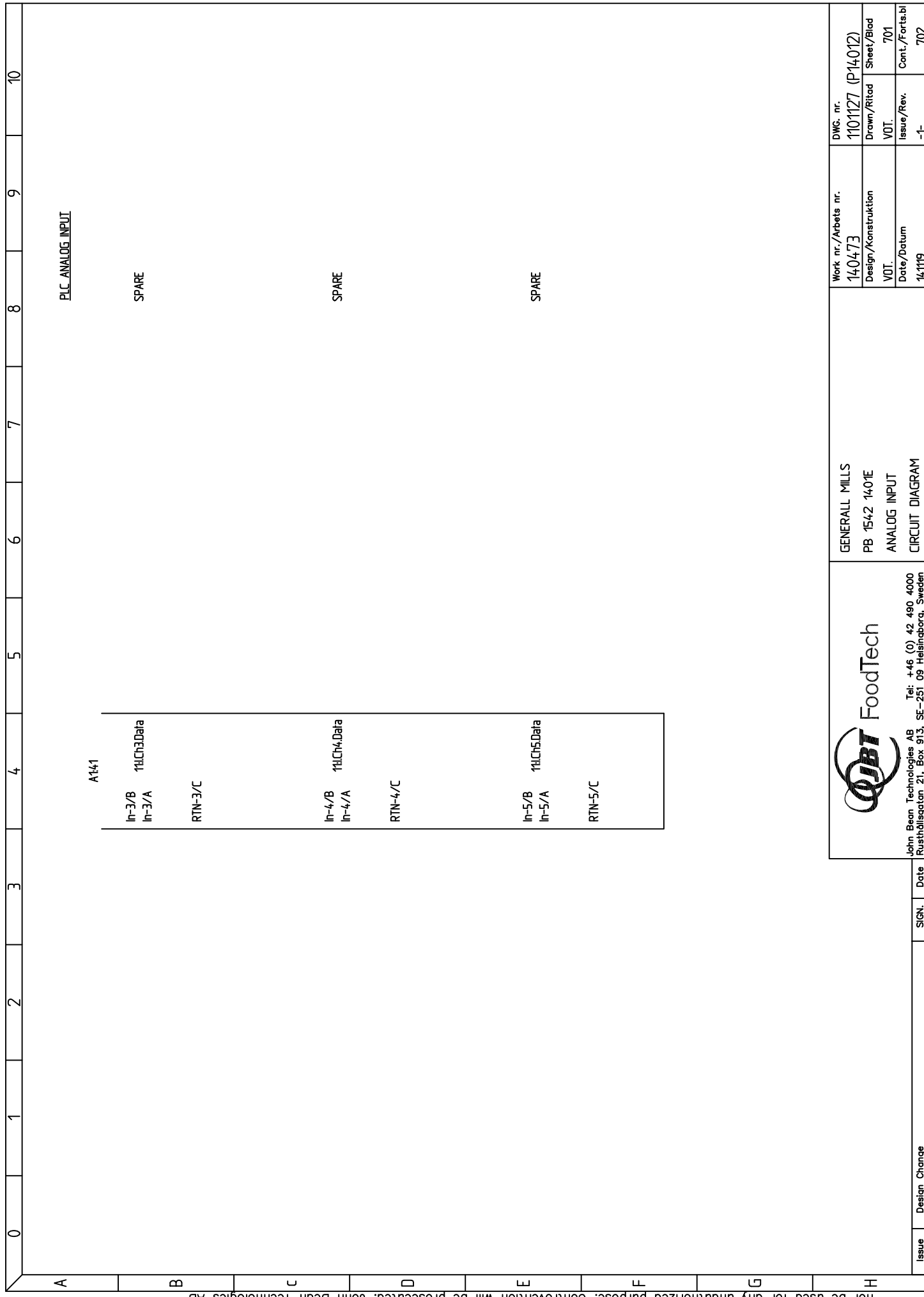
TEMPERATURE BELT WASH WATER 1

TEMPERATURE IN CABINET

SPARE

|                                                                                                          |                                                                              |                                 |                  |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------|------------------|
| <p>Work nr./Arbets nr.<br/>140473</p> <p>Design/Konstruktion<br/>VOT.</p> <p>Date/Datum<br/>14-11-19</p> | <p>GENERALL MILLS<br/>PB 1542 1401E<br/>ANALOG INPUT<br/>CIRCUIT DIAGRAM</p> | DWG. nr.                        | 1101127 (P14012) |
|                                                                                                          |                                                                              | Drawn/Ritad                     | Sheet/Blad       |
|                                                                                                          |                                                                              | VOT.                            | 700              |
|                                                                                                          |                                                                              | Issue/Rev.                      | -1               |
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| Issue                                                                                                    | Design Change                                                                | SIGN.                           | Date             |





|         |        |              |  |
|---------|--------|--------------|--|
| A144    |        |              |  |
| In-3/B  | In-3/A | 11i:Ch3.Data |  |
| RTN-3/C |        |              |  |
| In-4/B  | In-4/A | 11i:Ch4.Data |  |
| RTN-4/C |        |              |  |
| In-5/B  | In-5/A | 11i:Ch5.Data |  |
| RTN-5/C |        |              |  |

PLC\_ANALOG INPUT

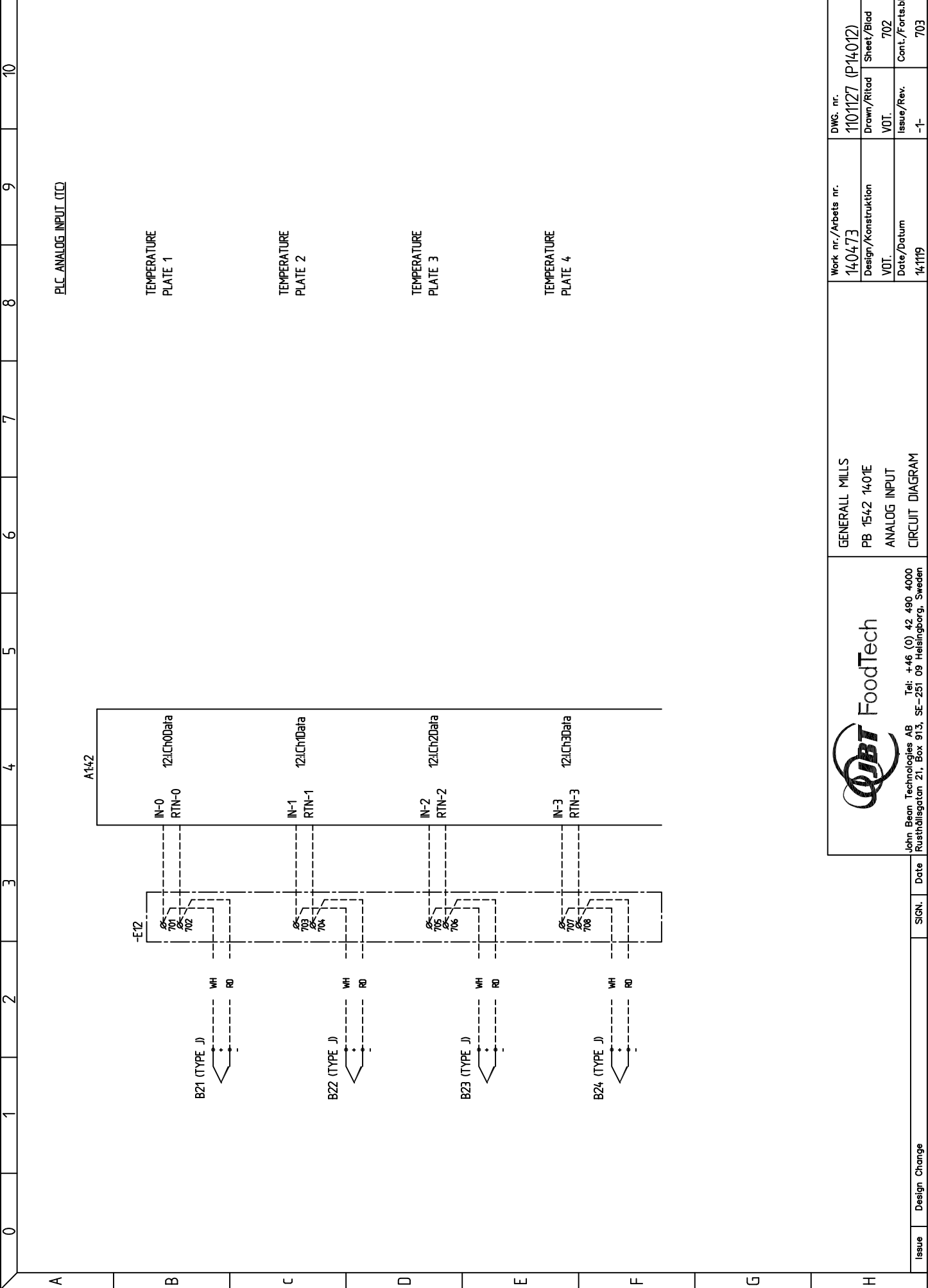
SPARE

SPARE

SPARE

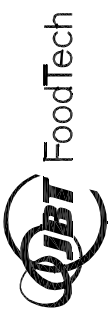
|                                                                                                                        |               |                                   |      |
|------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------|------|
| Issue                                                                                                                  | Design Change | SIGN.                             | Date |
| <br>John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br>Ruströdsägatan 21, Box 913, SE-251 09 Helsingborg, Sweden |               |                                   |      |
| GENERALL MILLS<br>PB 1542 1401E<br>ANALOG INPUT<br>CIRCUIT DIAGRAM                                                     |               | Work nr./Arbets nr.<br>140473     |      |
| Design/Konstruktion<br>VOT.<br>Date/Datum<br>14-11-19                                                                  |               | DWG. nr.<br>1101127 (P14012)      |      |
| Issue/Rev.<br>-1-                                                                                                      |               | Drawn/ Ritad<br>Sheet/Blad<br>701 |      |
| Cont./Fortsbl<br>702                                                                                                   |               |                                   |      |

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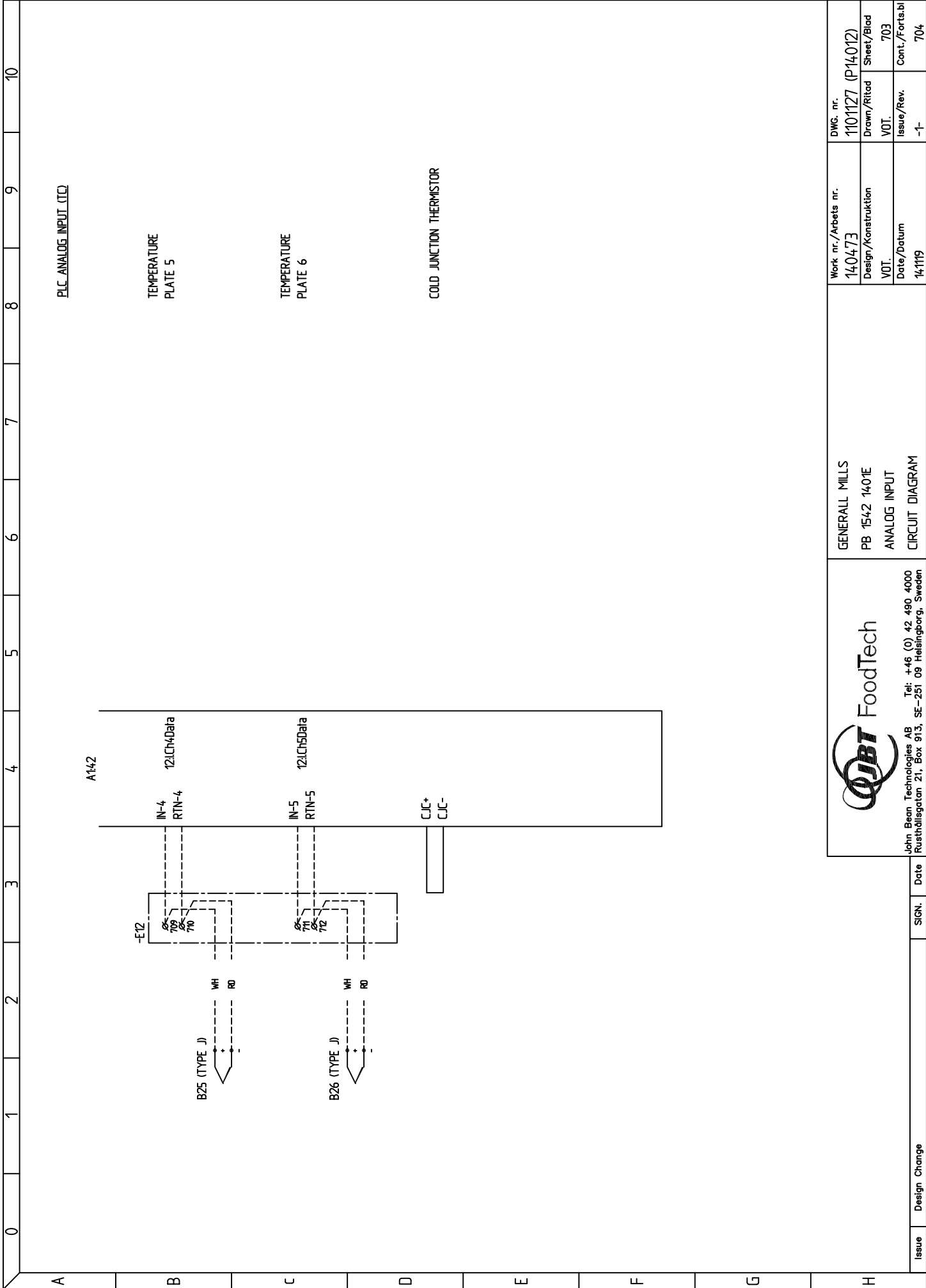
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|---------------------------------------------------------------------------|--|----------------------------------|
| Work nr./Arbets nr.<br>140473                                             |  | DWG. nr.<br>1101127 (P14012)     |
| Design/Konstruktion<br>VOT.                                               |  | Drawn/Ritad<br>Sheet/Blad<br>702 |
| Date/Datum<br>14/11/19                                                    |  | Issue/Rev.<br>-1-                |
| <b>GENERALL MILLS</b><br>PB 1542 1401E<br>ANALOG INPUT<br>CIRCUIT DIAGRAM |  | Cont./Fortsbl<br>703             |



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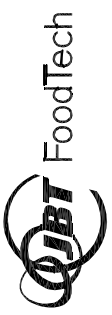
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|---------------|-------|
| Issue         | Date  |
| Design Change | SIGN. |

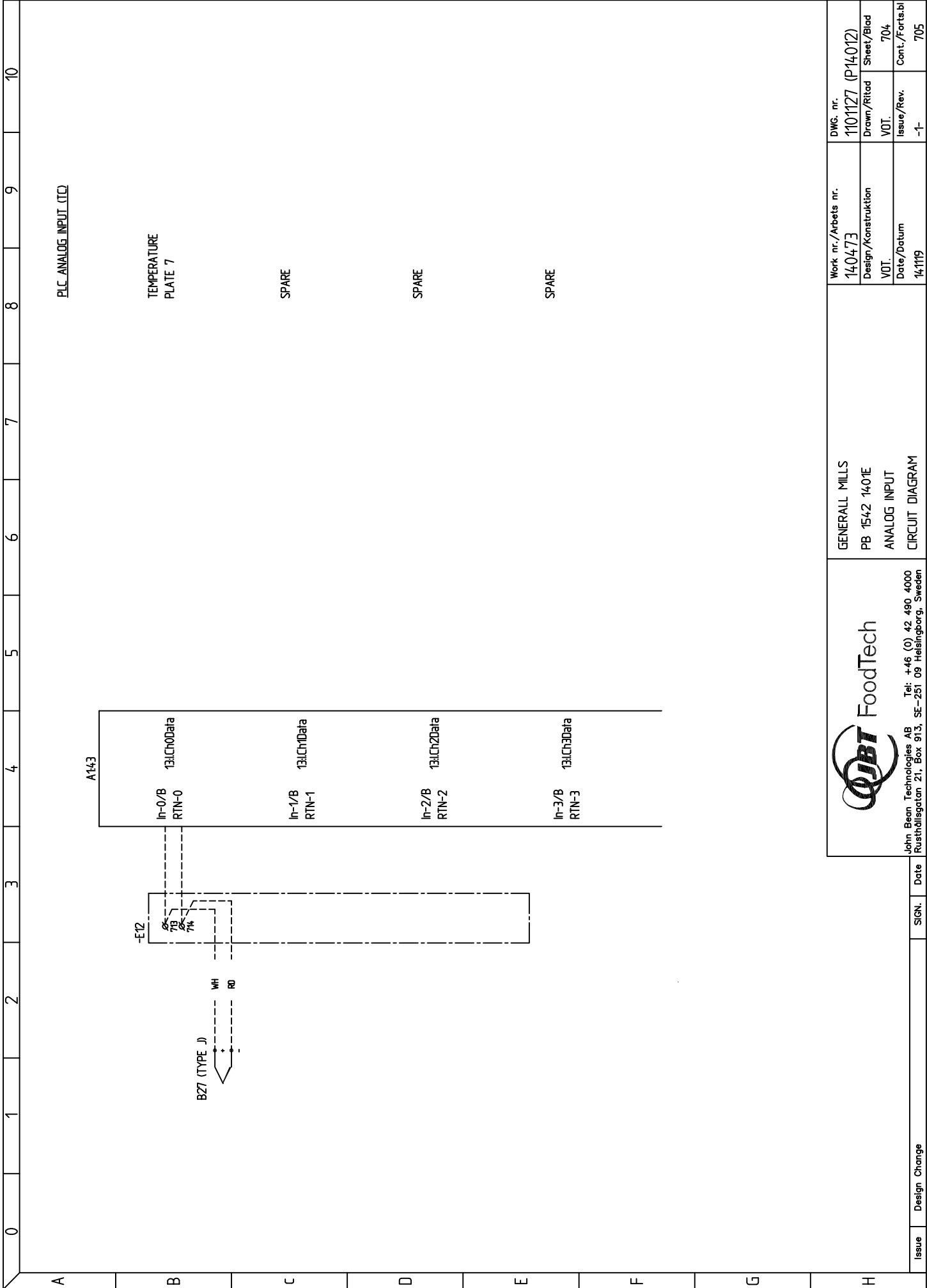


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|-------|---------------|-------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Issue | Design Change | SIGN. | Date |  <p>John Bean Technologies AB<br/>Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br/>Tel: +46 (0) 42 490 4000</p> | <p>GENERALL MILLS<br/>PB 1542 1401E<br/>ANALOG INPUT<br/>CIRCUIT DIAGRAM</p> | <p>Work nr./Arbets nr.<br/>140473</p> <p>Design/Konstruktion<br/>VDT.</p> <p>Date/Datum<br/>14-11-19</p> | <p>DWG. nr.<br/>1101127 (P14012)</p> <p>Drawn/Ritad<br/>VDT.</p> <p>Issue/Rev.<br/>-1-</p> | <p>Sheet/Blad<br/>703</p> <p>Cont./Forts.bl<br/>704</p> |
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0 1 2 3 4 5 6 7 8 9 10

PLC ANALOG INPUT (IC)

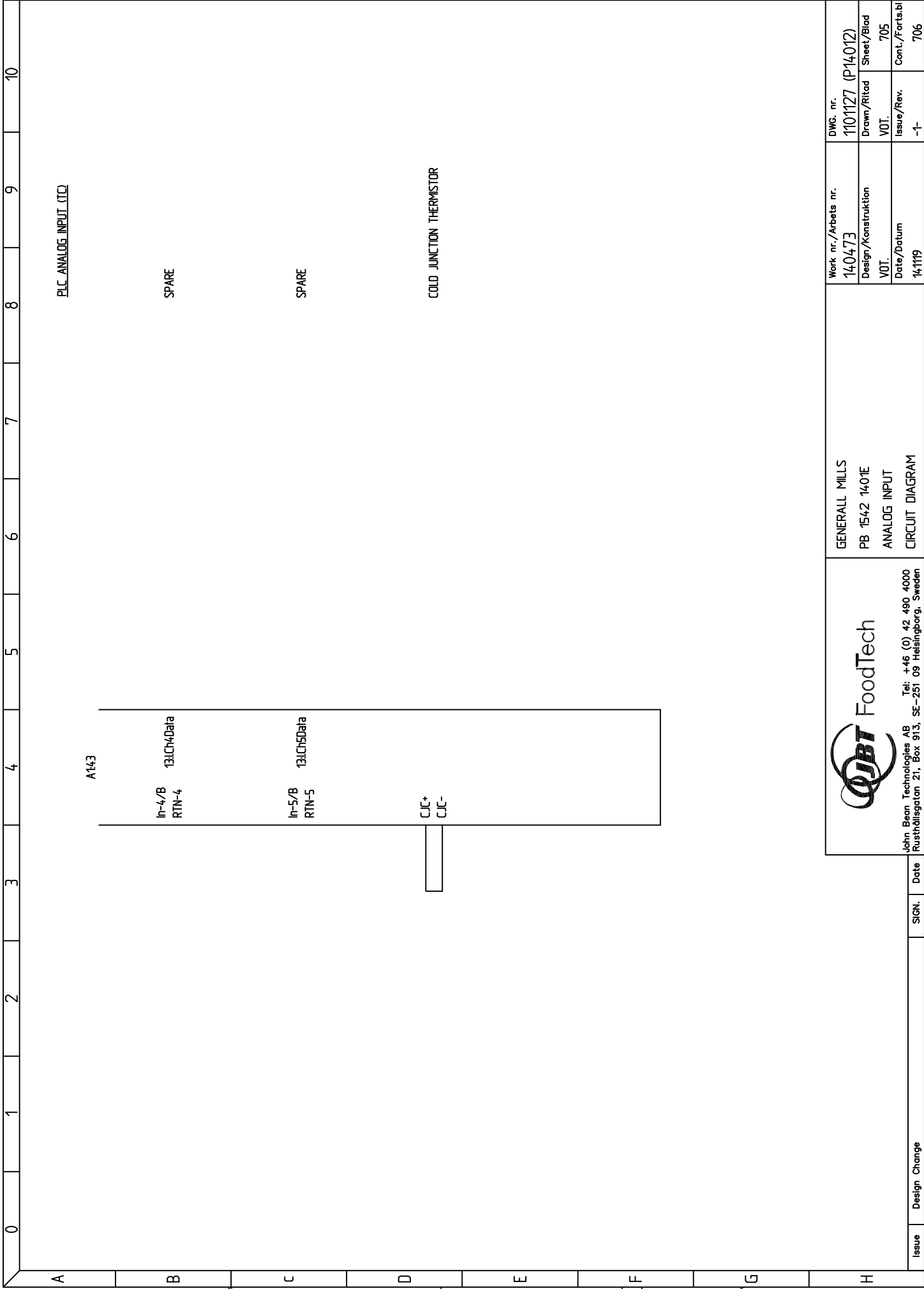
TEMPERATURE  
PLATE 7

SPARE

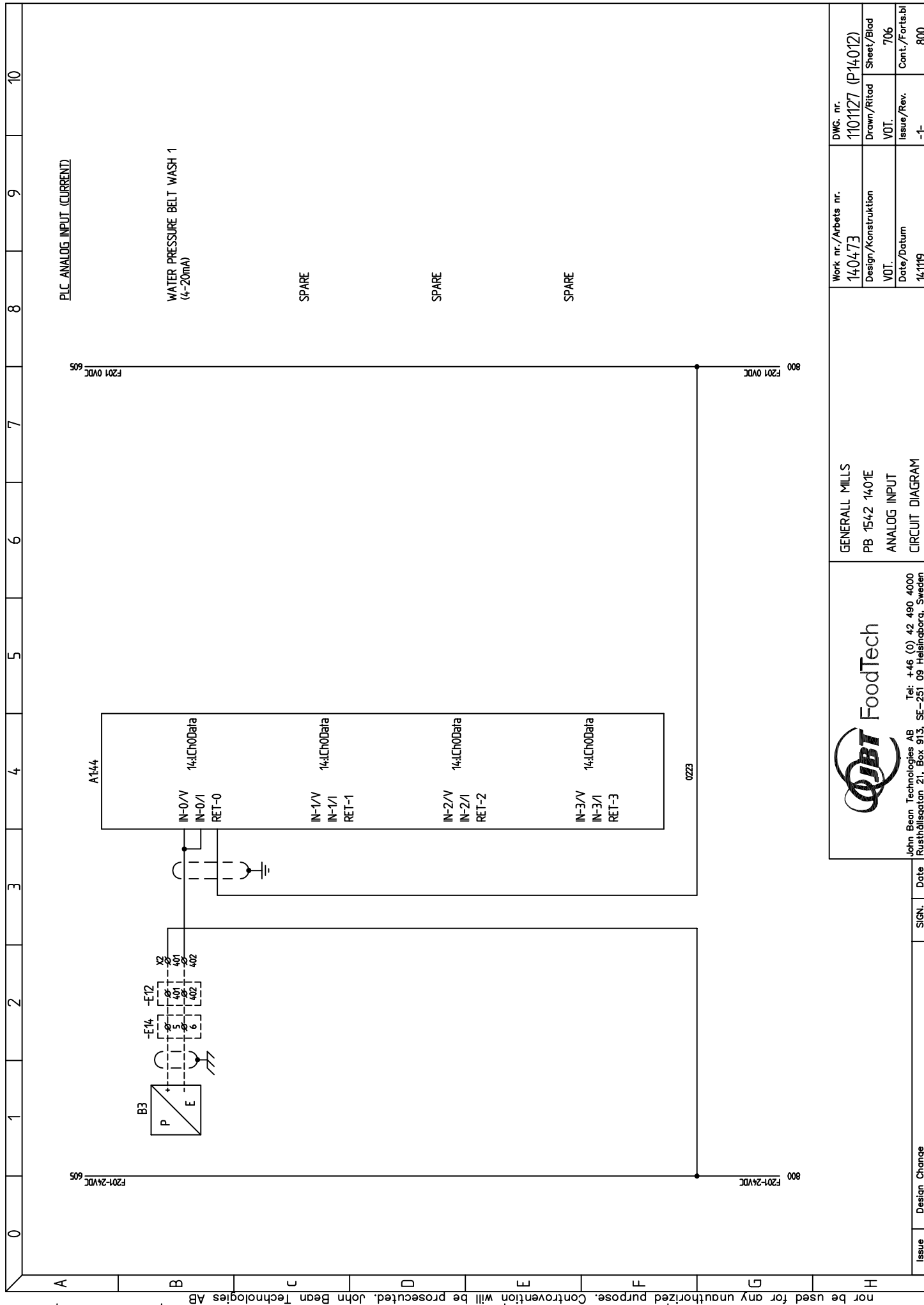
SPARE

SPARE

|                                                                                                          |                                                                              |                                                                                                |                   |                                 |  |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------|---------------------------------|--|
| <p>Work nr./Arbets nr.<br/>140473</p> <p>Design/Konstruktion<br/>VOT.</p> <p>Date/Datum<br/>14-11-19</p> | <p>GENERALL MILLS<br/>PB 1542 1401E<br/>ANALOG INPUT<br/>CIRCUIT DIAGRAM</p> | DWG. nr.<br>1101127 (P14012)                                                                   | Sheet/Blad<br>704 |                                 |  |
|                                                                                                          |                                                                              | Drawn/Ritad<br>VOT.                                                                            | Issue/Rev.<br>-1  |                                 |  |
|                                                                                                          |                                                                              | <p>John Bean Technologies AB<br/>Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden</p> |                   | <p>Tel: +46 (0) 42 490 4000</p> |  |
|                                                                                                          |                                                                              | <p><b>QJBT</b> FoodTech</p>                                                                    |                   | <p>Issue Design Change</p>      |  |



|                                                                                                                                                                                     |               |                                               |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------|------|
| Issue                                                                                                                                                                               | Design Change | SIGN.                                         | Date |
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| <p>GENERALL MILLS<br/> PB 1542 1401E<br/> ANALOG INPUT<br/> CIRCUIT DIAGRAM</p>                                                                                                     |               | <p>Work nr./Arbets nr.<br/> <b>140473</b></p> |      |
| <p>DWG. nr.<br/> <b>1101127 (P14012)</b></p>                                                                                                                                        |               | <p>Drawn/Ritad<br/> VOT.</p>                  |      |
| <p>Issue/Rev.<br/> -1-</p>                                                                                                                                                          |               | <p>Sheet/Blad<br/> 705</p>                    |      |
| <p>Date/Datum<br/> 14-11-19</p>                                                                                                                                                     |               | <p>Issue/Rev.<br/> -1-</p>                    |      |
| <p>Cont./Fortsbl<br/> 706</p>                                                                                                                                                       |               | <p>Cont./Fortsbl<br/> 706</p>                 |      |



10 9 8 7 6 5 4 3 2 1 0

PLC ANALOG INPUT CURRENT

WATER PRESSURE BELT WASH 1  
(4-20mA)

SPARE

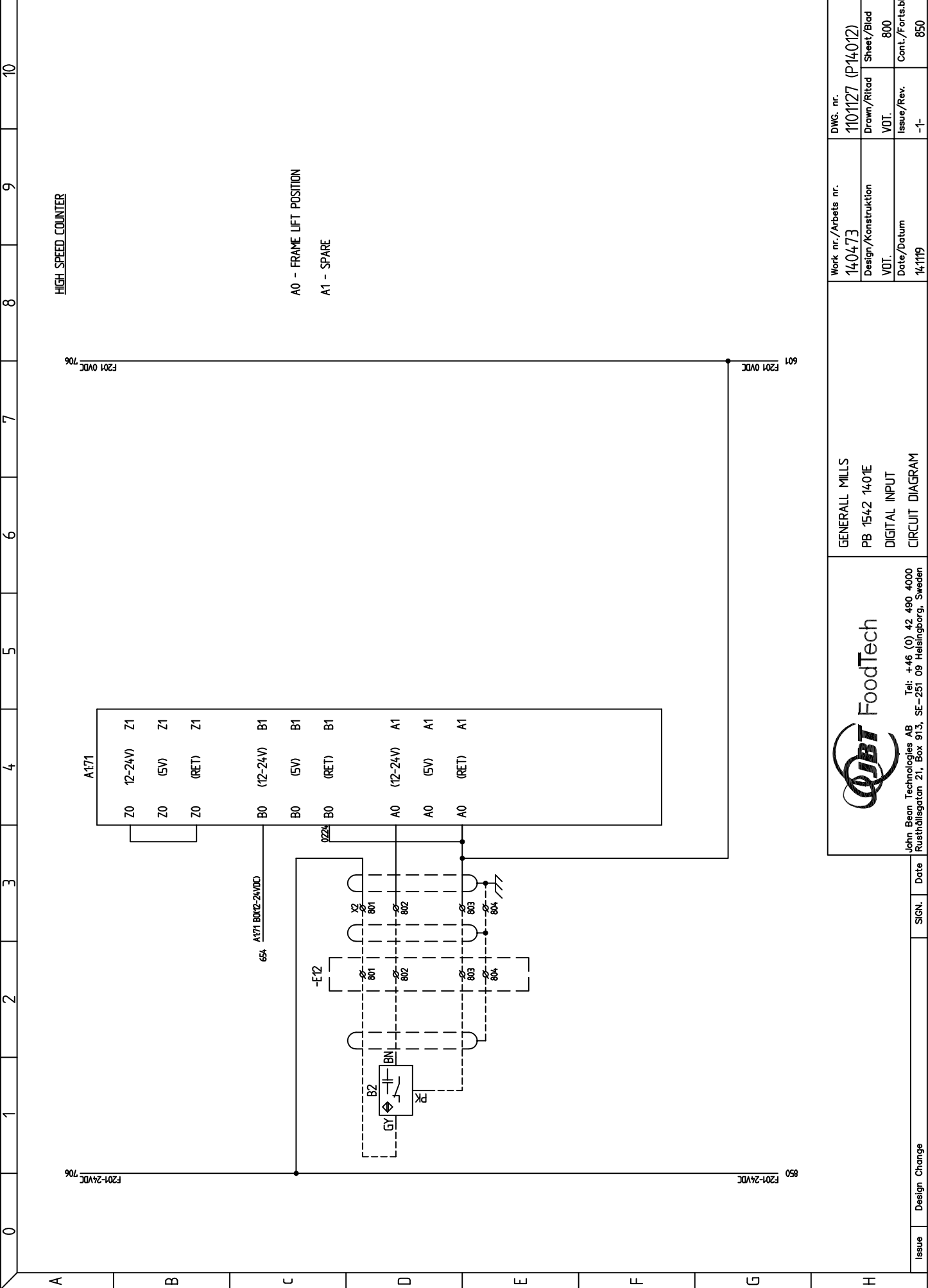
SPARE

SPARE

|                                                                          |                                      |                                     |                      |
|--------------------------------------------------------------------------|--------------------------------------|-------------------------------------|----------------------|
| <b>GENERAL MILLS</b><br>PB 1542 1401E<br>ANALOG INPUT<br>CIRCUIT DIAGRAM | Work nr./Arbets nr.<br><b>140473</b> | DWG. nr.<br><b>1101127 (P14012)</b> |                      |
|                                                                          | Design/Konstruktion<br>VDT.          | Drawn/Ritad<br>VDT.                 | Sheet/Blad<br>706    |
|                                                                          | Date/Datum<br>14-11-19               | Issue/Rev.<br>-1-                   | Cont./Fortsbl<br>800 |
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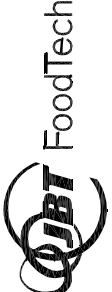
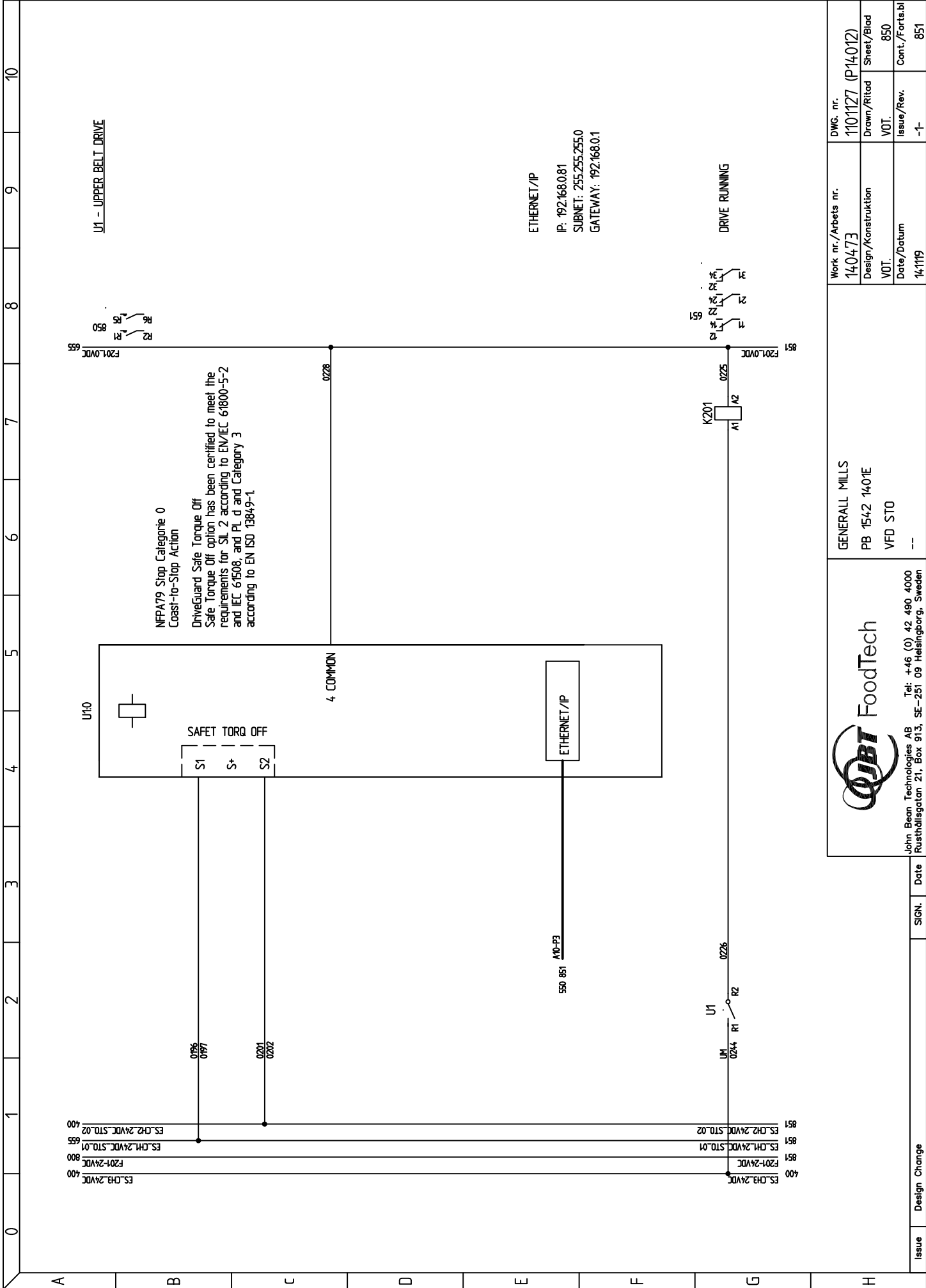
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 Tel: +46 (0) 42 490 4000





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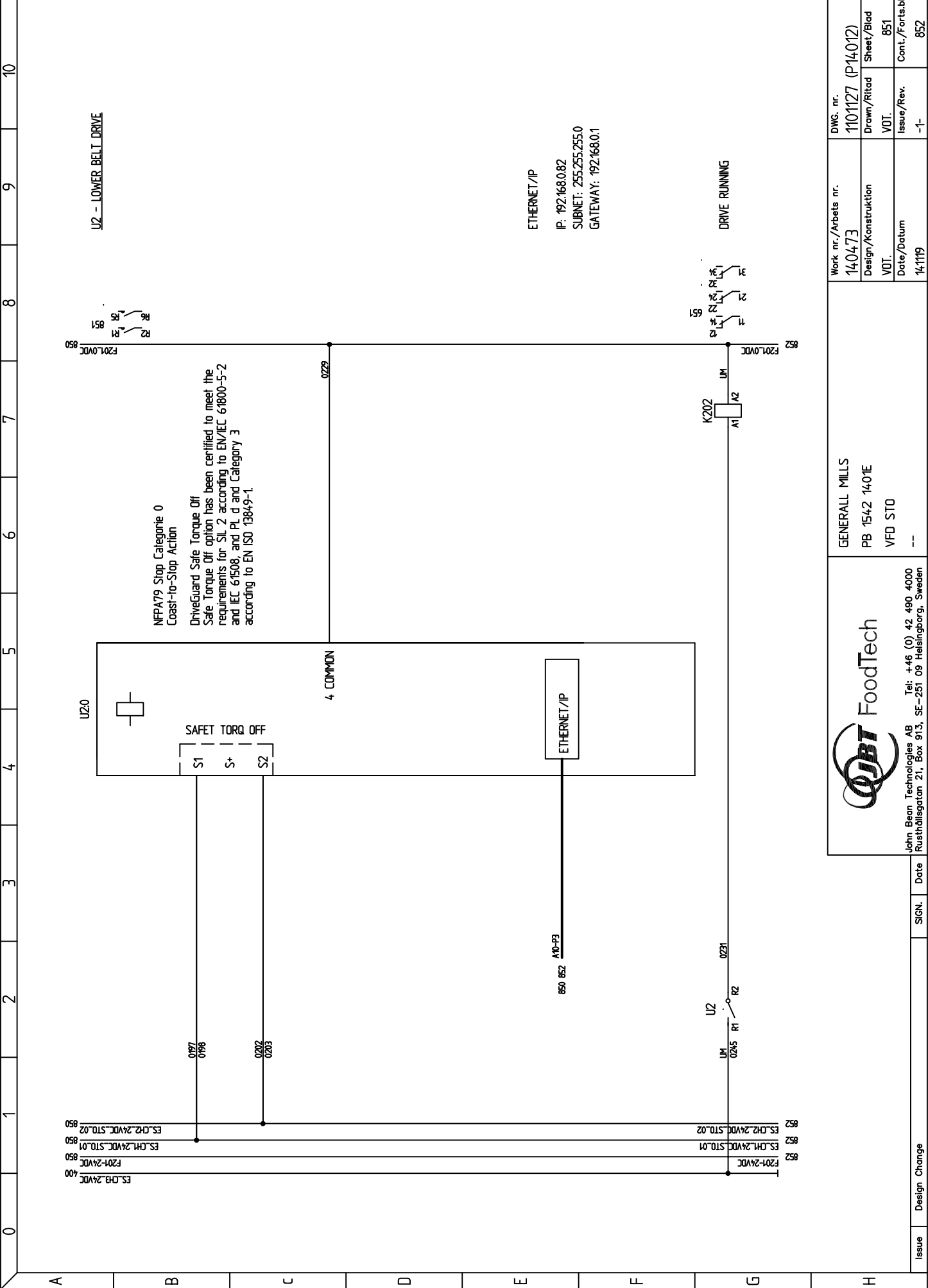
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| Issue                                                                                                                                                                               | Design Change | SIGN.                                   | Date                                        |
| <p style="text-align: center;"><b>QJBT FoodTech</b></p> <p>John Bean Technologies AB    Tel: +46 (0) 42 490 4000<br/> Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden</p> |               |                                         |                                             |
| <p>GENERALL MILLS<br/> PB 1542 1401E<br/> DIGITAL INPUT<br/> CIRCUIT DIAGRAM</p>                                                                                                    |               | <p>Work nr./Arbets nr.<br/> 14.0473</p> | <p>DWG. nr.<br/> 1101127 (P14012)</p>       |
|                                                                                                                                                                                     |               | <p>Design/Konstruktion<br/> VDT.</p>    | <p>Drawn/Ritad<br/> Sheet/Blad<br/> 800</p> |
|                                                                                                                                                                                     |               | <p>Date/Datum<br/> 14/11/19</p>         | <p>Issue/Rev.<br/> -1-</p>                  |
|                                                                                                                                                                                     |               |                                         | <p>Cont./Fortsbl<br/> 850</p>               |



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GENERALL MILLS  
 PB 1542 1401E  
 VFD STO

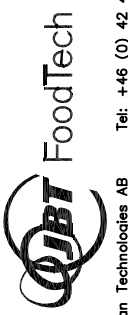
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| Date/Datum          | 14-11-19         | VDT.        | 850              |
| Issue/Rev.          | -1-              | Issue/Rev.  | Cont./Fortsätt   |
|                     |                  |             | 851              |



NFPA79 Stop Category 0  
Coast-to-Stop Action

DriveGuard Safe Torque Off  
Safe Torque Off option has been certified to meet the requirements for SIL 2 according to EN/IEC 61800-5-2 and IEC 61508, and PL d and Category 3 according to EN ISO 13849-1.

ETHERNET/IP  
IP: 192.168.0.82  
SUBNET: 255.255.255.0  
GATEWAY: 192.168.0.1

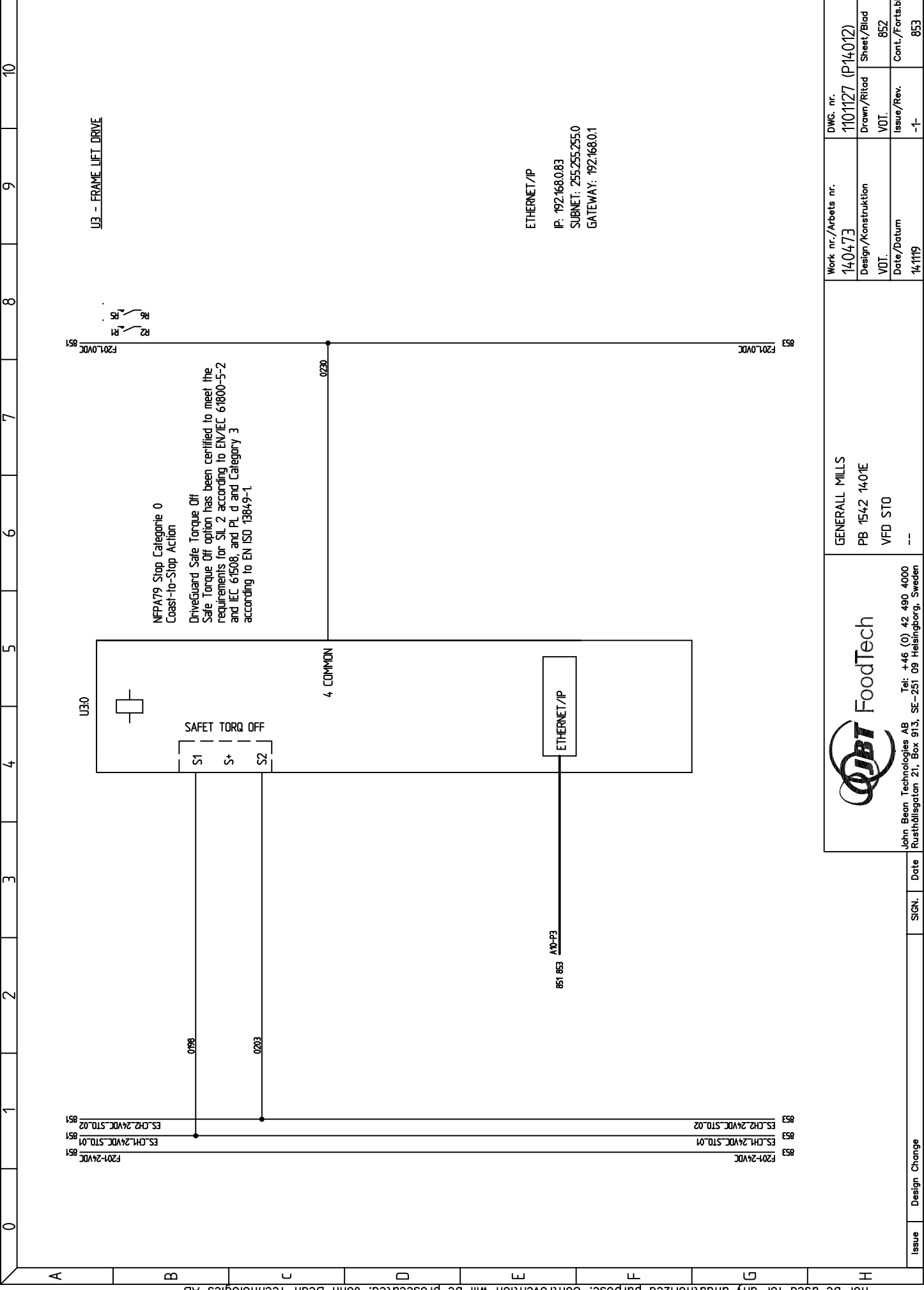


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|                                      |                                     |                          |
|--------------------------------------|-------------------------------------|--------------------------|
| Work nr./Arbets nr.<br><b>140473</b> | DWG. nr.<br><b>1101127 (P14012)</b> | Sheet/Blad<br><b>851</b> |
| Design/Konstruktion<br>VOT.          | Drawn/Ritad<br>VOT.                 | Issue/Rev.<br>-1-        |
| Date/Datum<br>14-11-19               |                                     | Cont./Fortsbl<br>852     |

**GENERALL MILLS**  
 PB 1542 1401E  
 VFD STO



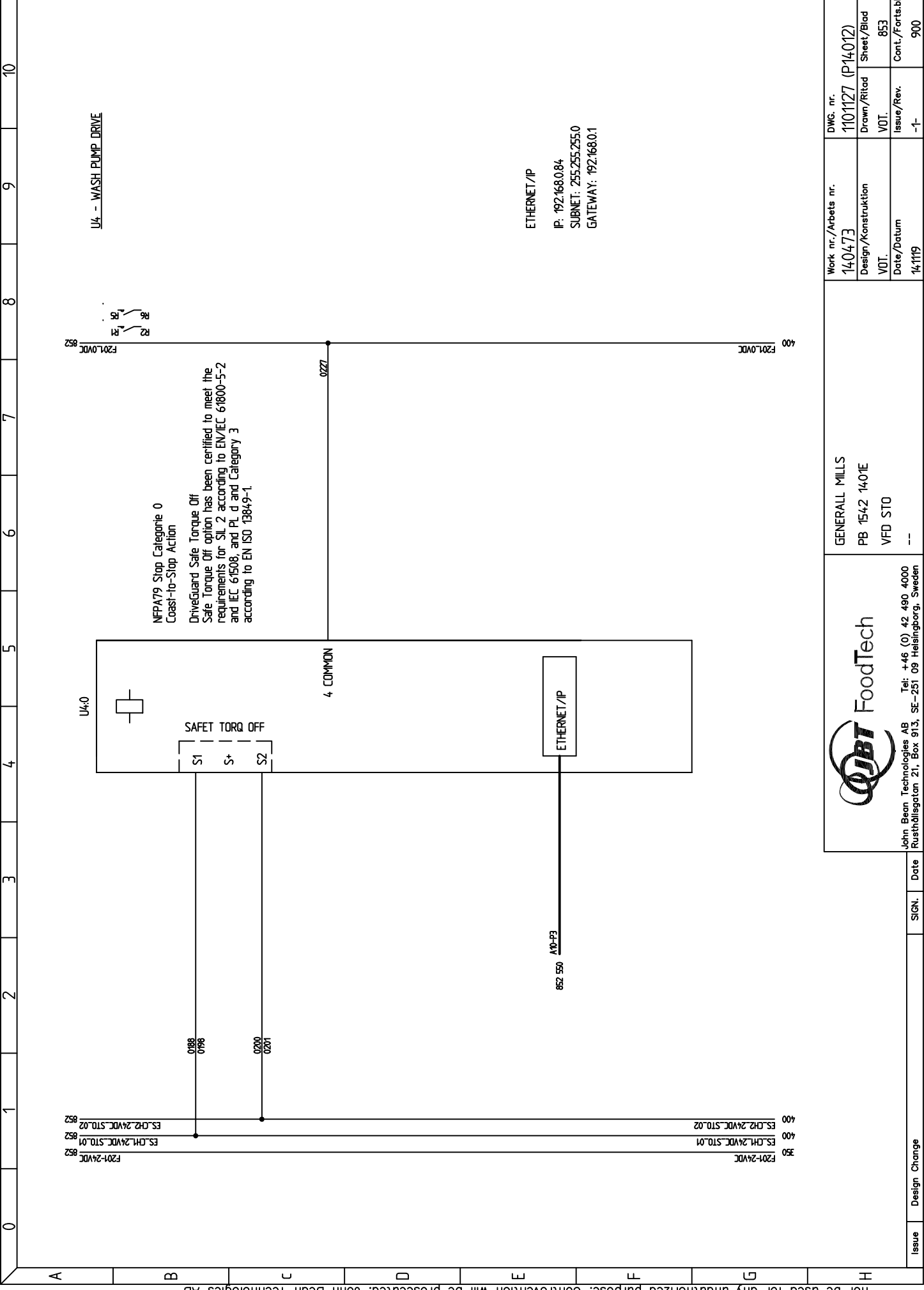
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| Design/Konstruktion | VDT.             |
| Date/Datum          | 14-11-19         |
| DWG. nr.            | 1101127 (P14012) |
| Drawn/Ritad         | Sheet/Blad       |
| VDT.                | 852              |
| Issue/Rev.          | -1-              |
| Cont./Fortsbl       | 853              |

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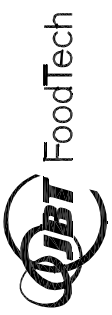
| Issue | Design Change | SIGN. | Date |
|-------|---------------|-------|------|
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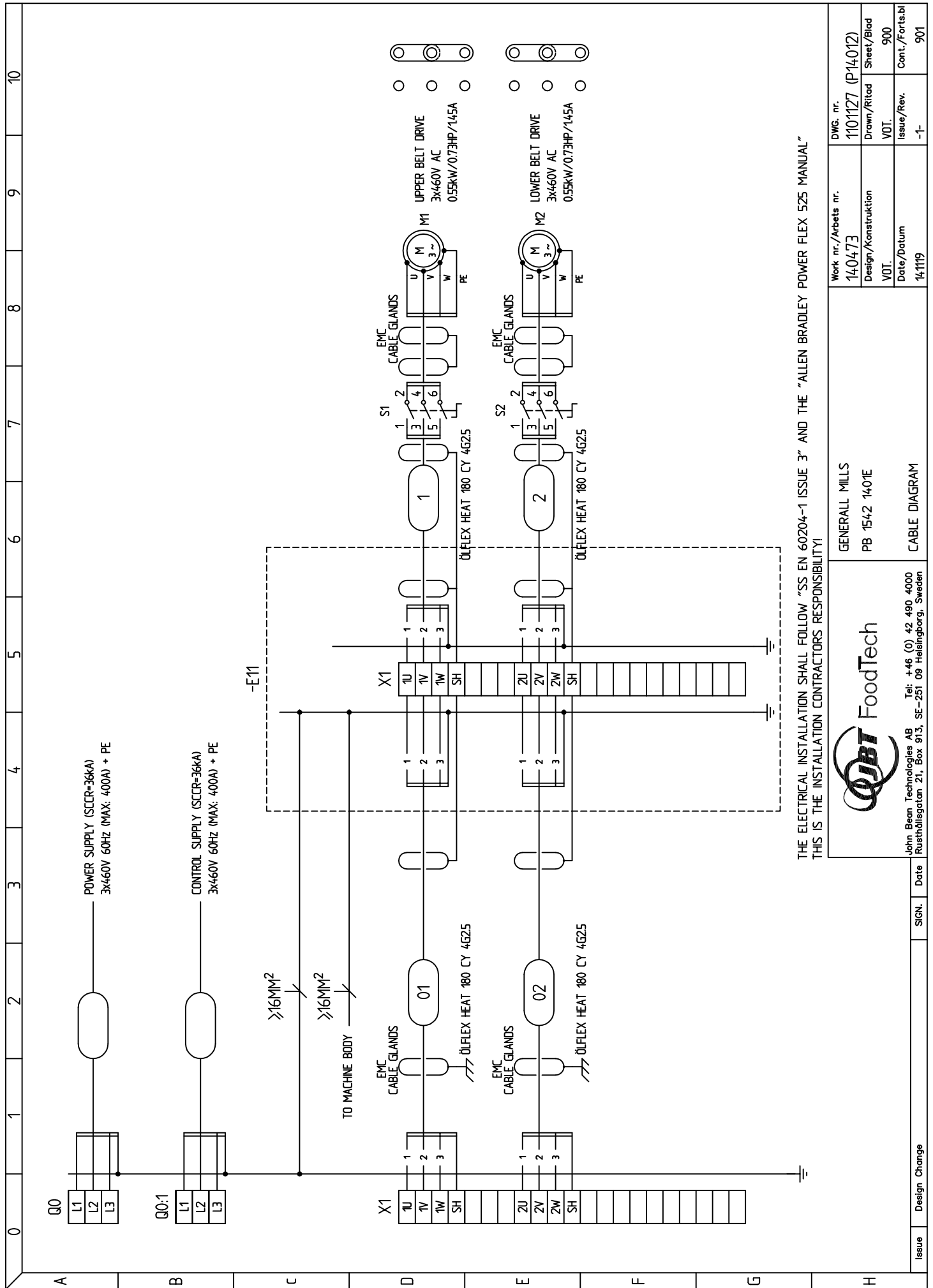


NFPA79 Stop Category 0  
Coast-to-Stop Action

DriveGuard Safe Torque Off  
Safe Torque Off option has been certified to meet the requirements for SIL 2 according to EN/IEC 61800-5-2 and IEC 61508, and PL d and Category 3 according to EN ISO 13849-1.

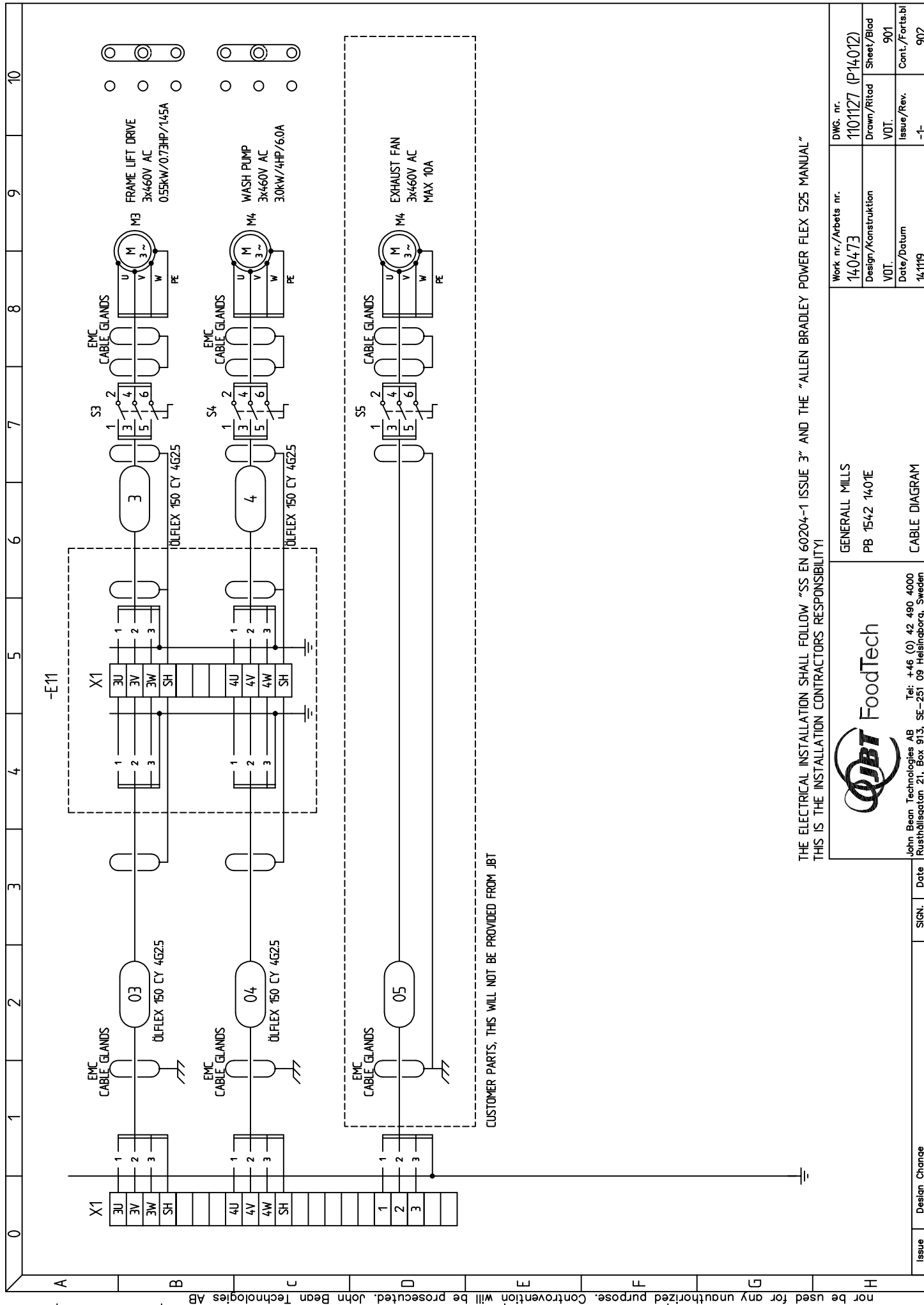
ETHERNET/IP  
IP: 192.168.0.84  
SUBNET: 255.255.255.0  
GATEWAY: 192.168.0.1

|                                                                                                                       |  |                                      |                                         |
|-----------------------------------------------------------------------------------------------------------------------|--|--------------------------------------|-----------------------------------------|
|                                  |  | Work nr./Arbets nr.<br><b>140473</b> | DWG. nr.<br><b>1101127 (P14012)</b>     |
| John Bean Technologies AB<br>Rustrindligsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |  | Design/Konstruktion<br>VOT.          | Drawn/Ritad<br>Sheet/Blad<br><b>853</b> |
| --                                                                                                                    |  | Date/Datum<br><b>14-11-19</b>        | Issue/Rev.<br><b>-1-</b>                |
| GENERAL MILLS<br>PB 1542 1401E<br>VFD STO                                                                             |  | Cont./Fortsbl<br><b>900</b>          |                                         |



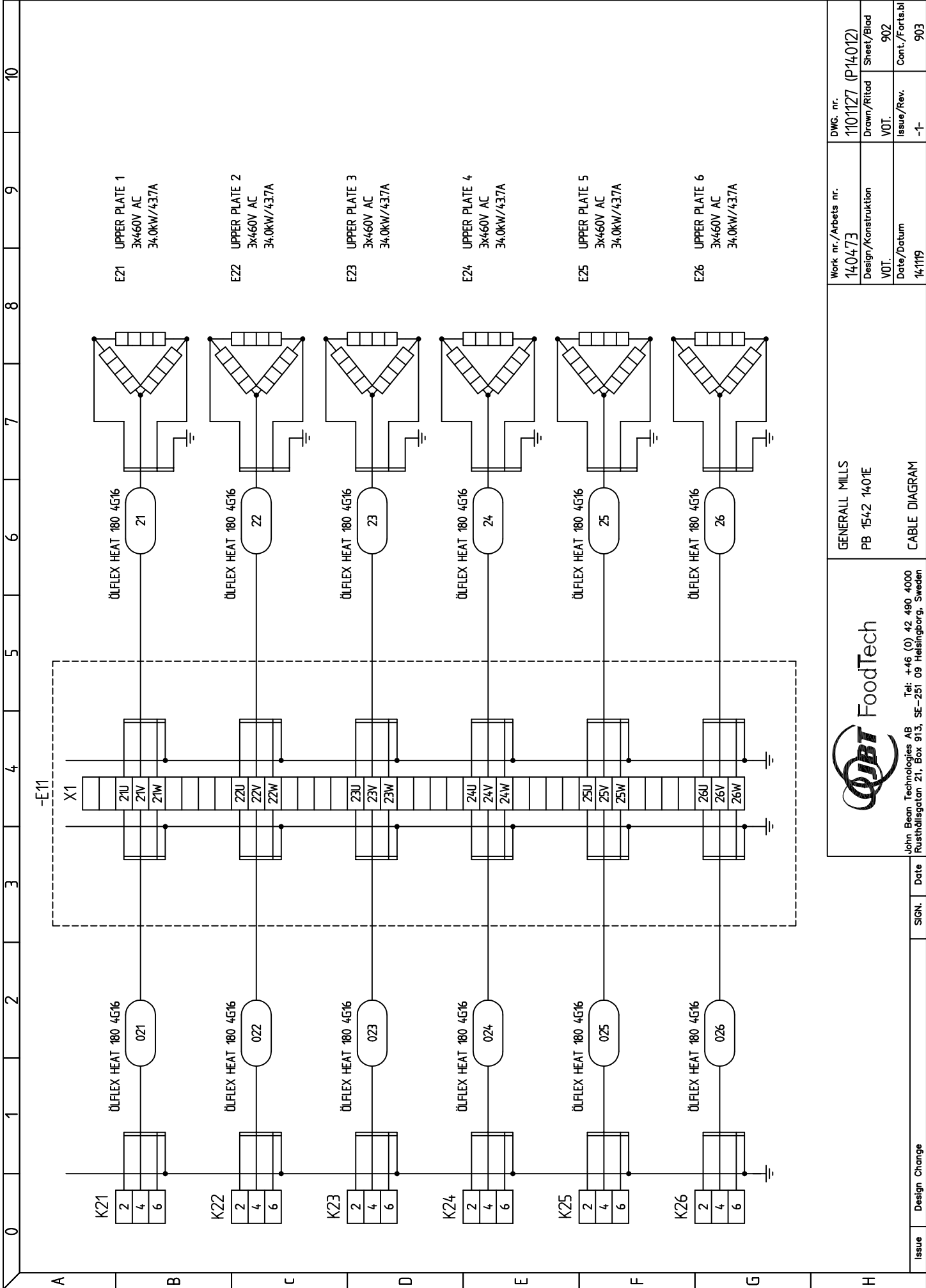
THE ELECTRICAL INSTALLATION SHALL FOLLOW "SS EN 60204-1 ISSUE 3" AND THE "ALLEN BRADLEY POWER FLEX 525 MANUAL"  
 THIS IS THE INSTALLATION CONTRACTORS RESPONSIBILITY!

|   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |       |               |       |      |    |    |    |    |                                                      |                                                      |                  |                  |                         |                         |                 |                    |                    |                                                          |                                                            |                               |                              |                             |                     |                        |                   |                   |                       |
|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|-------|---------------|-------|------|----|----|----|----|------------------------------------------------------|------------------------------------------------------|------------------|------------------|-------------------------|-------------------------|-----------------|--------------------|--------------------|----------------------------------------------------------|------------------------------------------------------------|-------------------------------|------------------------------|-----------------------------|---------------------|------------------------|-------------------|-------------------|-----------------------|
| A | B | C | D | E | F | G | H | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | G0    | G0:1          | X1    | X2   | S1 | S2 | M1 | M2 | UPPER BELT DRIVE<br>3x460V AC<br>0.55kW/0.73HP/1.45A | LOWER BELT DRIVE<br>3x460V AC<br>0.55kW/0.73HP/1.45A | EMC CABLE GLANDS | EMC CABLE GLANDS | ØFLEX HEAT 180 CY 4G2.5 | ØFLEX HEAT 180 CY 4G2.5 | TO MACHINE BODY | ≥16MM <sup>2</sup> | ≥16MM <sup>2</sup> | POWER SUPPLY (SCCR=36kA)<br>3x460V 60HZ (MAX: 400A) + PE | CONTROL SUPPLY (SCCR=36kA)<br>3x460V 60HZ (MAX: 400A) + PE | Work nr./Arbets nr.<br>140473 | DWG. nr.<br>1101127 (P14012) | Design/Konstruktion<br>VDT. | Drawn/Ritad<br>VDT. | Date/Datum<br>14-11-19 | Issue/Rev.<br>-1- | Sheet/Blad<br>900 | Cont./Forts.bl<br>901 |
|   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |       |               |       |      |    |    |    |    |                                                      |                                                      |                  |                  |                         |                         |                 |                    |                    |                                                          |                                                            |                               |                              |                             |                     |                        |                   |                   |                       |
|   |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   | Issue | Design Change | SIGN. | Date |    |    |    |    |                                                      |                                                      |                  |                  |                         |                         |                 |                    |                    |                                                          |                                                            |                               |                              |                             |                     |                        |                   |                   |                       |




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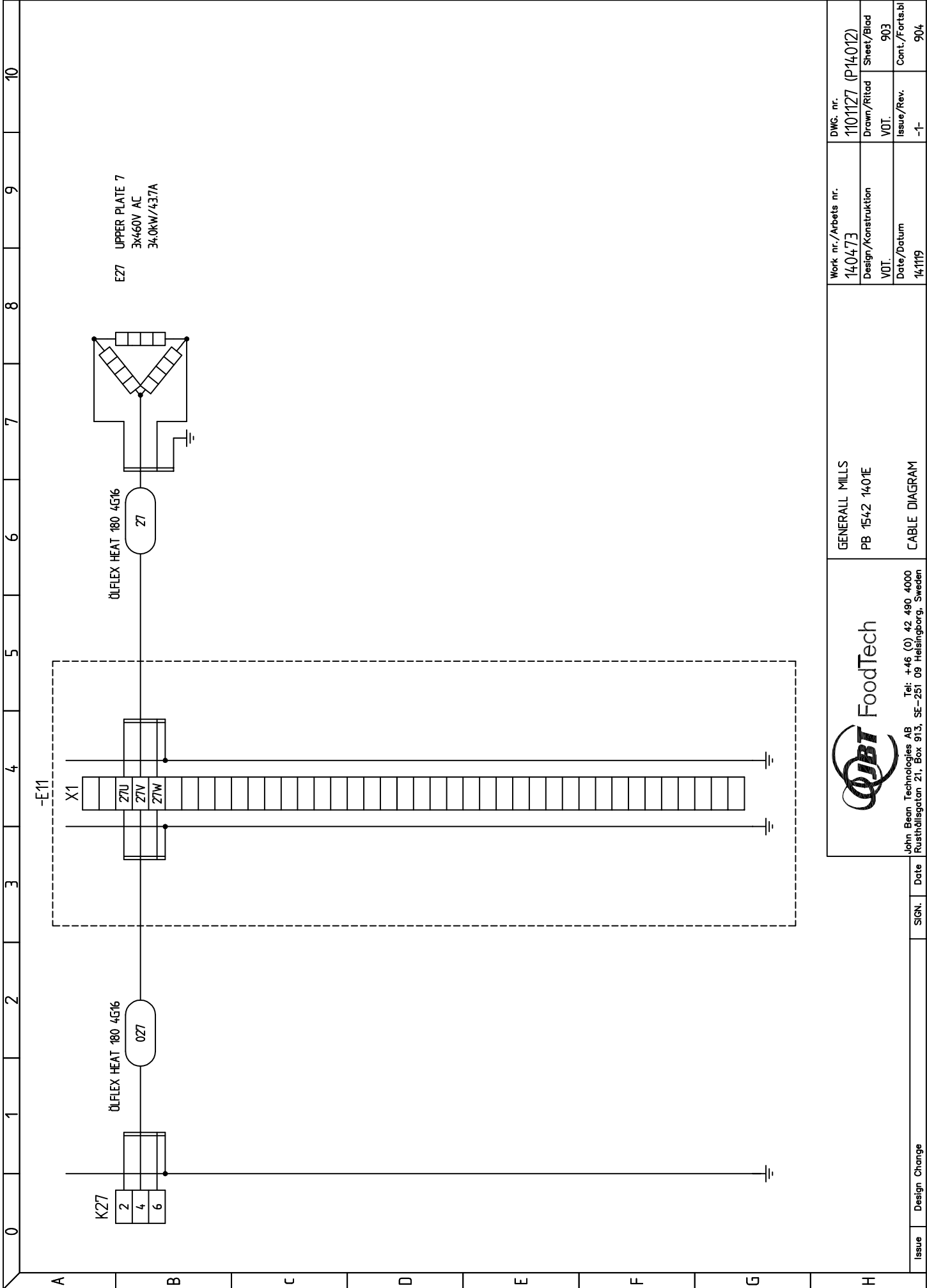
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| Date/Datum<br>14-11-19                                                                                                                              | Issue/Rev.<br>-1-            |
| Design/Konstruktion<br>VDT.                                                                                                                         | Sheet/Blad<br>901            |
| Date/Datum<br>14-11-19                                                                                                                              | Cont./Fortsbl<br>902         |
|                                                                                                                                                     |                              |
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| Issue                                                                                                                                               | Design Change                |
| SIGN.                                                                                                                                               | Date                         |
| GENERAL MILLS<br>PB 1542 1401E                                                                                                                      | CABLE DIAGRAM                |



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|                                                                                                                      |                              |
|----------------------------------------------------------------------------------------------------------------------|------------------------------|
| Work nr./Arbets nr.<br>14.0473                                                                                       | DWG. nr.<br>1101127 (P14012) |
|                                                                                                                      | Design/Konstruktion<br>VOT.  |
| Date/Datum<br>14/11/19                                                                                               | Issue/Rev.<br>-1-            |
|                                                                                                                      | Cont./Fortsbl<br>903         |
|                                 |                              |
| GENERALL MILLS<br>PB 1542 1401E<br>CABLE DIAGRAM                                                                     |                              |
| John Bean Technologies AB<br>Ruströdligsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000 |                              |
| Issue                                                                                                                | Design Change                |
| SIGN.                                                                                                                | Date                         |





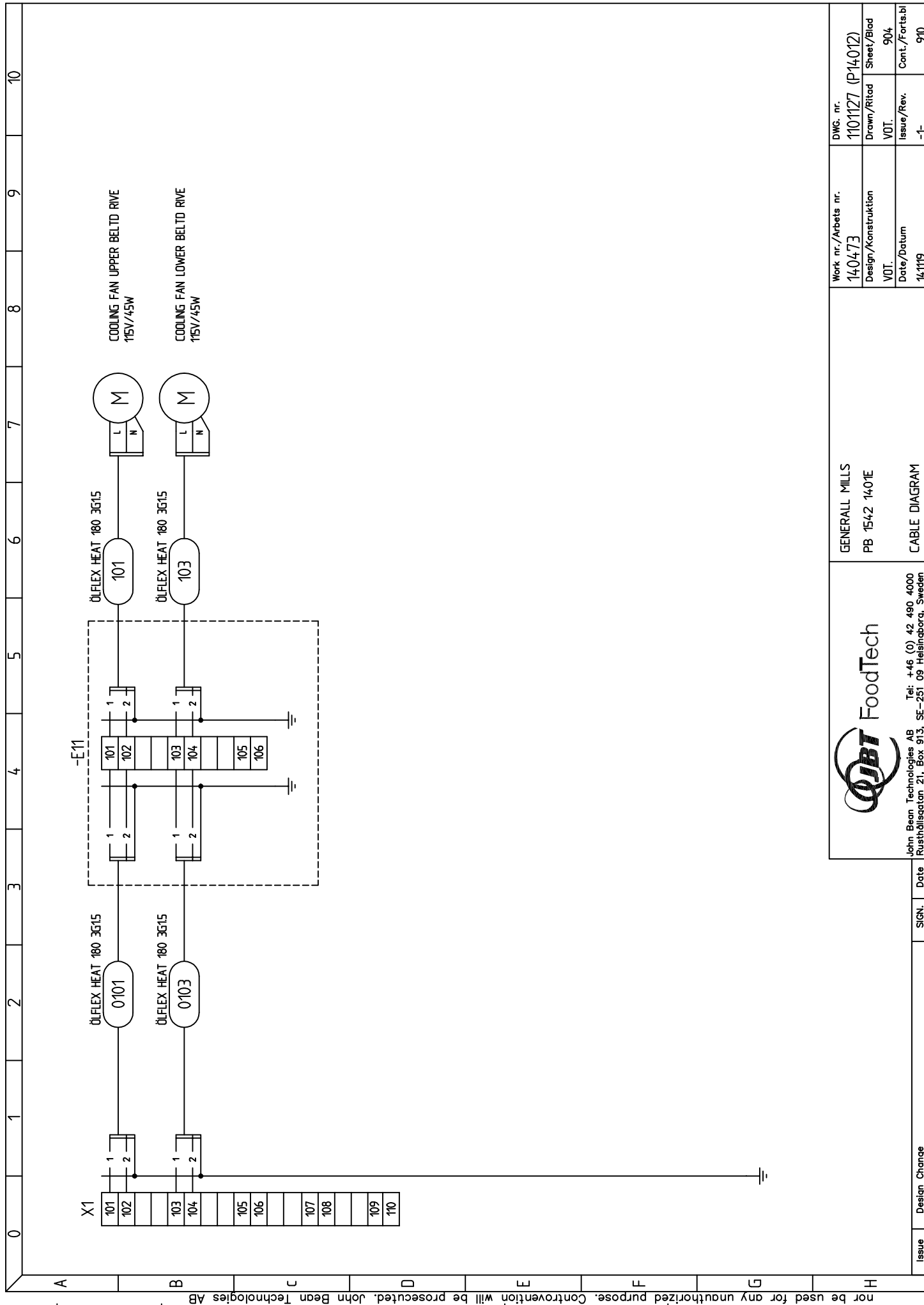
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| Work nr./Arbets nr.<br>14.0473  |  | DWG. nr.<br>1101127 (P14012) |
| Design/Konstruktion<br>VOT.     |  | Drawn/Ritad<br>VOT.          |
| Date/Datum<br>14/11/99          |  | Issue/Rev.<br>-1-            |
| GENERALL MILLS<br>PB 1542 1401E |  | Sheet/Blad<br>903            |
| CABLE DIAGRAM                   |  | Cont./Fortsbl<br>904         |

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| Issue | Design Change | SIGN. | Date |
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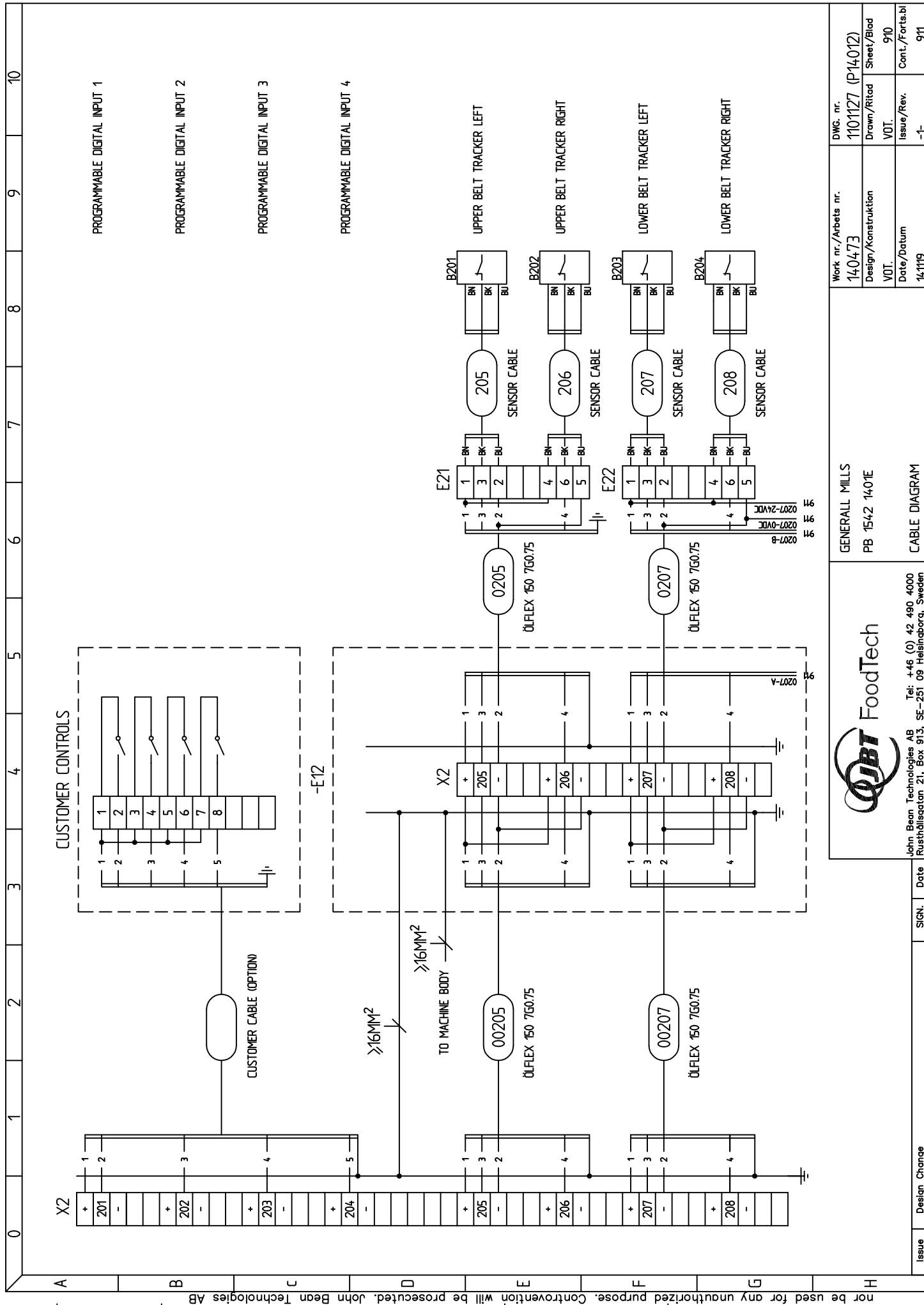


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|                                                                                                |                                                           |  |                                           |
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|                                                                                                | <p>Design/Konstruktion<br/>VDT.</p>                       |  | <p>Drawn/Ritad<br/>Sheet/Blad<br/>904</p> |
|                                                                                                | <p>Date/Datum<br/>14/11/19</p>                            |  | <p>Issue/Rev.<br/>-1-</p>                 |
|                                                                                                | <p>GENERALL MILLS<br/>PB 1542 1401E<br/>CABLE DIAGRAM</p> |  | <p>Cont./Fortsbl<br/>910</p>              |



PROGRAMMABLE DIGITAL INPUT 1

PROGRAMMABLE DIGITAL INPUT 2

PROGRAMMABLE DIGITAL INPUT 3

PROGRAMMABLE DIGITAL INPUT 4

UPPER BELT TRACKER LEFT

UPPER BELT TRACKER RIGHT

LOWER BELT TRACKER LEFT

LOWER BELT TRACKER RIGHT

|                     |                  |
|---------------------|------------------|
| Work nr./Arbets nr. | DWG. nr.         |
| 14.0473             | 1101127 (P14012) |
| Design/Konstruktion | Drawn/Ritad      |
| VDT.                | Sheet/Blad       |
| Date/Datum          | VDT.             |
| 14-1119             | 910              |
|                     | Issue/Rev.       |
|                     | -1-              |
|                     | Cont./Forts.bl   |
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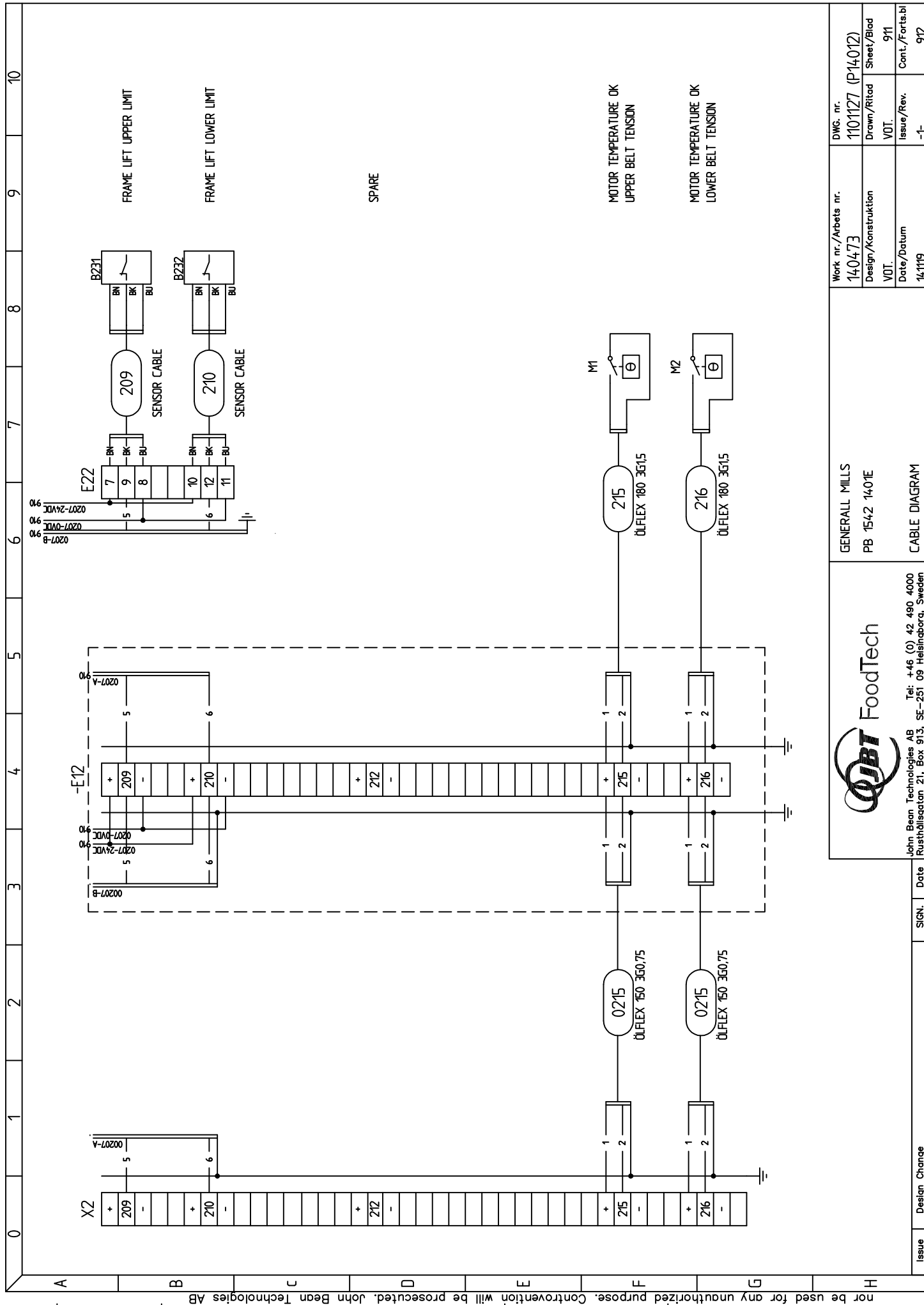
GENERALL MILLS  
PB 1542 1401E

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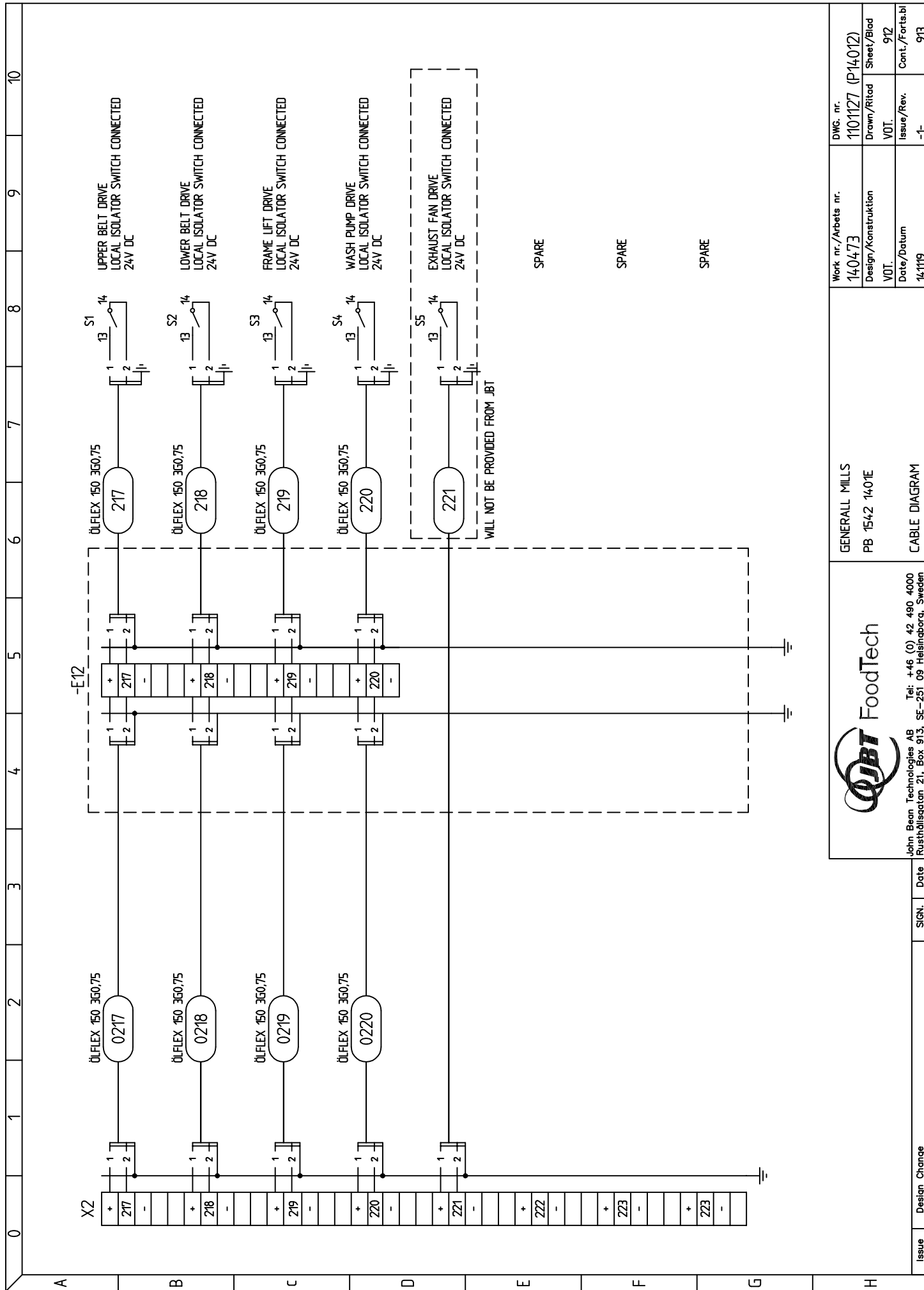
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| Work nr./Arbets nr. | 1101127 (P14012) | DWG. nr.    | 1101127 (P14012) |
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| Date/Datum          | 14-11-19         | VDT.        | 911              |
| Cable Diagram       |                  | Issue/Rev.  | -1               |
|                     |                  |             | 912              |

**QJBT FoodTech**

Generall Mills  
PB 1542 1401E

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A B C D E F G H

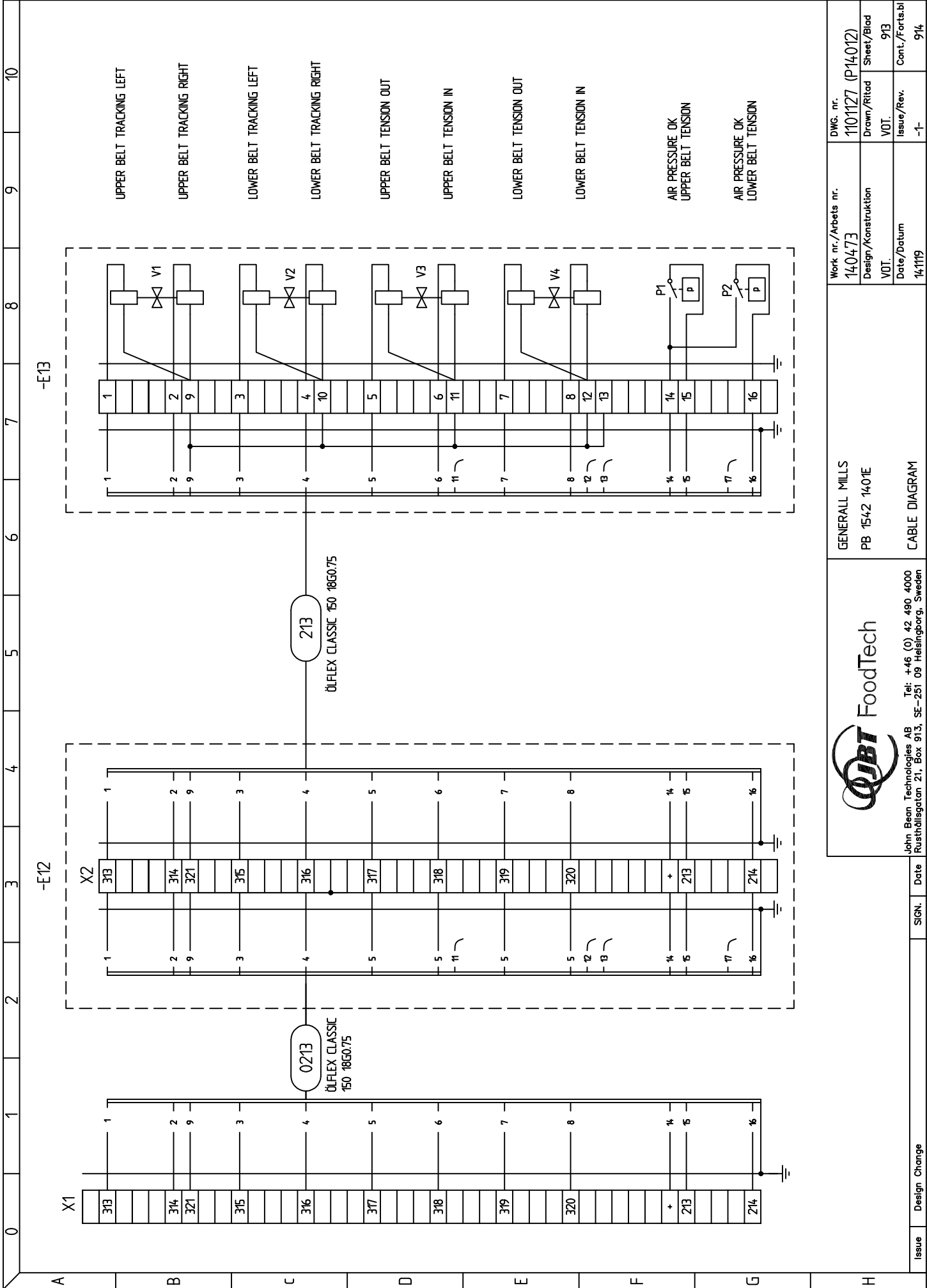


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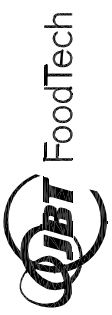
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|                                | Design/Konstruktion<br>VOT.   |                   |                      |
| DATE/Datum<br>14-11-19         | Work nr./Arbets nr.<br>140473 | Issue/Rev.<br>-1- | Cont./Fortsbl<br>913 |
| GENERAL MILLS<br>PB 1542 1401E | Design/Konstruktion<br>VOT.   | Date/Rev.<br>-1-  | Cont./Fortsbl<br>913 |
| CABLE DIAGRAM                  | DATE/Datum<br>14-11-19        | Issue/Rev.<br>-1- | Cont./Fortsbl<br>913 |

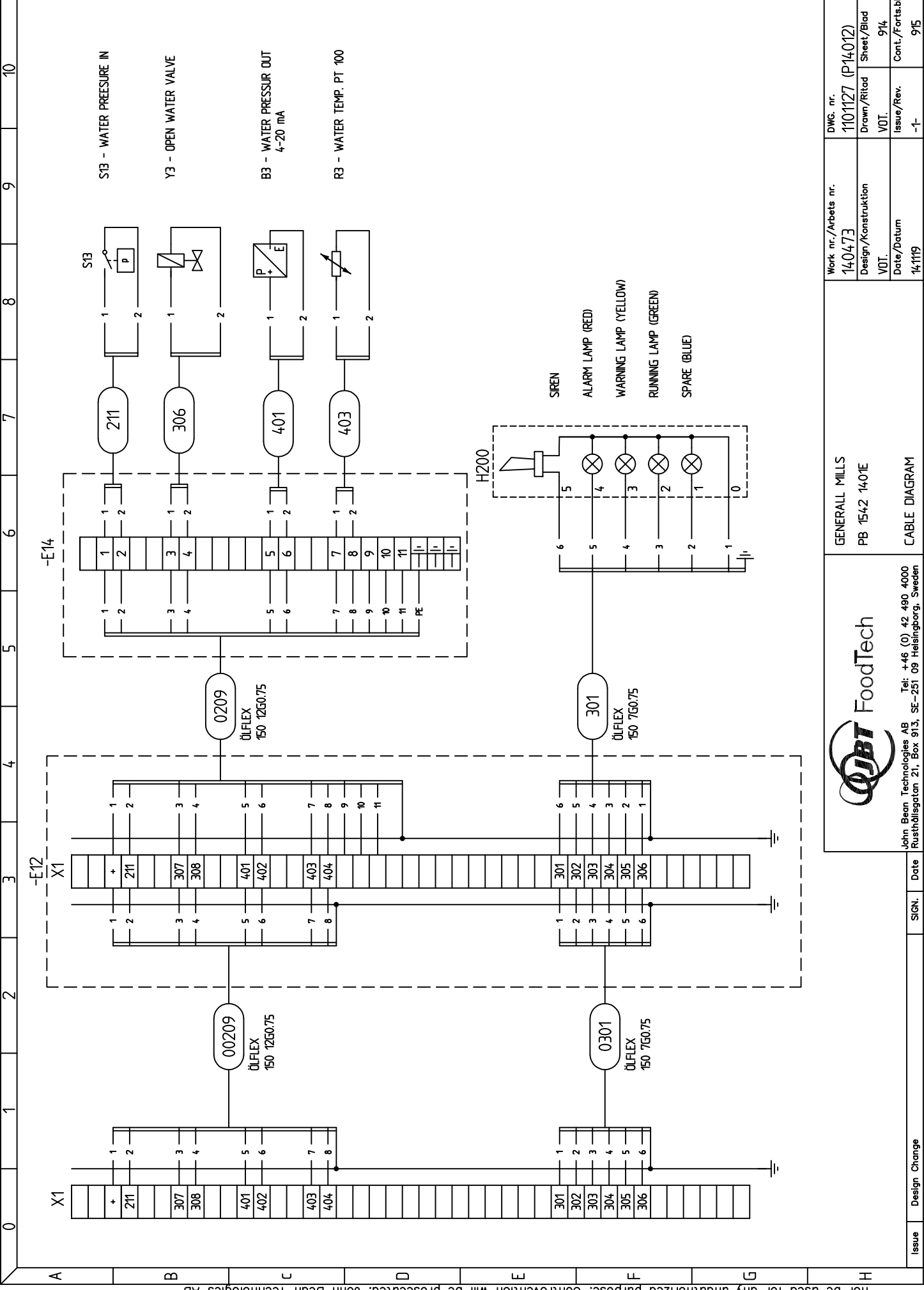
**JB** FoodTech

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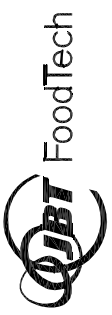


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|---------------------------------|---------------|--------|---------------|---------------|---------------|------------------|---------------|---------------------------------------------------------------------------------------|---------------|-------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|---------------|----------|---------------|
| Issue                           | Design Change | Issue  | Design Change | Issue         | Design Change | Issue            | Design Change | Issue                                                                                 | Design Change | Issue | Design Change | Issue                                                                                                                                                  | Design Change | Issue      | Design Change | Issue    | Design Change |
|                                 |               |        |               |               |               |                  |               |                                                                                       |               |       |               |                                                                                                                                                        |               |            |               |          |               |
| Work nr./Arbets nr.             |               | 140473 |               | DWG. nr.      |               | 1101127 (P14012) |               | Design/Konstruktion                                                                   |               | VDT.  |               | 9/3                                                                                                                                                    |               | Date/Datum |               | 14/11/19 |               |
| DRAWN/RITAD                     |               | VDT.   |               | DATE/REV.     |               | -1-              |               | SHEET/BLOK                                                                            |               | 9/3   |               | CONT./FORTSBL                                                                                                                                          |               | 9/4        |               |          |               |
| GENERALL MILLS<br>PB 1542 1401E |               |        |               | CABLE DIAGRAM |               |                  |               |  |               |       |               | John Bean Technologies AB<br>Ruströdlingsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden<br>Tel: +46 (0) 42 490 4000<br>SE-251 09 Helsingborg, Sweden |               |            |               |          |               |

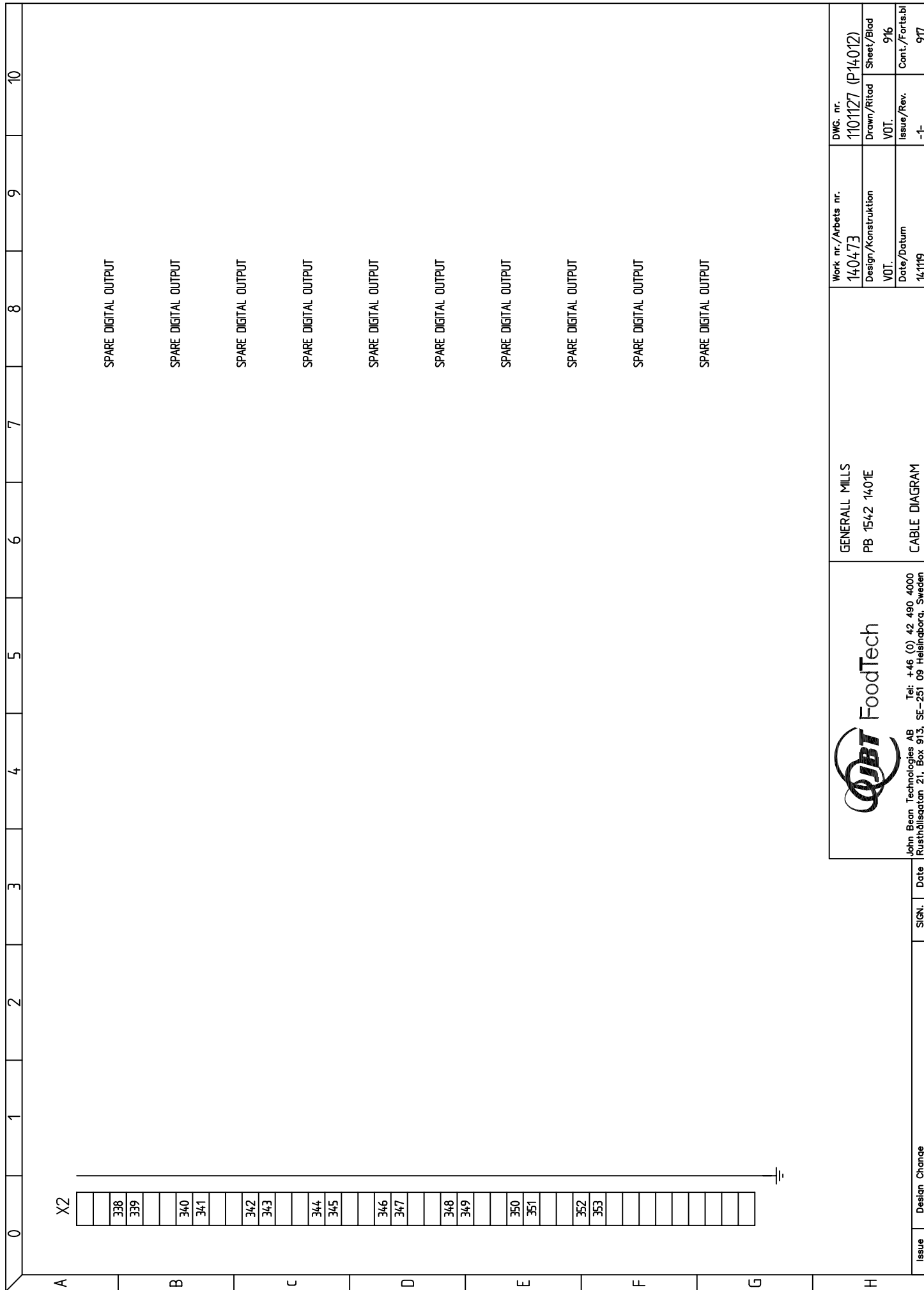


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|       |               |      |       |      |                                                                                        |                                                                                       |                                                  |                                                                                         |                                                                          |                                             |
|-------|---------------|------|-------|------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------|
| Issue | Design Change | Date | SIGN. | Date | John Bean Technologies AB<br>Rusthållsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden |  | GENERALL MILLS<br>PB 1542 1401E<br>CABLE DIAGRAM | Work nr./Arbets nr.<br>14.0473<br>Design/Konstruktion<br>VOT.<br>Date/Datum<br>14/11/19 | DWG. nr.<br>1101127 (P14012)<br>Drawn/Ritad<br>VOT.<br>Issue/Rev.<br>-1- | Sheet/Blod<br>9/14<br>Cont./Fortsbl<br>9/15 |
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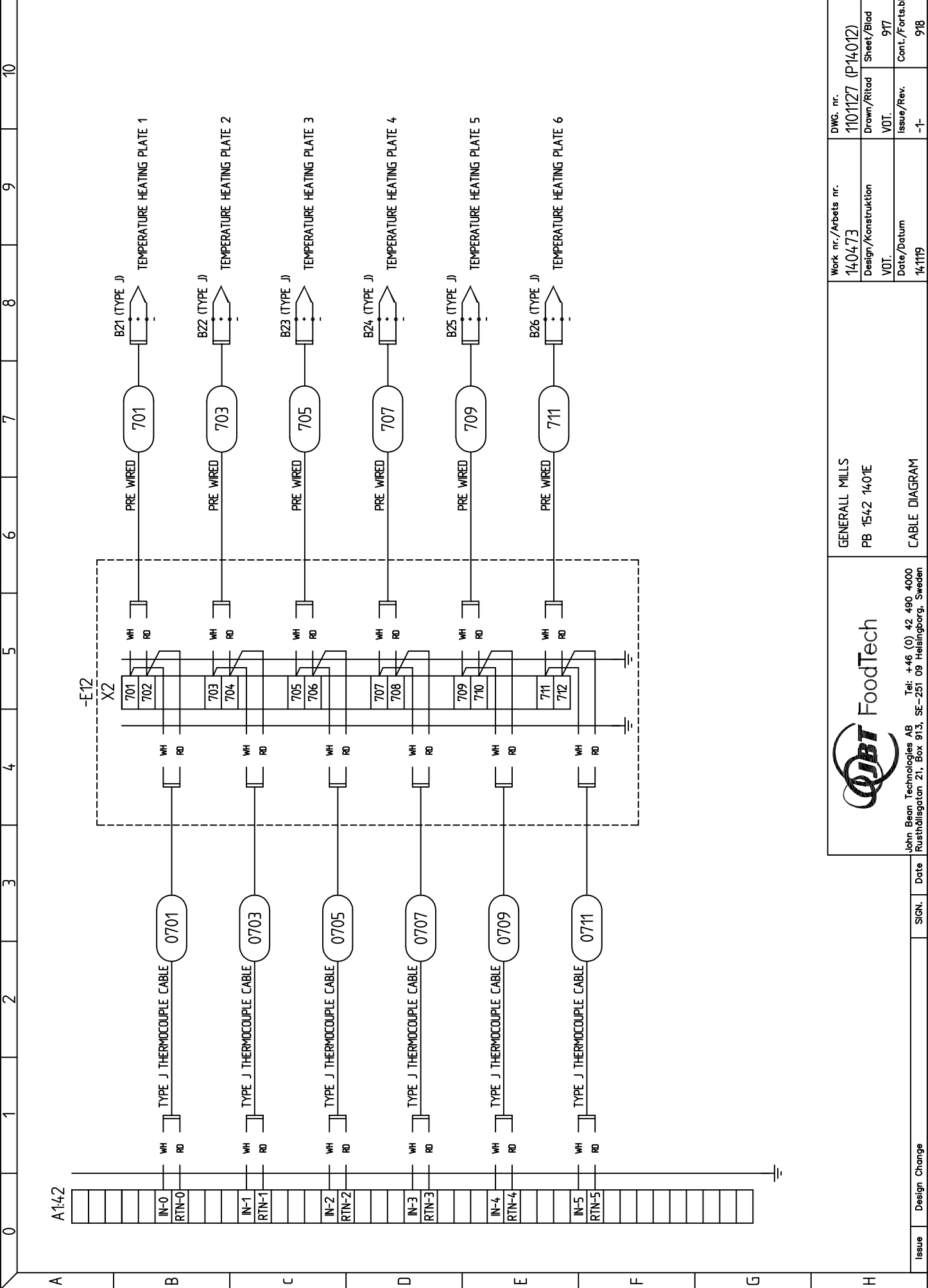






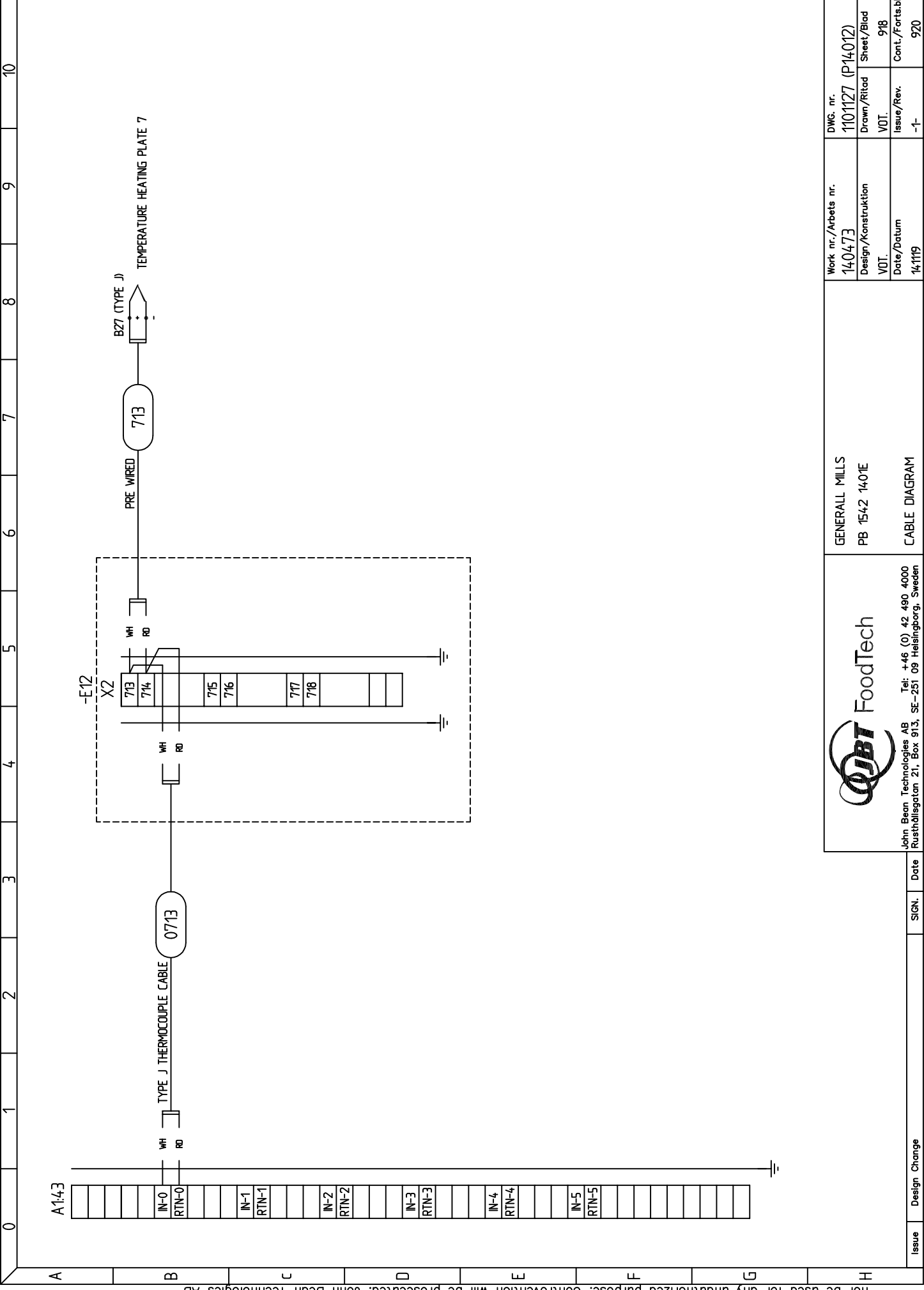
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| Date/Datum<br>14-11-19        | Issue/Rev.<br>-1-            |
| Sheet/Blad<br>916             | Cont./Fortsbl<br>917         |

|                                |                                                                                        |
|--------------------------------|----------------------------------------------------------------------------------------|
| GENERAL MILLS<br>PB 1542 1401E | John Bean Technologies AB<br>Rusthällsgatan 21, Box 913, SE-251 09 Helsingborg, Sweden |
| CABLE DIAGRAM                  | Tel: +46 (0) 42 490 4000                                                               |
|                                |                                                                                        |
| Issue                          | Design Change                                                                          |
| SIGN.                          | Date                                                                                   |



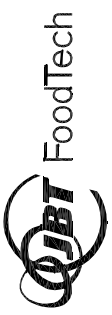
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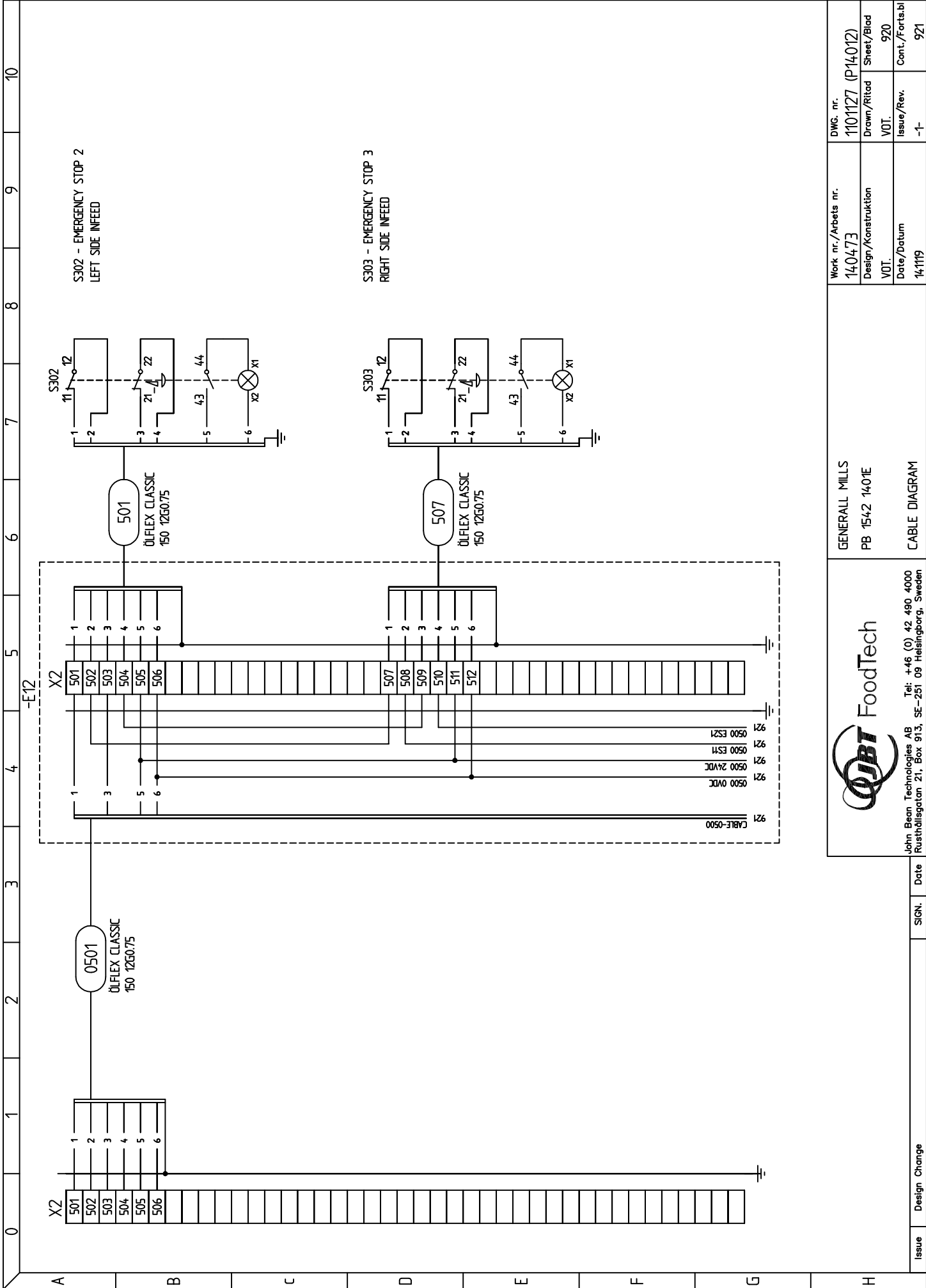
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| Work nr./Arbets nr.<br>14.0473                                                                                        | DWG. nr.<br>1101127 (P14012) |
|                                                                                                                       | Design/Konstruktion<br>VOT.  |
| Date/Datum<br>14/11/19                                                                                                | Issue/Rev.<br>-1-            |
|                                                                                                                       |                              |
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| GENERAL MILLS<br>PB 1542 1401E<br>CABLE DIAGRAM                                                                       |                              |
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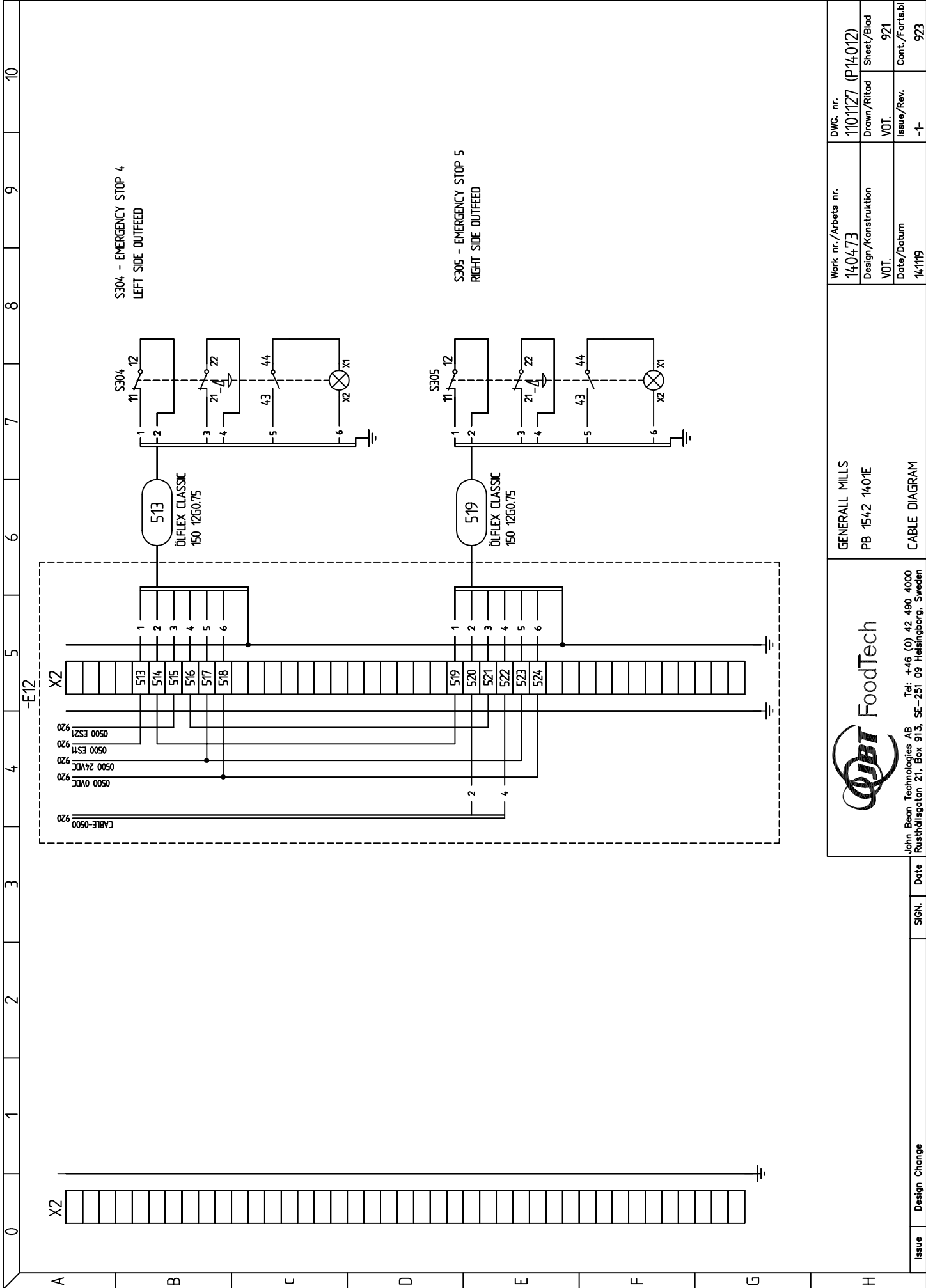
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| GENERALL MILLS<br>PB 1542 1401E<br>CABLE DIAGRAM                                                                   |               | Work nr./Arbets nr.<br>140473 |      |
| DWG. nr.<br>1101127 (P14012)                                                                                       |               | Drawn/Ritad<br>VOT. 918       |      |
| Design/Konstruktion<br>VOT.                                                                                        |               | Issue/Rev.<br>-1-             |      |
| Date/Datum<br>14-11-19                                                                                             |               | Cont./Fortsbl<br>920          |      |



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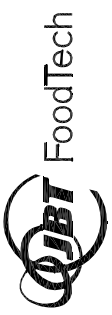
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| <b>Date/Datum</b><br>14-11-19                                                                                                 |  | <b>Issue/Rev.</b><br>-1-              | <b>Cont./Fortsbl</b><br>921         |
| <b>GENERALL MILLS</b><br>PB 1542 1401E                                                                                        |  | <b>CABLE DIAGRAM</b>                  |                                     |
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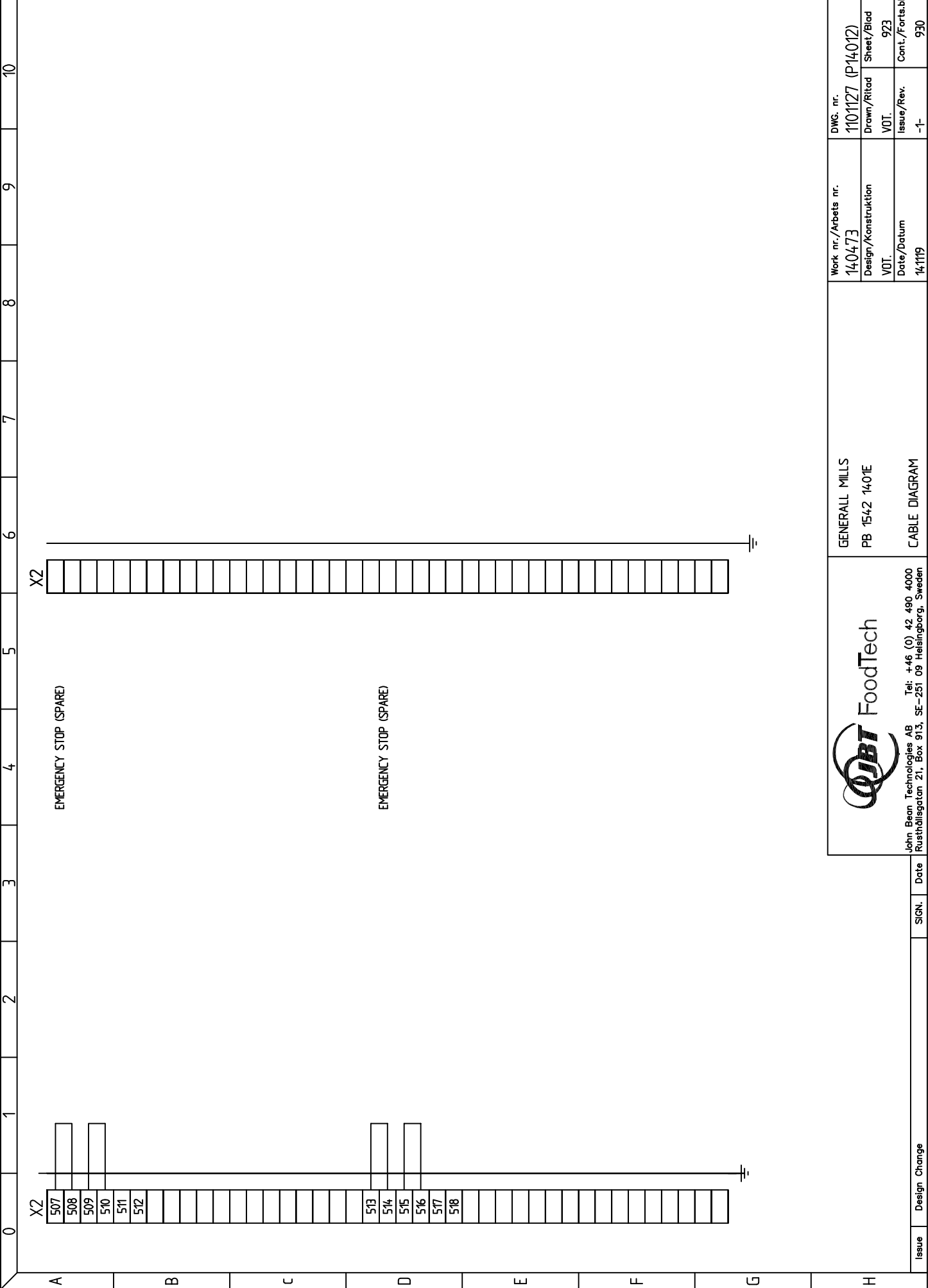
| Issue | Design Change | SIGN. | Date |
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S304 - EMERGENCY STOP 4  
LEFT SIDE OUTFEED

S305 - EMERGENCY STOP 5  
RIGHT SIDE OUTFEED

|                                                                                                                    |  |                                       |                                     |
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|                               |  | Work nr./Arbets nr.<br><b>14.0473</b> | DWG. nr.<br><b>1101127 (P14012)</b> |
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| CABLE DIAGRAM                                                                                                      |  | Date/Datum<br>14/11/19                | Issue/Rev.<br>-1-                   |
| GENERALL MILLS<br>PB 1542 1401E                                                                                    |  | Cont./Fortsbl<br>923                  |                                     |

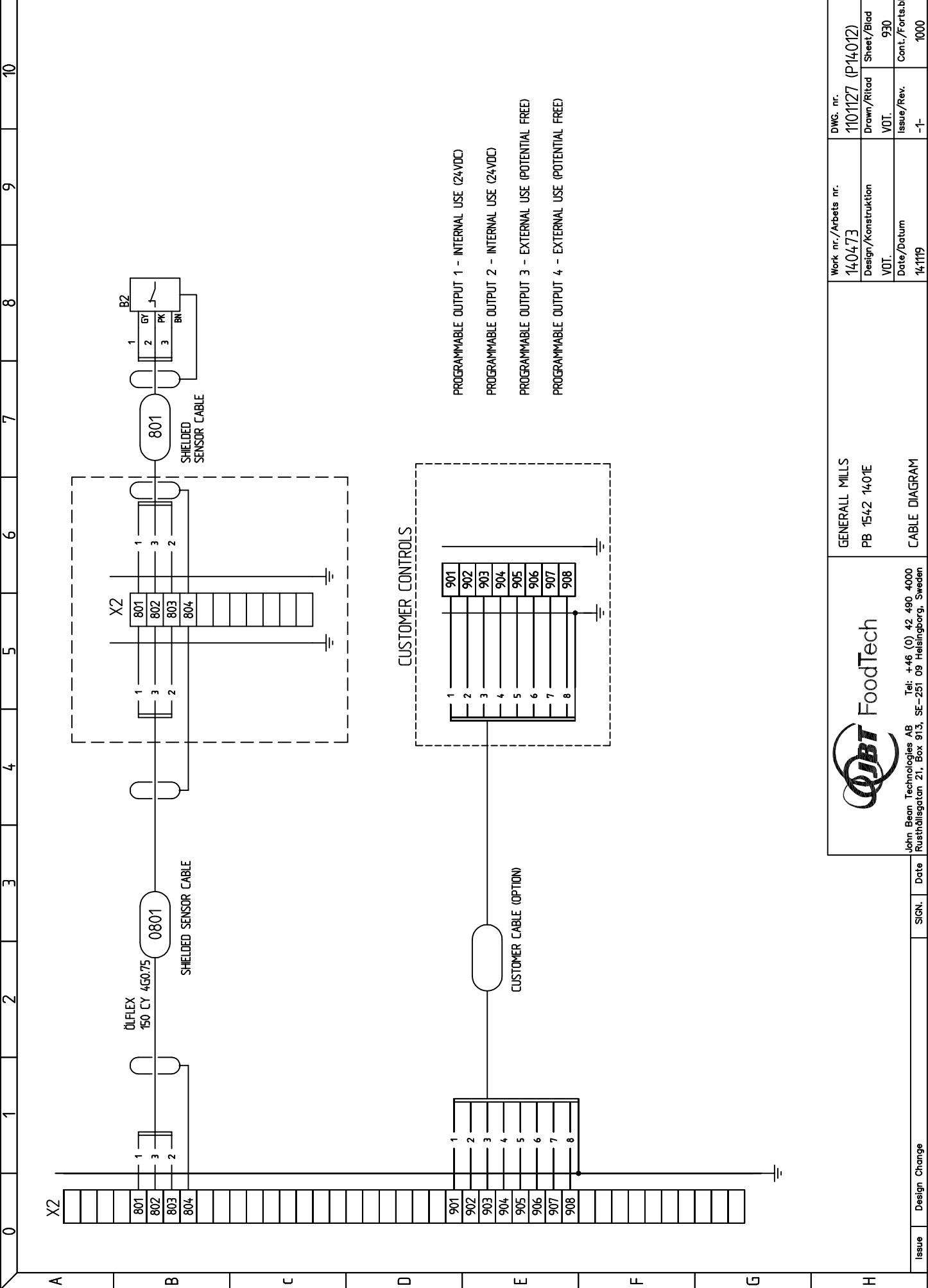


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GENERALL MILLS  
 PB 1542 1401E  
 CABLE DIAGRAM

|                     |                  |
|---------------------|------------------|
| Work nr./Arbets nr. | DWG. nr.         |
| 140473              | 1101127 (P14012) |
| Design/Konstruktion | Drawn/Ritad      |
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| Date/Datum          | Issue/Rev.       |
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|----|--------------------------|---|---|------------------------------------------------------|---|---|---|
| A  | B                        | C | D | E                                                    | F | G | H |
| X2 | 801<br>802<br>803<br>804 |   |   | 901<br>902<br>903<br>904<br>905<br>906<br>907<br>908 |   |   |   |

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|                     |                  |
|---------------------|------------------|
| Issue               | Design Change    |
| SIGN.               | Date             |
| CABLE DIAGRAM       |                  |
| PB 1542 1401E       |                  |
| GENERALL MILLS      |                  |
| Work nr./Arbets nr. | 140473           |
| Design/Konstruktion | VOT.             |
| Date/Datum          | 14-11-19         |
| Issue/Rev.          | -1-              |
| Sheet/Blad          | 930              |
| DWG. nr.            | 1101127 (P14012) |





# ***BELT REPAIR INSTRUCTIONS***



# Contents

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# 1

## Safety



This welding equipment may only be used for welding cooking belts with PTFE coating.



Always maintain a good ergonomic posture while operating the equipment. Use a two-handed grip on the welder when replacing the equipment in its stand after use.

**Note!** The stand is not a handle!



Check the cable before using the equipment. Worn or pinched cables must be replaced by qualified personnel.



Metal surfaces can be very hot. Watch your hands and wear suitable protective clothing when working with the equipment



This equipment fulfils all of the requirements specified in EU directives and standards.

## 2 Belt welding kit

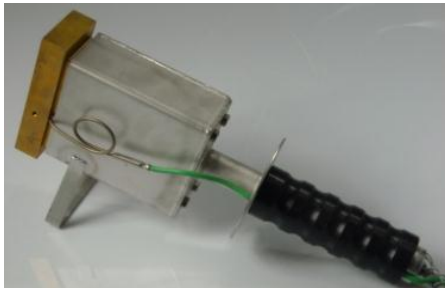
The belt welding kit consists of:



Welding plate



Electrical control box 380 °C (720 °F)



Welding iron

The welding iron shoe is available as a listed spare part item and replacements can be ordered from JBT Foodtech AB.



PTFE welding tape

## 3 Preparations

### Ventilation



When heated, PTFE belts release fumes and these must be ventilated. Where welding is carried out indoors, permanent extraction/ventilation systems must be installed to safely duct the fumes outside the building to prevent the spread of gases.

If a permanent system is impractical, or the work is of a temporary nature, a suitable mobile extractor must be used.



### Using the welding iron

Check the cable before using the equipment. Worn or pinched cables must be replaced by trained personnel.



Connect the unit to the power supply and allow the welding iron to reach the preset temperature of 380 °C (720 °F)..

### Quality control

1. Test-weld a grill belt off-cut, following the instructions.
2. Perform a pull-test to indicate the quality of the weld. Using a pair of pliers, pull the weld apart.
3. If the PTFE material will be seen to have been torn from the woven glass fiber substrate, this indicates a well-made weld.



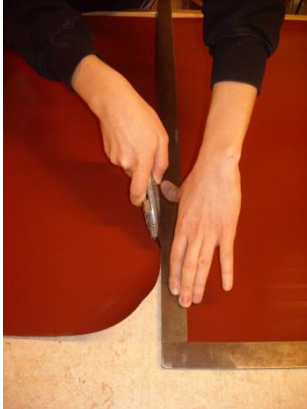
## 4

## Cutting the belt

Measure the length of belt required, including the overlap, and cut both ends identically using a set-square, a sharp knife and a wooden cutting board.

- When welding belts of ten metres and longer, the overlap allowed for the weld must be 40 mm using a 45 mm wide welding tape.
- For belts shorter than ten metres the overlap allowed for the weld must be 27 mm using a 32 mm welding tape.

It is vital that this procedure is performed with great precision. Use a pen and measuring tape to mark the position.



Position the set-square to trim the end at exactly 90°.



Trim approximately two millimetres from the corners.

### **Note!**

When fitting ready trimmed cooking belts supplied by JBT Foodtech, no trimming/cutting is required.

## 5 Positioning the belt

Place the welding plate in the position located on the machine. Position the belt so that the weld is in the center of the plate.

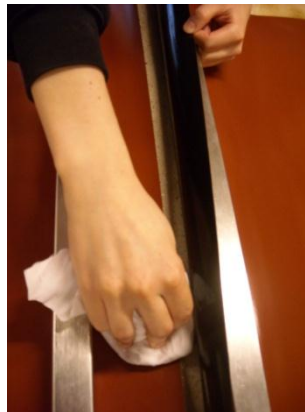


Carefully clean the surfaces to be welded with ethanol. Mechanically clean the welding iron contact surface.



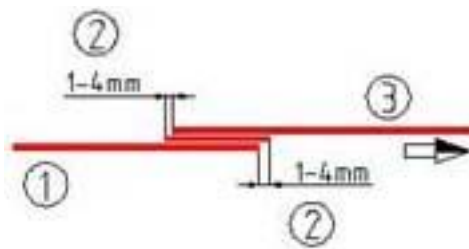
### **Caution!**

Follow Health & Safety procedures when using solvent-based products.

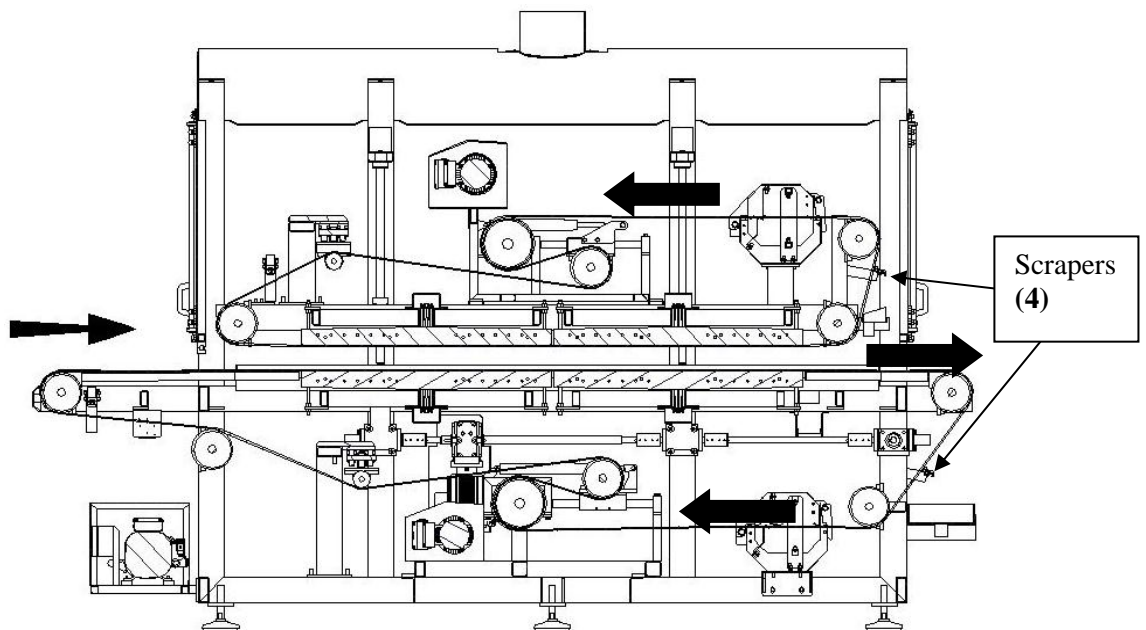




The belt is placed overlapped for welding.



1. Check the belt direction of travel (arrow) and secure the lower belt end (1).
2. Cut tape approx. 60 mm wider than the belt. Leave tape protruding on both sides.
3. Apply the **clean** welding tape to the surface with an overlap of **at least** 1 mm. (2).
4. Position the upper belt end (3) and secure, ensuring the surfaces to be welded is not under tension. Check that the welding tape is properly placed between the fixing clamps.



*Example of a machine, showing the belt direction (arrows).*



**Note!**

Observe the overlap in relation of the belt's direction of travel and the position of the scrapers (4) to ensure these do not catch and tear the weld.

## 6 Welding the joint



Always maintain an ergonomically suitable posture when working so as to minimize physical stress/loading. When finished, use both hands *on the handle* to place the welding iron back onto its stand.

### Note!

The stand is not intended for use as a grab-handle.

The welding iron is ready for use when it has reached the preset temperature of 380 °C (720 °F).



Begin working from center of the grill belt. Place the welding iron in the middle of the joint and press down lightly.

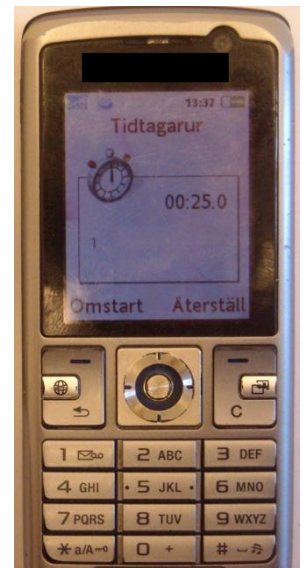
Hold the welding iron still for approx. 25 seconds

before sliding outwards, first to one side and then the other.

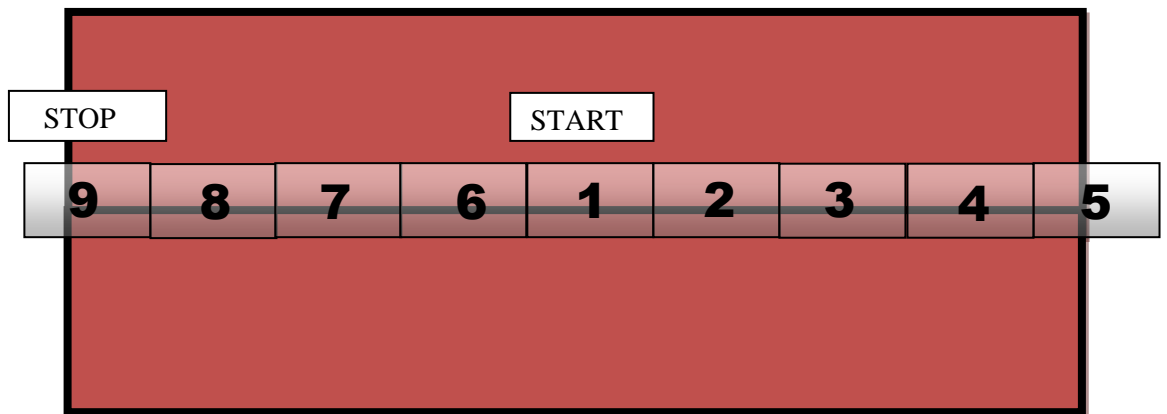
It is important to run the welding iron past the edges of the belt.

Once the weld is secure, TWO (2) more passes with the welding iron are required to ensure sufficient heat and pressure has reached every part of the joint.

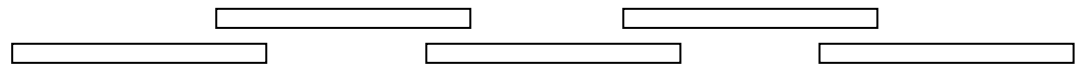
**Follow the instructions on next page.**



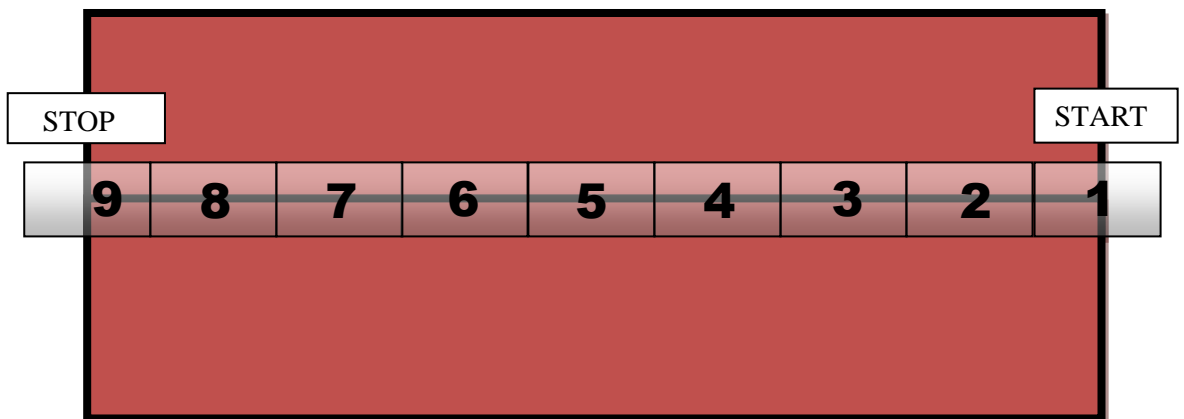
**Step 1:** Welding iron application sequences 'start' and 'stop' points. Move the welding iron according to figures 1 to 9 in figure below.



Overlap the welding iron 'footprint' as shown below. Hold the welding iron still for approx. 25 seconds at each welding point.



**Step 2:** When the band has been welded as per Step 1, continue by welding as shown below. Move the welding iron according to figures 1 to 9. Always overlap the welding iron footprints.



Repeat step 2 once more.  
A total of **three** welding sequences will have been made.

Finish the repair as follows:

1. When the weld has been made, the fixing clamps can be released and the welding plate removed.  
The welded joint should have a darker color than the grill belt.  
The welding tape will have melted into the joints, thus preventing seepage of fats into the joint during the grilling process.
2. Trim off any excess welding tape and clean the joint with chemically pure alcohol.



**Caution!**

Follow Health & Safety procedures when using solvent-based products.

3. The belt is now ready for use.

## 8 Repairing damages



### Repairing minor damage to a belt

The repair tape will have a different color on each side. The silver-gray side is laid against the cooking belt. No welding foil is required.

1. Thoroughly clean the damaged area of the belt with ethanol.
2. Using the welding iron, heat the damaged area for 20 seconds.
3. Roughen the area with sandpaper and wipe clean with a suitable solvent.
4. Cut off sufficient repair tape to cover the damaged area, allowing a 30 mm overlap.

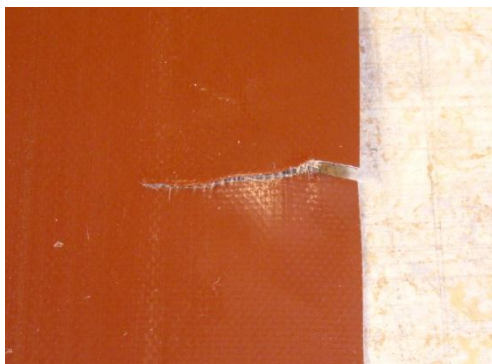
**Note!** Avoid cutting the tape in a way that leaves rough or uneven edges, which can be torn by the scraper.

5. Apply the welding iron for 45 seconds to weld the repair tape to the damaged area.
6. Check the patch. If any part is unsatisfactory attached, clean with ethanol and repeat step 5.



### Repairing damage to the edge of a belt

1. Cut off sufficient repair tape to cover the both the upper and lower surfaces and fold it over the edge of the belt.
2. Weld as described above.

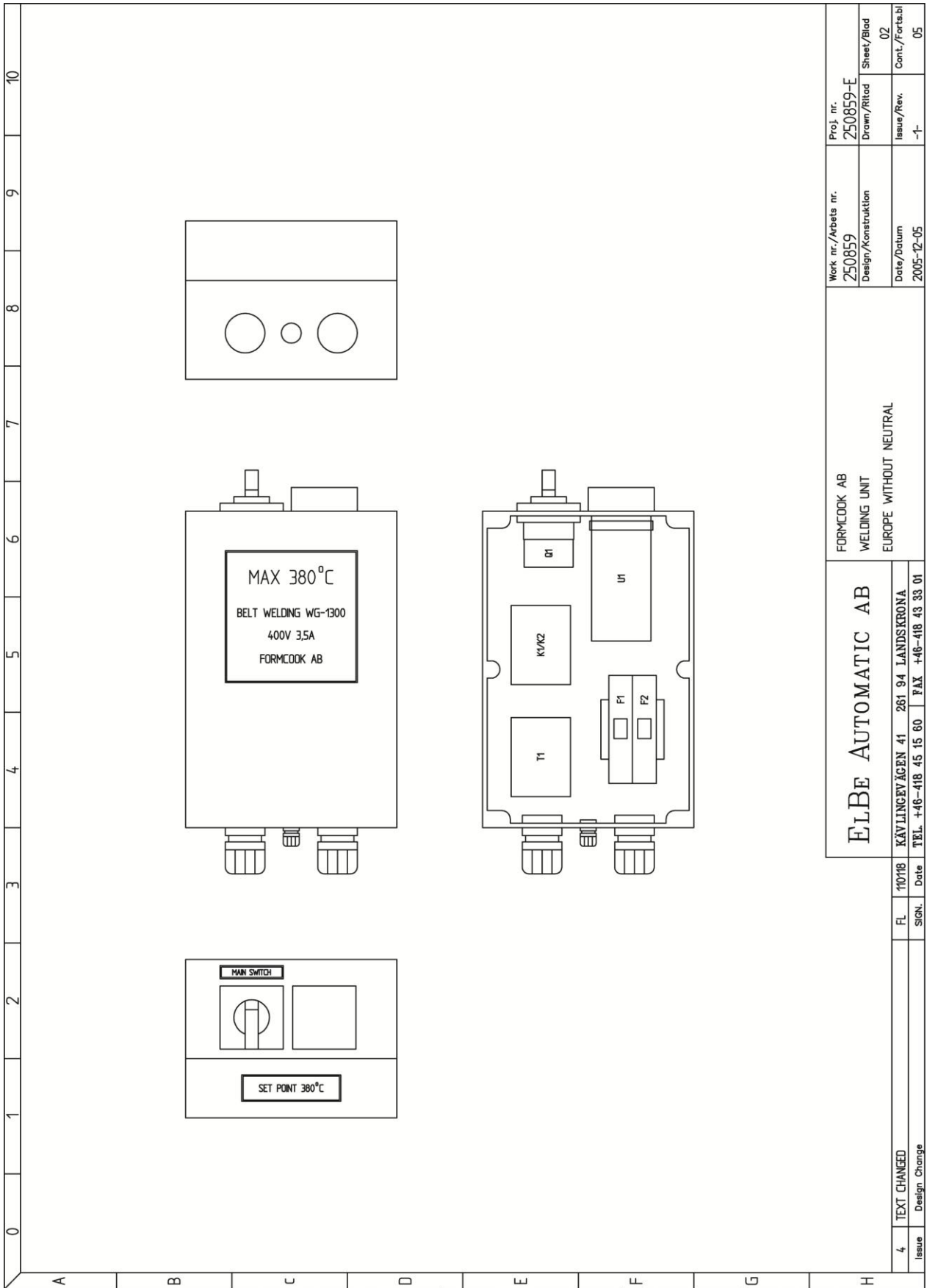




## 9 Electrical / Wiring diagrams

| 0 | 1                                            | 2                            | 3                                               | 4                                 | 5                                          | 6 | 7 | 8 | 9                             | 10                                    |                                                          |
|---|----------------------------------------------|------------------------------|-------------------------------------------------|-----------------------------------|--------------------------------------------|---|---|---|-------------------------------|---------------------------------------|----------------------------------------------------------|
| A | INTERNAL CONN.WIRE /<br>INTERN KOPPLINGSTRÅD |                              |                                                 |                                   |                                            |   |   |   |                               |                                       |                                                          |
| B | POWER / KRAFT                                |                              | RK                                              | BLACK / SVART<br>BLUE / BLÅ       | PHASE / FAS<br>NEUTRAL / NOLLA             |   |   |   |                               |                                       | 2X400V AC + N                                            |
| C | CONTROL / MANÖVER AC                         |                              | RK 0,75<br>RK 0,75                              | RED / RÖD<br>GREY / GRÅ           | PHASE / FAS<br>NEUTRAL / NOLLA             |   |   |   |                               |                                       | 50HZ                                                     |
| D | CONTROL / MANÖVER DC                         |                              | RK 0,75<br>RK 0,75                              | DARKBLUE / MÖRKBLÅ<br>WHITE / VIT | +<br>-                                     |   |   |   |                               |                                       | FULL LOAD AMPERE RATING /<br>STRÖM VID FULL LAST<br>3,5A |
| E | EXTERNAL SIGNALS /<br>EXTERNA SIGNALER       |                              | RK 0,75                                         | ORANGE / ORANGE                   |                                            |   |   |   |                               | LARGEST MOTOR /<br>STÖRSTA MOTOR<br>- |                                                          |
| F | FERRULES / ÄNDHYLSOR                         |                              | POWER / KRAFT ( > RK 2,5 )<br>CONTROL / MANÖVER |                                   |                                            |   |   |   | MAX FUSE / MAX SÄKRING<br>16A |                                       |                                                          |
| G |                                              |                              |                                                 |                                   |                                            |   |   |   |                               |                                       |                                                          |
| H | 4                                            | PAGE (01)02.03.20 CHANGED    | FL                                              | 10/18                             | ELBE AUTOMATIC AB                          |   |   |   |                               |                                       | FORMCOOK AB<br>WELDING UNIT<br>EUROPE WITHOUT NEUTRAL    |
| I | 3                                            | PAGE (01)03.05.11.20 CHANGED | PZ                                              | 06/024                            | KÄVYLINGEVÄGEN 41 261 94 LANDSKRONA        |   |   |   |                               |                                       | 250859<br>Design/Konstruktion                            |
| J | 2                                            | PAGE 03 CHANGED              | PZ                                              | 06/0201                           | TEL. +46-418 45 15 80 FAX +46-418 43 33 01 |   |   |   |                               |                                       | 250859-E<br>Drawn/Ritad                                  |
| K | Issue                                        | Design Change                | SIGN.                                           | Date                              | 2005-12-05                                 |   |   |   |                               |                                       | Issue/Rev.<br>-4-                                        |
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| 4     |  | TEXT CHANGED  | FL    | 110718 | Date | KÄVLINGEVÄGEN 41 261 94 LANDSKRONA         |  | ELBE AUTOMATIC AB      |  | FORMCOOK AB            |  | Work nr./Arbets nr. |  | 250859     |  | Proj. nr.      |  | 250859-E   |  |
| Issue |  | Design Change | Sign. |        |      | TEL. +46-418-45 15 60 FAX +46-418 43 33 01 |  | EUROPE WITHOUT NEUTRAL |  | WELDING UNIT           |  | Date/Datum          |  | 2005-12-05 |  | Drawn/Ritad    |  | Sheet/Blad |  |
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| REV. | POS.  | PSL/ST | ITEM/BENÄMNING    | MANUFACTURER/TILVERKARE | TYP                | DATA                          | REV/ANN    |
|------|-------|--------|-------------------|-------------------------|--------------------|-------------------------------|------------|
| 4    |       | 1      | BOX               | WEDMILLER               |                    | 160x240x120                   | PLASTIC    |
|      |       | 1      |                   | ELBE                    |                    | 6A 2002 04 16                 | STAINLESS  |
|      |       | 1      |                   | ELBE                    |                    | 6A 2002 04 17                 | STAINLESS  |
|      |       | 1      | HANDEL            | ELBE                    |                    |                               | PLASTIC    |
| 4    |       | 4      | DISTANCE          | ELBE                    |                    |                               | STAINLESS  |
| 4    |       | 1      | CRIMP HOSE        | WHOLESALE               | KYMAR 3/8          | E07 761 62                    |            |
| 4    |       | 1      | ISOLATION         | ELBE                    |                    |                               |            |
| 4    |       | 1      | HEATER            | CALMEKS                 |                    | 3x450W / 115V ( FORMCOOK )    |            |
| 4    | F1    | 1      | AUTOMATIC FUSE    | WHOLESALE               | C6 A               | E21 T22 12                    |            |
| 4    | F2    | 1      | AUTOMATIC FUSE    | WHOLESALE               | C6 A               | E21 T22 12                    |            |
| 4    | K1-K2 | 2      | SOLID STATE RELAY | JUMO                    | TYA 432-45 / 50660 | 004-08537                     | 4-32Vdc    |
| 3    | Q1    | 1      | SWITCH            | KRAUS & NAIMER          | CH10 A201-607 E-V  |                               |            |
| 4    | U1    | 1      | TEMP REGULATORY   | JUMO                    | dTRON 16.1         | 004-90032                     | 110-240Vac |
|      | T1    | 1      | TRANSFORMER       | TRAND                   | DF5a 25            | 1200-04789                    | 25VA       |
|      | TS1   | 1      | TEMP SENSOR       | JUMO                    |                    | 000 6844 1                    | 110-240Vac |
| 4    |       | 1      | EXTENSION         | WHOLESALE               | 416 PG             | E19 600 33                    |            |
| 4    |       | 3m     | EXTENSION CABEL   | WHOLESALE               | H07RN-F            | E05 307 20                    |            |
|      |       | 25m    | CABEL             | MILTRONIC               | 104221             | 70.3011/10-043-000-101-23/061 | 110-240Vac |
| 4    |       | 1      | CABEL GLAND       | KAMIC                   | SR 040/PG          |                               |            |
| 3    |       | 2      | CABEL GLAND       | SKINTOP                 | M20                |                               |            |
| 3    |       | 1      | CABEL GLAND       | SKINTOP                 | M12                |                               |            |
| 3    |       | 2      | EARTH TERMINAL    | WELAND                  | WK SL U 4          |                               |            |
| 4    |       | 1      | TERMINAL          | WELAND                  | WK 4               |                               |            |
| 4    |       | 1      | END SUPPORT WHITE | WELAND                  |                    |                               |            |
| 4    |       | 1      | EXTENSION         | NELCO                   | B4 SK              | 08 452 08                     |            |

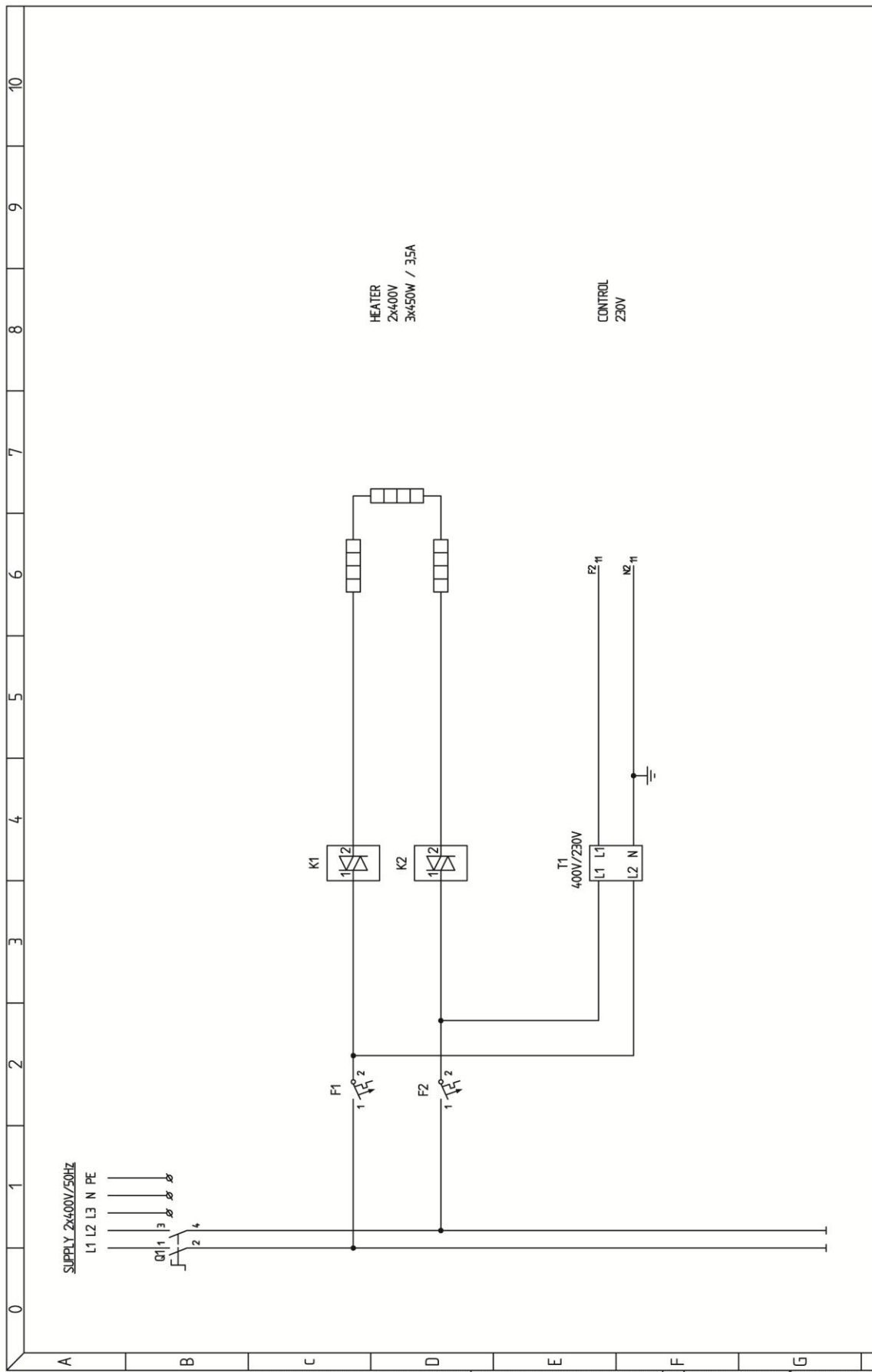
  

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| WELDING UNIT           |  | Design/Konstruktion | 250859     | Drawn/Ritad | Sheet/Bild      |
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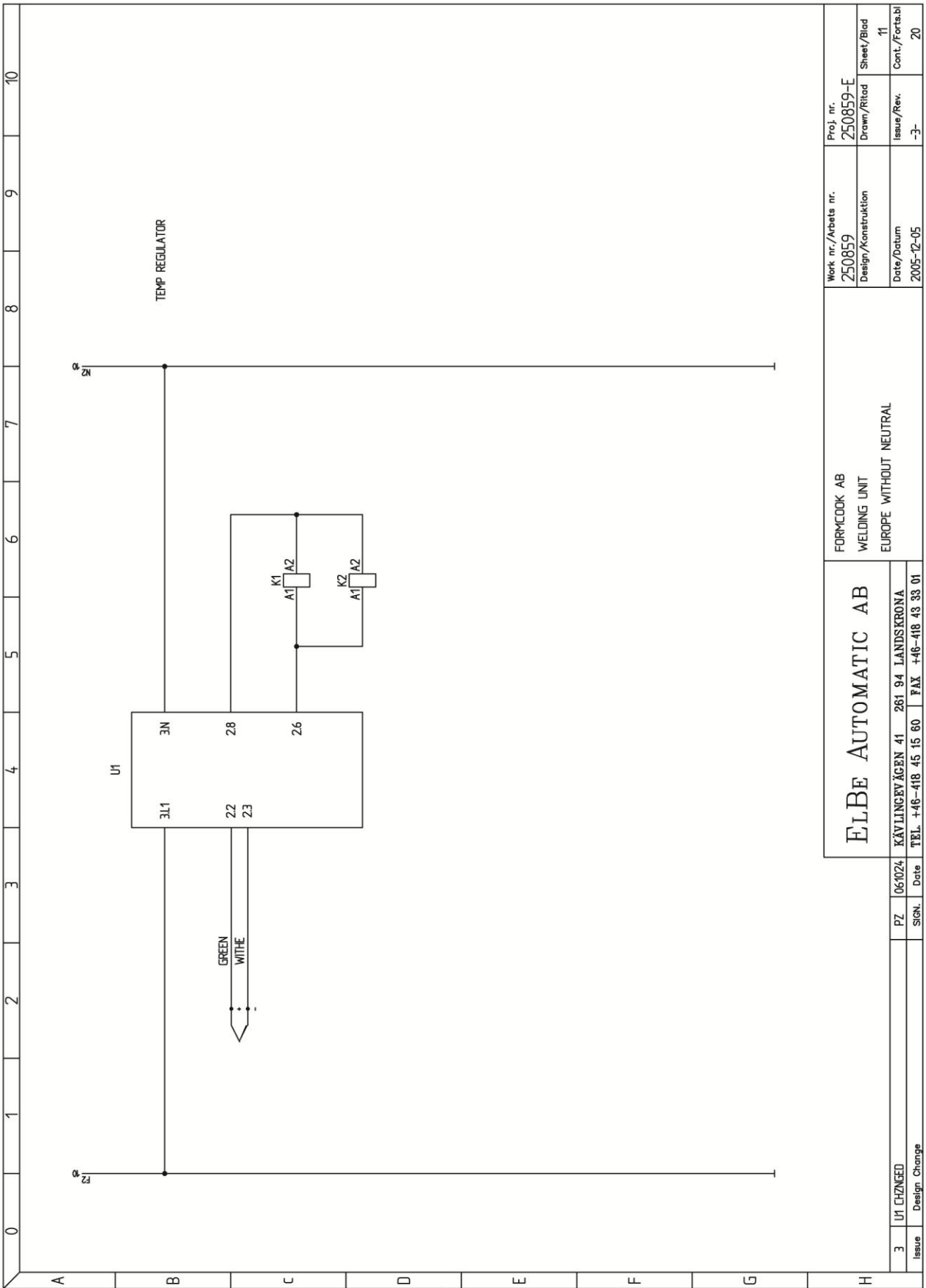
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| 4                 | TEXT CHANGED                          | PZ   | 061024 |
| 3                 | Q1 CABLE GLANDS AND TERMINALS CHANGED | PZ   | 060201 |
| 2                 | T1 ADDED                              | SGN. | Date   |
| Issue             | Design Change                         |      |        |

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| FORMCOOK AB           |  | WELDING UNIT         |  | EUROPE WITHOUT NEUTRAL   |  | Work nr./Arbets nr.<br>250859   |  |
| ELBE AUTOMATIC AB     |  | KÄVLINGEVÄGEN 41     |  | 281 94 LANDSKRONA        |  | Proj. nr.<br>250859-E           |  |
| TEL. +46-418 45 15 60 |  | FAX +46-418 43 33 01 |  | Date/datum<br>2005-12-05 |  | Drawn/Ritad<br>Sheet/Blad<br>10 |  |
|                       |  |                      |  | Issue/Rev.<br>-1-        |  | Cont./Fortstabi<br>11           |  |



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|       |  |               |       |  |        |                        |  |                      |  |                     |  |                     |  |                |  |
|-------|--|---------------|-------|--|--------|------------------------|--|----------------------|--|---------------------|--|---------------------|--|----------------|--|
| 3     |  | U1 CHANGED    | PZ    |  | 061024 | KÄVINGEVÄGEN 41        |  | 281 94 LANDSKRONA    |  | FORMCOOK AB         |  | Work nr./Arbets nr. |  | Proj. nr.      |  |
| Issue |  | Design Change | SIGN. |  | Date   | TEL. +46-418 45 15 60  |  | FAX +46-418 43 33 01 |  | WELDING UNIT        |  | 250859              |  | 250859-E       |  |
|       |  |               |       |  |        | EUROPE WITHOUT NEUTRAL |  |                      |  | Design/Konstruktion |  | Drawn/Ritad         |  | Sheet/Blad     |  |
|       |  |               |       |  |        |                        |  |                      |  | Date/Datum          |  | Issue/Rev.          |  | Cont./Forts.bl |  |
|       |  |               |       |  |        |                        |  |                      |  | 2005-12-05          |  | -3-                 |  | 11             |  |
|       |  |               |       |  |        |                        |  |                      |  |                     |  |                     |  | 20             |  |

U1

| REV. | PNR. | SET | REMARK | REV. | PNR. | SET | REMARK | REV. | PNR. | SET | REMARK | REV. | PNR. | SET | REMARK |
|------|------|-----|--------|------|------|-----|--------|------|------|-----|--------|------|------|-----|--------|
|      | SCL  | 0   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | SCH  | 100 |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | SPL  | 0   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | SPH  | 400 |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | OFFS | 0   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | Pb.1 | 11  |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | df   | 7   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | r1   | 29  |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | CY1  | 59  |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | HYS1 | 1   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | Y0   | 0   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | Y1   | 100 |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | Y2   | 100 |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | df   | 1.3 |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | SP1  | 380 |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | SP2  | 0   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | SENS | 4   |        |      |      |     |        |      |      |     |        |      |      |     |        |
|      | LIN  | 12  |        |      |      |     |        |      |      |     |        |      |      |     |        |

|       |                  |        |    |        |      |  |
|-------|------------------|--------|----|--------|------|--|
|       | FL               | 110118 | PZ | 06/024 | Date |  |
| 4     | TEXT CHANGED     |        |    |        |      |  |
| 3     | SETTINGS CHANGED |        |    |        |      |  |
| Issue | Design Change    |        |    |        |      |  |

|  |                          |                      |                               |
|--|--------------------------|----------------------|-------------------------------|
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|  |                          |                      | Work nr./Arbets nr.<br>250859 |
|  |                          |                      | Design/Konstruktion           |
|  |                          |                      | Date/Datum<br>2005-12-05      |
|  |                          |                      | ProJ. nr.<br>250859-E         |
|  |                          |                      | Drawn/Ritad                   |
|  |                          |                      | Issue/Rev.<br>-4-             |
|  |                          |                      | Sheet/Blad<br>20              |
|  |                          |                      | Cont./Forts.bl<br>-           |

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# ORIGINAL EQUIPMENT MANUFACTURER'S MANUAL



0000-09-01GB-00-00





# P3-topax<sup>®</sup> 17

**Description:** Liquid, alkaline cleaning agent for foam cleaning in the food industry

**Product strengths:**

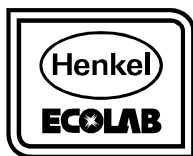
- excellent properties for the removal of fat, grease and protein
- good rinsing properties

## Properties

|                              |                             |                                                                    |                                              |
|------------------------------|-----------------------------|--------------------------------------------------------------------|----------------------------------------------|
| <b>Concentrate</b>           | <b>Appearance:</b>          | clear, colourless to yellowish liquid *                            |                                              |
|                              | <b>Storage stability:</b>   | 0 - 40 °C                                                          |                                              |
|                              | <b>Solubility:</b>          | at 20 °C miscible with water in any proportion                     |                                              |
|                              | <b>Density:</b>             | 1.05 - 1.09 g/cm <sup>3</sup> (at 20 °C)*                          |                                              |
|                              | <b>P content:</b>           | 0.0 %                                                              |                                              |
|                              | <b>N content:</b>           | 0.5 %                                                              |                                              |
|                              | <b>COD:</b>                 | 92 - 112 mg O <sub>2</sub> /g                                      |                                              |
|                              | <b>Flash point:</b>         | not applicable                                                     |                                              |
|                              | <b>Application solution</b> | <b>pH:</b>                                                         | 11.5 - 11.9<br>(1 %, 25 °C, deionized water) |
|                              |                             | <b>Conductivity:</b>                                               | 1.5 mS/cm<br>(1 %, 25 °C, deionized water)   |
| <b>Titration:</b>            |                             | 3.5 - 3.8 ml *<br>(50 ml 1 % solution; 0.1 n HCl; phenolphthalein) |                                              |
| <b>Foam characteristics:</b> |                             | strongly foaming,<br>not suitable for CIP-systems                  |                                              |

\* Parameters subject to incoming goods control

- **Material compatibility:** P3-topax 17 is, under the application conditions described below, compatible with stainless steel, mild steel (St 37/2), aluminium and galvanized surfaces
- **Metals**
- **Others** ceramic surfaces



## Application

**P3-topax 17** is especially suitable for the removal of fat, grease and protein residues.

1. **Pre-rinse** with water at 40 - 60 °C for removal of rough soil
2. **Foam** all surfaces with a 2 - 5 % **P3-topax 17** solution  
Contact time: 10 - 20 minutes
2. **Final rinse** with water at 40 - 60 °C, ensuring all foam and soil is completely removed

## Monitoring

### Concentration determination

- **Titration**

|                     |                            |
|---------------------|----------------------------|
| Receiving flask:    | 50 ml application solution |
| Titration solution: | 0.1 n HCl                  |
| Indicator:          | Phenolphthalein            |
| Titration factor:   | 0.28                       |

Volume added in ml x 0.28 = (by wt.) %  
**P3-topax 17**

- **Conductivity** Specific conductivity of **P3-topax 17**

### P3-System

For the application of **P3-topax 17** we recommend using the **P3-TOPAX HYGIENE SYSTEM**:

- solid unit for rinsing, foaming and disinfecting in the pressure area of 25 bar
- demand-oriented, adjustable dosage
- easy to apply and to maintain

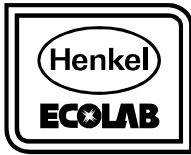
Our P3-System brochures are available on request.

## Safety

**P3-topax 17** is labelled as "irritating" (symbol "Xi")

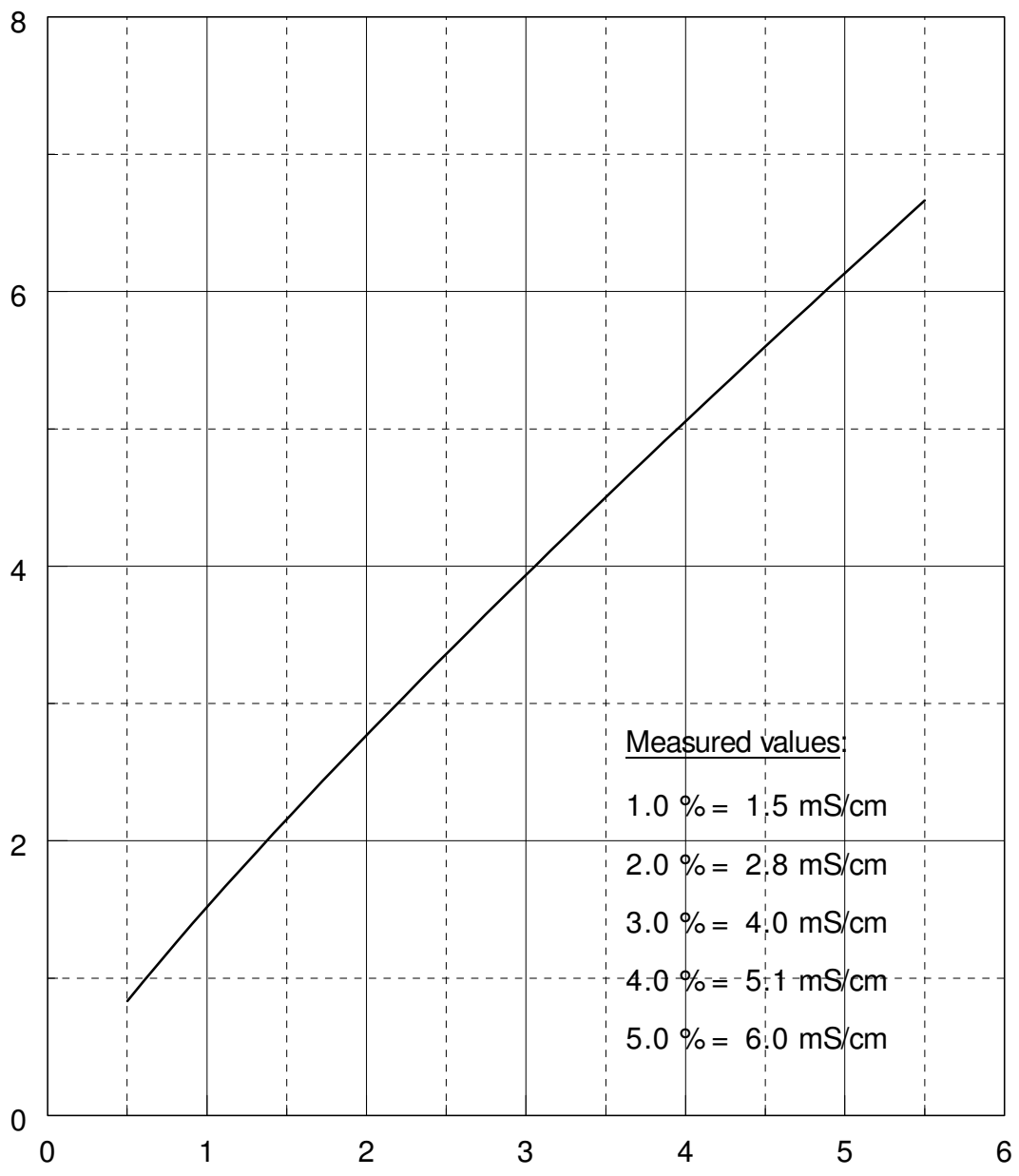
The relevant risk and safety phrases are given in the EC Safety Data Sheet. We recommend our safety concept "P3 - immer auf Nr. Sicher" (P3 - safety first) as an aid to training your employees in how to handle cleaning agents and disinfectants safely. We will be glad to answer any questions you may have in this context.





**P3-topax 17**  
Specific conductivity (25 °C, 0 ‰)

Conductivity [mS/cm]



Concentration in %

The information in this brochure corresponds to our current knowledge and experience and describes the characteristic features for the ordinary use of **P3-topax 17**. It is not legally binding assurance of defined properties or of the suitability for a definite purpose. Further, in view of numerous parameters that can influence the use of our products, it does not exonerate the user from liability for finding out the suitability of the products and the corresponding safety measures to be taken. Moreover, a possible infringement of patent rights must be avoided.



# P3-topax<sup>®</sup> 36

**Description:** Liquid, highly alkaline cleaning agent for the removal of greasy and smoke resin residues in the food industry

- Product strengths:**
- especially suitable for the removal of heavy fat and smoke resin residues
  - highly effective against fat and protein residues
  - foam-persistent
  - economical dosage

## Properties

|                             |                              |                                                                    |
|-----------------------------|------------------------------|--------------------------------------------------------------------|
| <b>Concentrate</b>          | <b>Appearance:</b>           | clear, brown liquid *                                              |
|                             | <b>Storage stability:</b>    | 0 - 40 °C                                                          |
|                             | <b>Solubility:</b>           | at 20 °C miscible with water in any proportion                     |
|                             | <b>Density (20 °C):</b>      | 1.36 - 1.40 g/cm <sup>3</sup> *                                    |
|                             | <b>P content:</b>            | 0.03 %                                                             |
|                             | <b>N content:</b>            | 0.00 %                                                             |
|                             | <b>COD:</b>                  | 104 - 124 mg O <sub>2</sub> /g                                     |
|                             | <b>Flash point:</b>          | not applicable                                                     |
| <b>Application solution</b> | <b>pH:</b>                   | 12.7 - 13.1<br>(1 %, 20 °C, deionized water)                       |
|                             | <b>Conductivity:</b>         | 16.9 mS/cm<br>(1 %, 20 °C, deionized water)                        |
|                             | <b>Titration:</b>            | 7.9 - 8.9 ml *<br>(50 ml 1 % solution; 0.5 n HCl; phenolphthalein) |
|                             | <b>Foam characteristics:</b> | foaming,<br>not suitable for CIP-systems                           |

\* Parameter subject to incoming goods control

|                                |                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------|
| <b>Material compatibility:</b> | <b>P3-topax 36</b> is, under the application conditions described below, compatible with |
| • <b>Metals</b>                | austenitic CrNi steels (quality at least DIN 1.4301 = AISE 304)                          |
| • <b>Plastics</b>              | PE, PP, rigid PVC (DIN 8061/62)                                                          |
| • <b>Others</b>                | ceramics                                                                                 |

## Application

- **Smokehouses**
  1. A 3 - 5 % **P3-topax 36** cleaning solution is **sprayed, foamed** or **fogged** on by (automated) cleaning equipment at 70 - 90 °C
  2. Contact time 20 - 40 minutes. During this process, the environmental air should circulate at a temperature of 80 - 90 °C by use of wet steam
  3. After cleaning, rinse with water, ensuring all soil and foam is completely removed
  
- **Cooking vats/fryers**
  1. Pre-rinse with water at 50 - 70 °C
  2. Fill the containers with a 1 - 3 % **P3-topax 36** solution
  3. Heat the solution to 60 - 80 °C
  4. Contact time 15 - 30 minutes at this temperature level
  5. After draining, the containers should be thoroughly rinsed
  
- **Daily maintenance**
  1. Foam with a 3 - 5 % **P3-topax 36** solution
  2. Contact time 15 - 30 minutes
  5. Final rinse with water at 40 - 60 °C

## Important indications !

- Effluent, containing chemicals, must only be discharged according to the local regulations
- Chemicals containing effluent must only be discharged into the biological treatment station after passing the neutralization- and buffer tank
- When discharging chemically polluted effluent, it is essential to pay specific attention to the bacteria toxicity of this water. This is especially important when dealing with biocide containing effluents and anaerobic sewage plants
- In case of doubt please seek advice from our technical service

# Monitoring

## Concentration determination

- **Titration**

|                     |                            |
|---------------------|----------------------------|
| Receiving flask:    | 50 ml application solution |
| Titration solution: | 0.5 n HCl                  |
| Indicator:          | Phenolphthalein            |
| Titration factor:   | 0.119                      |

Volume added in ml x 0.119 = (by wt.) % **P3-topax 36**

- **Conductivity** Specific conductivity of **P3-topax 36**

## P3-System

For automatic cleaning we recommend our **P3-MAXXI FOAMER** for smoke chambers. A dosage pump for **P3-topax 36** provides an excellent formation and dispersion of the foam at a shortened cleaning time.

The dosage of **P3-topax 36** solutions from preparation vessels can be carried out volume-proportional to the water flow and conductivity-controlled. We recommend the use of **P3-Elados EMP** diaphragm pumps for metering and for control and phase separation of the **P3-topax 36** solution the use of **P3-LMI 01** inductive conductivity meters.

For the manual application of **P3-topax 36** we recommend using our **P3-MAXXI FOAMER**:

- solid unit for rinsing, foaming and disinfecting in the pressure area of 25 bar
- demand-oriented, adjustable dosage
- easy to apply and to maintain

Our P3-System brochures are available on request.

## Safety

**P3-topax 36** is labelled as "corrosive" (symbol "C"); it contains sodium hydroxide and potassium hydroxide

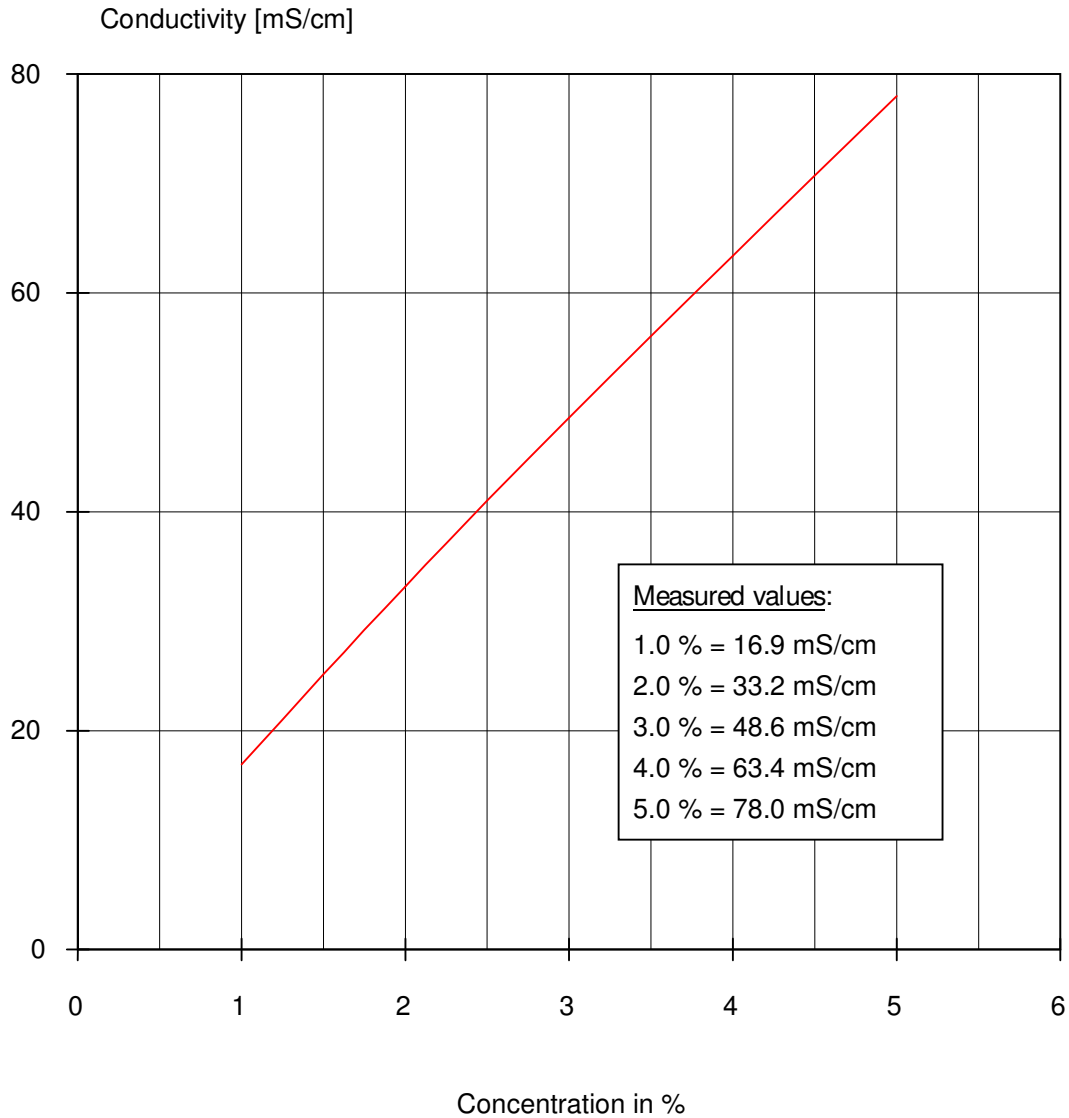
## INDICATION!

During cleaning and sanitizing operations, especially when using **high pressure systems**, misting can occur. These aerosols produced consist of a fine water mist and the applied chemical. Inhalation of such aerosol mist must be avoided. Wearing a respirator is imperative.

The relevant risk and safety phrases are given in the EC Safety Data Sheet. We recommend our safety concept "P3 - immer auf Nr. Sicher" (P3 - safety first) as an aid to training your employees in how to handle cleaning agents and disinfectants safely. We will be glad to answer any questions you may have in this context.

## P3-topax 36

Specific conductivity (20 °C, 0 ‰)  
Temperature coefficient:  $\alpha$ : 1.91 % / °C



The information in this brochure corresponds to our current knowledge and experience and describes the characteristic features for the ordinary use of **P3-topax 36**. It is not legally binding assurance of defined properties or of the suitability for a definite purpose. Further, in view of numerous parameters that can influence the use of our products, it does not exonerate the user from liability for finding out the suitability of the products and the corresponding safety measures to be taken. Moreover, a possible infringement of patent rights must be avoided.

(Version January 2002)



# P3-topax<sup>®</sup> 99

**Description:** Liquid, slightly alkaline, foaming, alkylamine acetate-based disinfectant for the food industry

- Product strengths:**
- visual control by foam disinfection
  - good bactericidal and fungicidal efficacy
  - good performance also at low temperatures
  - universally applicable
  - DVG-registered

## Properties

|                             |                              |                                                   |
|-----------------------------|------------------------------|---------------------------------------------------|
| <b>Concentrate</b>          | <b>Appearance:</b>           | clear, yellowish liquid *                         |
|                             | <b>Storage stability:</b>    | 0 - 50 °C                                         |
|                             | <b>Solubility:</b>           | at 20 °C miscible with water in any proportion    |
|                             | <b>Density:</b>              | 0.99 - 1.01 g/cm <sup>3</sup> (at 20 °C) *        |
|                             | <b>P content:</b>            | 0.0 %                                             |
|                             | <b>N content:</b>            | 1.4 %                                             |
|                             | <b>COD:</b>                  | 401 - 441 mg O <sub>2</sub> /g                    |
| <b>Application solution</b> | <b>Flash point:</b>          | not applicable                                    |
|                             | <b>pH:</b>                   | 8.6 - 9.0<br>(1 %, 20 °C, deionized water)        |
|                             | <b>Conductivity:</b>         | 0.37 mS/cm<br>(1 %, 20 °C, deionized water)       |
|                             | <b>Foam characteristics:</b> | strongly foaming,<br>not suitable for CIP-systems |

\* Parameters subject to incoming goods control

**Material compatibility:**  
compatible with

**P3-topax 99** is, under the application conditions described below,

- **Metals** austenitic CrNi steels (quality at least DIN 1.4301 = AISE 304), mild steel (St 37/2), non-ferrous metals, aluminium, zinc
- **Plastics** PE, PP, rigid PVC
- **Seals** NBR, CR, EPDM
- **Others** glass and ceramic

## Microbiology

Bactericidal and fungicidal effect of **P3-topax 99**:

Sterilization time in minutes using the qualitative DVG suspension test method 1988

| Sterilization time in minutes     |                            |                                  |         |       |         |
|-----------------------------------|----------------------------|----------------------------------|---------|-------|---------|
| Test organisms                    | Organism conc./ml inoculum | without / with protein loading * |         |       |         |
|                                   |                            | 20 °C                            |         | 10 °C |         |
|                                   |                            | 1.0 %                            | 1.0 % * | 1.0 % | 1.0 % * |
| <b>Gram-positive bacteria</b>     |                            |                                  |         |       |         |
| Staphylococcus aureus ATCC 6538   | $5.9 \times 10^6$          | 5                                | 5       | 5     | 5       |
| Enterococcus faecium DSM 2918     | $7.6 \times 10^6$          | 5                                | 5       | 5     | 5       |
| Listeria monocytogenes BGA 6458   | $9.1 \times 10^6$          | 5                                | 5       | 5     | 5       |
| <b>Gram-negative bacteria</b>     |                            |                                  |         |       |         |
| Proteus mirabilis ATCC 14153      | $2.4 \times 10^6$          | 5                                | 5       | 15    | 30      |
| Pseudomonas aeruginosa ATCC 15442 | $4.2 \times 10^6$          | 5                                | 15      | 30    | 60      |
| Salmonella typhimurium ATCC 13311 | $7.0 \times 10^6$          | 5                                | 15      | 30    | 30      |
| Yersinia enterocolitica K 2950    | $8.9 \times 10^6$          | 5                                | 5       | 5     | 15      |
| Campylobacter jejuni NTCT 11332   | $1.0 \times 10^6$          | 5                                | 5       | 5     | 5       |
| <b>Yeasts and moulds</b>          |                            |                                  |         |       |         |
| Candida albicans ATCC 10231       | $3.2 \times 10^6$          | 5                                | 5       | 5     | 15      |
| Penicillium expansum K 7630       | $2.5 \times 10^6$          | 5                                | 15      | 15    | 30      |

\* DVG-protein loading = 10 % beef serum  
Especially considering major harmful germs in the food industry

# Application

**P3-topax 99** is suitable for the disinfection of plants and instruments as well as floors and walls in food processing industries, using a 2 % **P3-topax 99** application solution in **foaming procedure**. For small items, a **static disinfection** in a 1 % **P3-topax 99** solution can be applied.

- ⇒ Disinfection in slaughteries and meat processing industries (e. g. conveyor vats, conveyor chains, separation belts, processing machines)
- ⇒ Disinfection in delicatessen industries (e. g. stirring vessels, tanks, packaging machines)
- ⇒ Disinfection in dairies and cheese factories (e. g. cheese cooling and ripening rooms, cheese moulds)
- **Pre-rinse** with water for removal of rough soil
- **Foam** all surfaces with a 2 % **P3-topax 99** solution  
**Place** small items in a 1 - 2 % **P3-topax 99** solution  
Contact time: 15 minutes min.
- **Final rinse** with water of drinking water quality

## Important indications !

- Effluent, containing chemicals, must only be discharged according to the local regulations
- Chemicals containing effluent must only be discharged into the biological treatment station after passing the neutralization- and buffer tank
- When discharging chemically polluted effluent, it is essential to pay specific attention to the bacteria toxicity of this water. This is especially important when dealing with biocide containing effluents and anaerobic sewage plants
- In case of doubt please seek advice from our technical service



# Monitoring

## Concentration determination

- **Titration**

Receiving flask: 100 ml application solution  
Titration solution: 0.1 n HCl  
Indicator: ca. 10 ml Tashiro

Volume added HCl =  $V_1$

Titrate 100 ml of process water as described above

Volume added HCl =  $V_2$

$(V_1 - V_2) \times 0.14 =$  (by wt.) % **P3-topax 99**

- **Conductivity**

Specific conductivity of **P3-topax 99**

## **P3-System**

For the application of **P3-topax 99** we recommend using the **P3-TOPAX HYGIENE SYSTEM**:

- solid unit for rinsing, foaming and disinfecting in the pressure area of 25 bar
- demand-oriented, adjustable dosage
- easy to apply and to maintain

Our P3-System brochures are available on request.

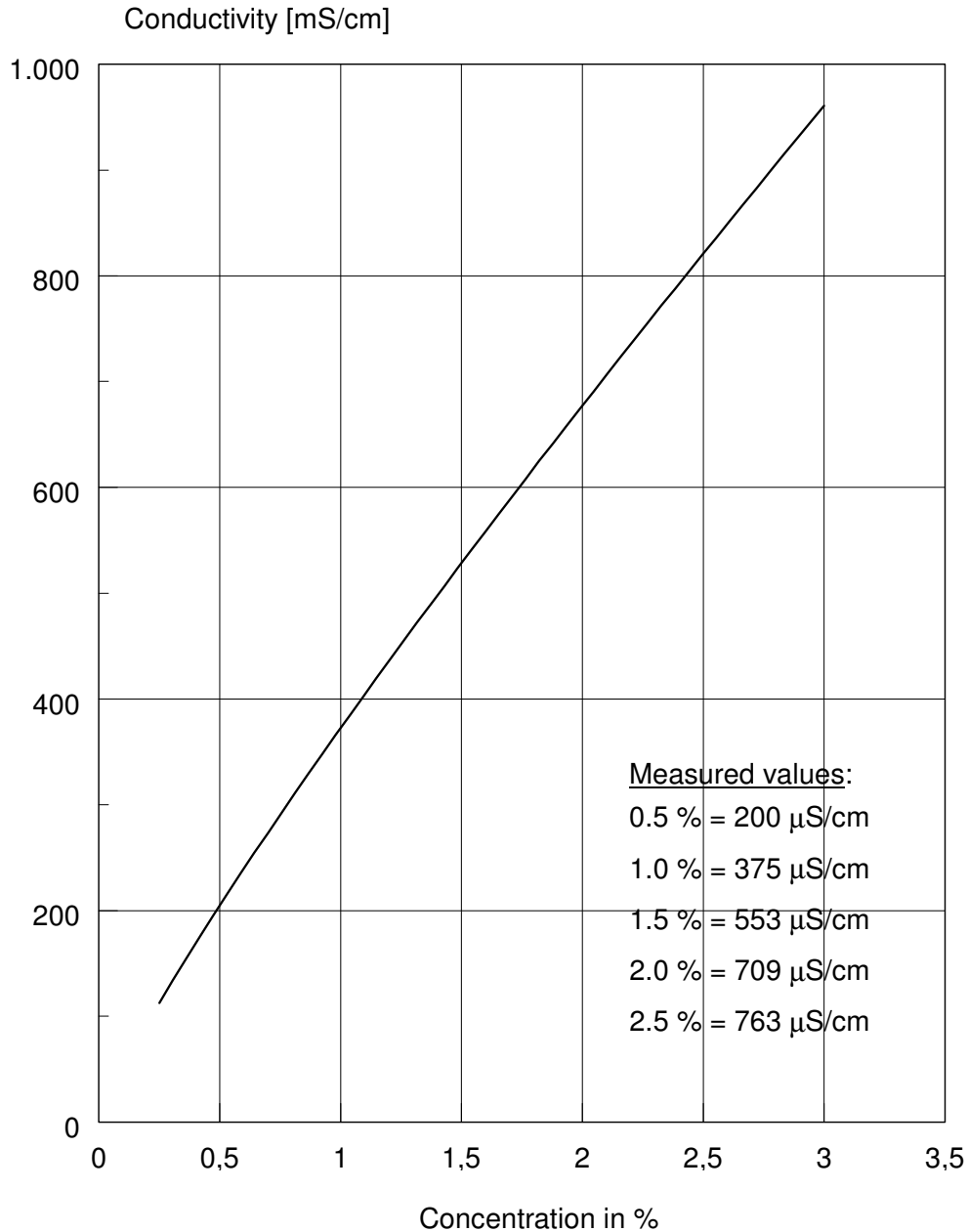
## **Safety**

**P3-topax 99** is labelled as "corrosive" (symbol "C"); it contains alkyl ammonium acetate

The relevant risk and safety phrases are given in the EC Safety Data Sheet. We recommend training your employees in how to handle cleaning agents and disinfectants safely. We will be glad to answer any questions you may have in this context.

## P3-topax 99

Specific conductivity (25 °C, 0 ‰)  
Temperature coefficient:  $\alpha$ : 2.81 % / °C



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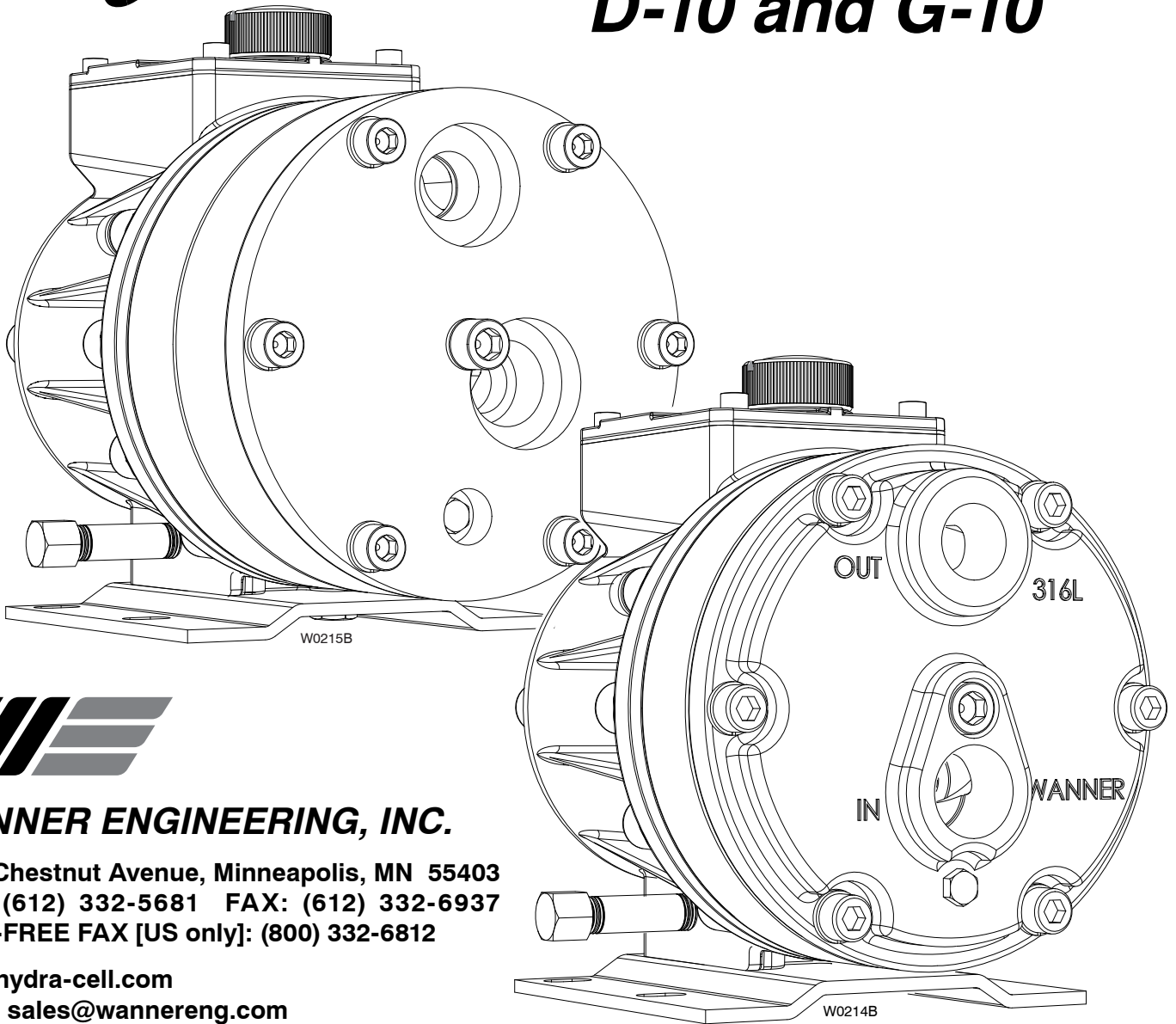
(Version August 2000)

**Installation & Service**  
**D10-991-2400B**

# Hydra-Cell®

## INDUSTRIAL PUMPS

**Models:**  
**D-10 and G-10**



**WANNER ENGINEERING, INC.**

1204 Chestnut Avenue, Minneapolis, MN 55403  
TEL: (612) 332-5681 FAX: (612) 332-6937  
TOLL-FREE FAX [US only]: (800) 332-6812

[www.hydra-cell.com](http://www.hydra-cell.com)  
email: [sales@wannereng.com](mailto:sales@wannereng.com)

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## D/G-10 Specifications

|                                |                                                                                                                                                                                                                                |            |       |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|
| <b>Max Pressure</b>            | Metallic: 1000 psi (70 bar)<br>Non-Metallic: 250 psi (17 bar)<br>Slurry Duty (SD): 300 psi (21 bar)                                                                                                                            |            |       |
| <b>Capacity @ Max Pressure</b> | rpm                                                                                                                                                                                                                            | gpm        | l/min |
| D/G-10-X                       | 1450                                                                                                                                                                                                                           | 7.8        | 29.0  |
| D/G-10-E                       | 1750                                                                                                                                                                                                                           | 8.0        | 30.3  |
| D/G-10-S                       | 1750                                                                                                                                                                                                                           | 6.0        | 22.7  |
| D/G-10-I                       | 1750                                                                                                                                                                                                                           | 3.9        | 14.9  |
| <b>Delivery @ Max Pressure</b> | revs/gal                                                                                                                                                                                                                       | revs/liter |       |
| D/G-10-X                       | 185                                                                                                                                                                                                                            | 50         |       |
| D/G-10-E                       | 219                                                                                                                                                                                                                            | 58         |       |
| D/G-10-S                       | 292                                                                                                                                                                                                                            | 77         |       |
| D/G-10-I                       | 448                                                                                                                                                                                                                            | 117        |       |
| <b>Max Inlet Pressure</b>      | Metallic: 250 psi (17 bar)<br>Non-Metallic: 50 psi (3.5 bar)<br>Slurry Duty (SD): 50 psi (3.5 bar)                                                                                                                             |            |       |
| <b>Max Temperature</b>         | Metallic: 250°F (121°C) – consult factory for temperatures above 160°F (71°C)<br>Non-Metallic: Polypropylene: 120°F (49°C);<br>Kynar, Celcon & Slurry Duty: 140°F (60°C) – consult factory for temperatures above 120°F (49°C) |            |       |
| <b>Inlet Port</b>              | D-10: 1 inch NPT<br>G-10: 1 inch BSPT                                                                                                                                                                                          |            |       |
| <b>Discharge Port</b>          | D-10: 3/4 inch NPT<br>G-10: 3/4 inch BSPT                                                                                                                                                                                      |            |       |
| <b>Shaft Diameter</b>          | 7/8 inch (22.22 mm)                                                                                                                                                                                                            |            |       |
| <b>Shaft Rotation</b>          | Bidirectional                                                                                                                                                                                                                  |            |       |
| <b>Bearings</b>                | Tapered roller                                                                                                                                                                                                                 |            |       |
| <b>Oil Capacity</b>            | 1.1 US quarts (1.05 liters)                                                                                                                                                                                                    |            |       |
| <b>Weight</b>                  | Metallic Heads: 48 lbs (22 kg)<br>Non-Metallic Heads: 35 lbs (16 kg)                                                                                                                                                           |            |       |

## Calculating Required Horsepower (kW)\*

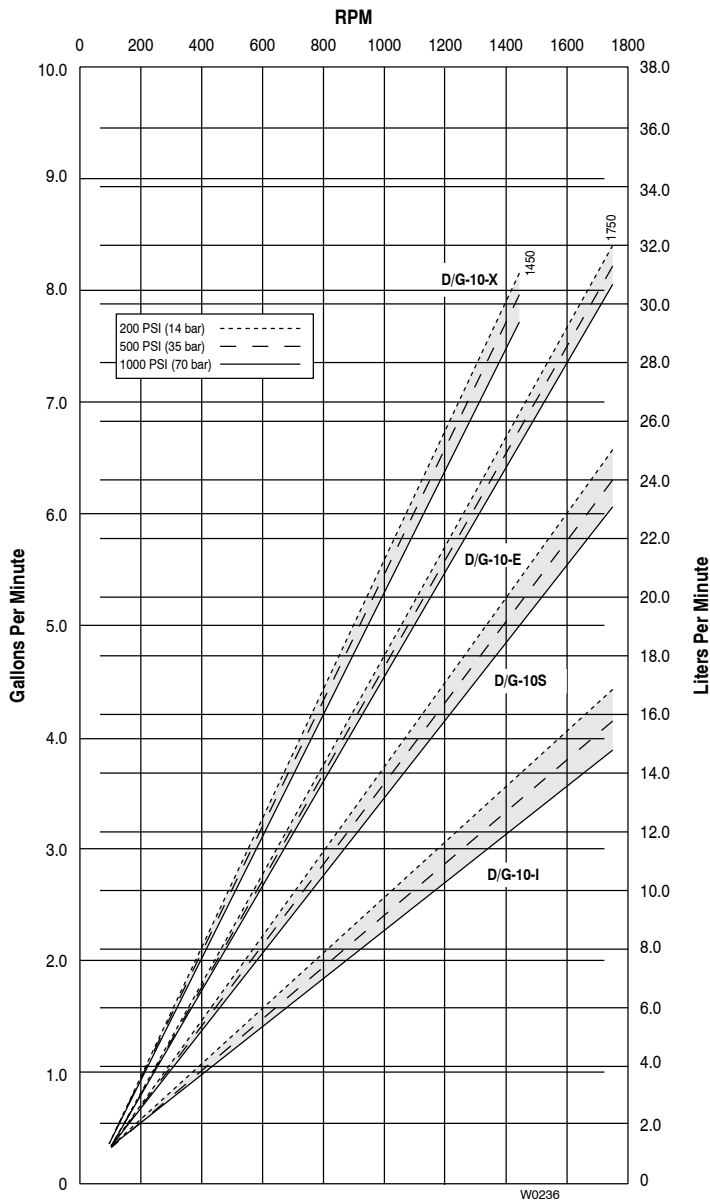
$$\frac{15 \times \text{rpm}}{63,000} + \frac{\text{gpm} \times \text{psi}}{1,460} = \text{electric motor HP}^*$$

$$\frac{15 \times \text{rpm}}{84,428} + \frac{\text{lpm} \times \text{bar}}{511} = \text{electric motor kW}^*$$

\* rpm equals pump shaft rpm. HP/kW is required application power. Use caution when sizing motors with variable speed drives.

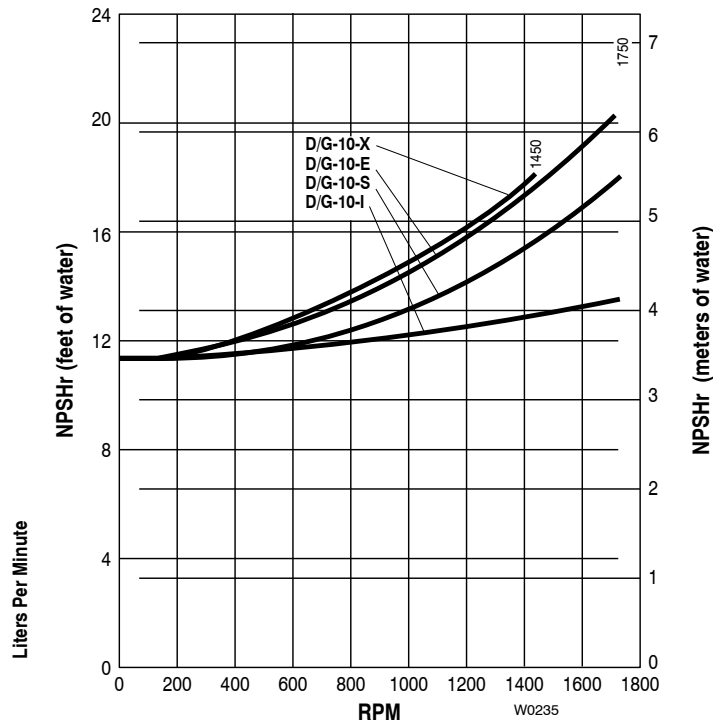
# D/G-10 Specifications

## Performance\*

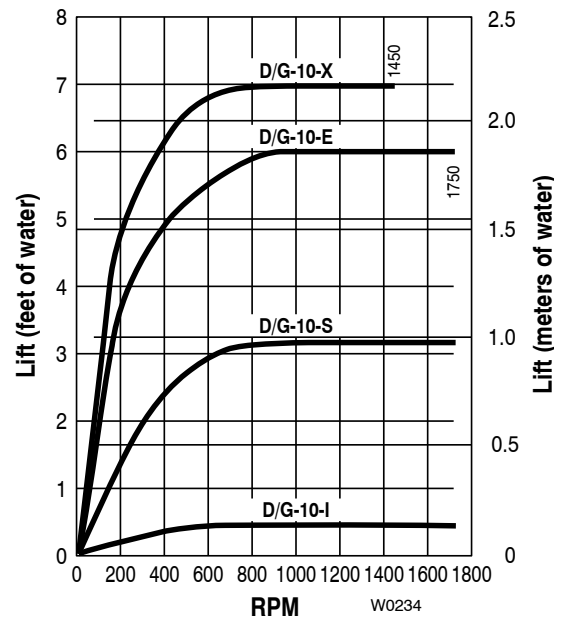


\* Specifications depict D/G-10 metallic and non-metallic pump head models only. Contact factory or visit our web site ([www.hydra-cell.com](http://www.hydra-cell.com)) for performance specifications on slurry duty (SD) models.

## Net Positive Suction Head – NPSHr\*



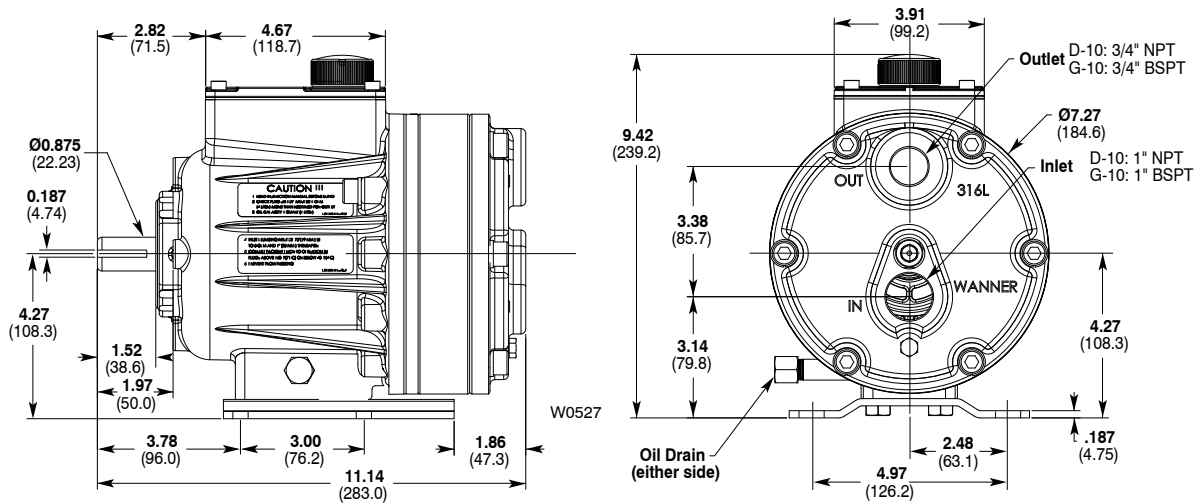
## Dry Lift\*



# D/G-10 Dimensions

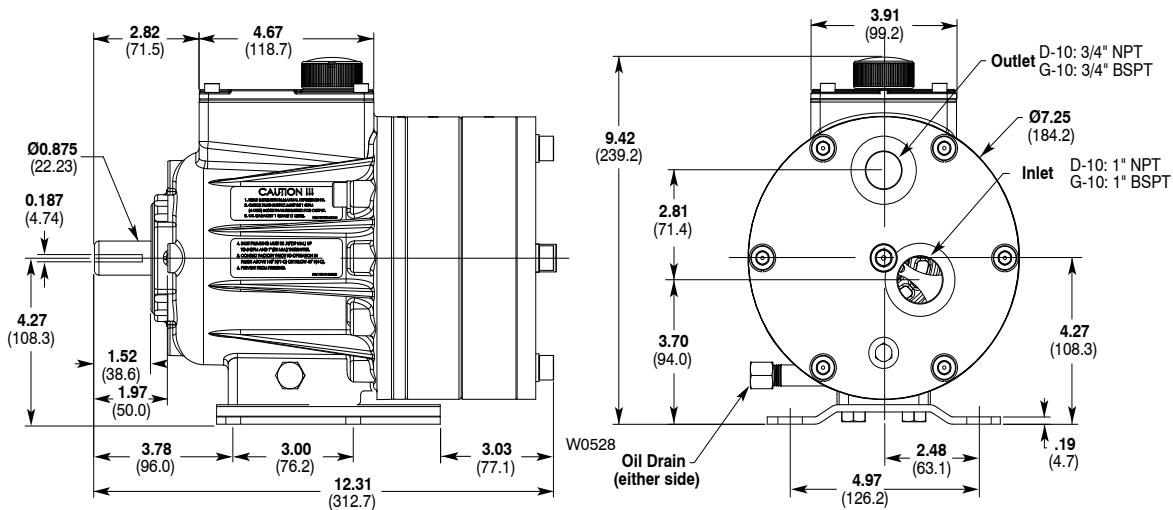
## Models with Metallic Pumping Head

- Brass
- Cast Iron
- 316 Stainless Steel
- Nickel Alloy (C Series)



## Models with Non-Metallic or Slurry Duty (SD) Pump Head

- Kynar®
- Polypropylene
- Celcon



# D/G-10 Installation

## Location

Locate the pump as close to the supply source as possible.

Install it in a lighted clean space where it will be easy to inspect and maintain. Allow room for checking the oil level, changing the oil, and removing the pump head (manifold, valve plate and related items).

## Mounting

The pump shaft can rotate in either direction.

To prevent vibration, mount the pump and motor securely on a level rigid base.

On a belt-drive system, align the sheaves accurately; poor alignment wastes horsepower and shortens the belt and bearing life. Make sure the belts are properly tightened, as specified by the belt manufacturer.

On a direct-drive system, align the shafts accurately. Unless otherwise specified by the coupling manufacturer, maximum parallel misalignment should not exceed 0.015 in. (0.4 mm) and angular misalignment should be held to 1° maximum. Careful alignment extends life of the coupling, pump, shafts, and support bearings. Consult coupling manufacturer for exact alignment tolerances.

## Important Precautions

**Adequate Fluid Supply.** To avoid cavitation and premature pump failure, be sure that the pump will have an adequate fluid supply and that the inlet line will not be obstructed. See "Inlet Piping".

**Positive Displacement.** This is a positive-displacement pump. To avoid severe system damage if the discharge line ever becomes blocked, install a relief valve downstream from the pump. See "Discharge Piping".

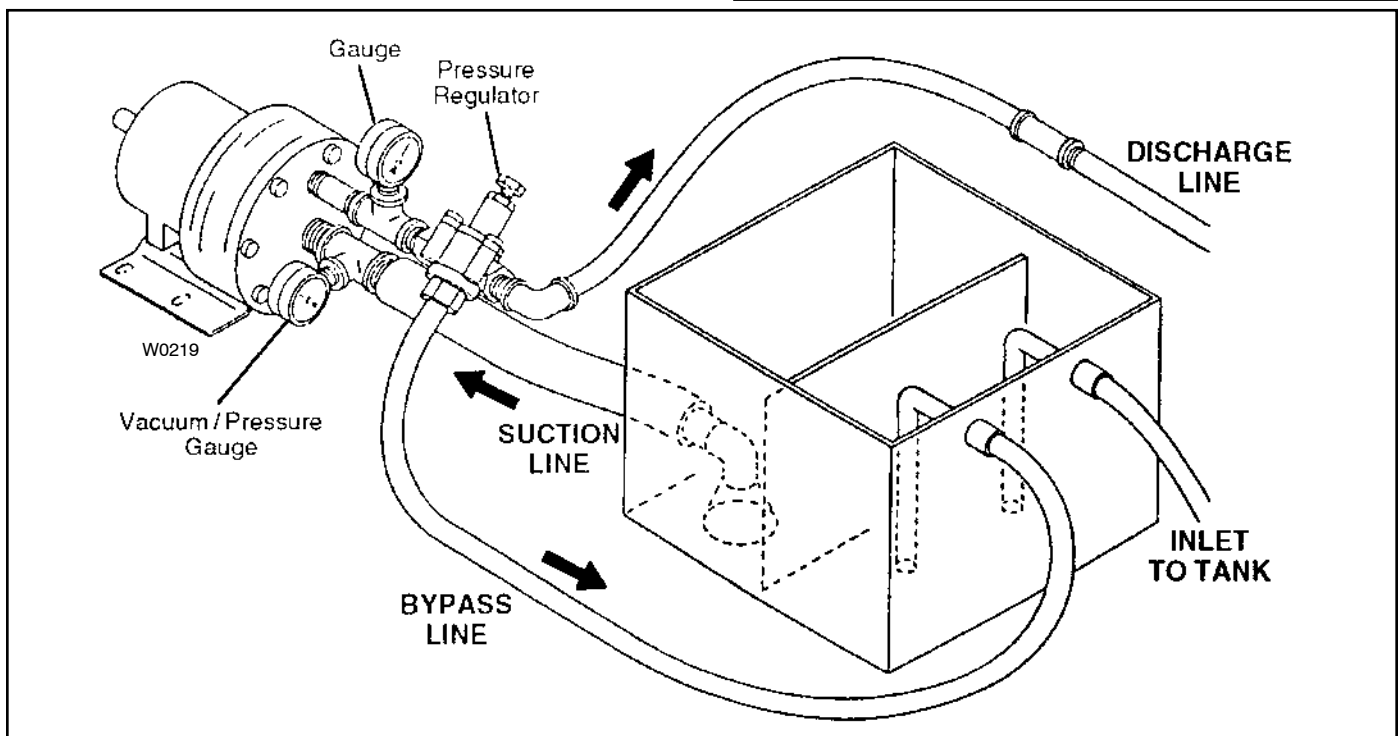
**Safety Guards.** Install adequate safety guards over all pulleys, belts, and couplings. Follow all codes and regulations regarding installation and operation of the pumping system.

**Shut-Off Valves.** Never install shut-off valves between the pump and discharge pressure regulator, or in the regulator bypass line.

**Freezing Conditions.** Protect the pump from freezing. See also the Maintenance Section.

Consult the Factory for the following situations:

- Extreme temperature applications – above 160° F. (71° C) or below 40° F. (4.4° C)
- Pressure feeding of pumps
- Viscous or abrasive fluid applications
- Chemical compatibility problems
- Hot ambient temperatures – above 110° F. (43° C)
- Conditions where pump oil may exceed 200° F. (93° C) because of a combination of hot ambient temperatures, hot fluid temperature, and full horsepower load — an oil cooler may be required



# D/G-10 Installation

## Inlet Piping (Suction Feed)

**CAUTION: When pumping at temperatures above 160° F (71° C), use a pressure-feed system.**

Install draincocks at any low points of the suction line, to permit draining in freezing conditions.

Provide for permanent or temporary installation of a vacuum gauge to monitor the inlet suction. To maintain maximum flow, vacuum at the pump inlet should not exceed 7 in. Hg at 70° F (180 mm Hg at 21° C). **Do not supply more than one pump from the same inlet line.**

### Supply Tank

Use a supply tank that is large enough to provide time for any trapped air in the fluid to escape. The tank size should be at least twice the maximum pump flow rate.

Isolate the pump and motor stand from the supply tank, and support them separately.

Install a separate inlet line from the supply tank to each pump.

Install the inlet and bypass lines so they empty into the supply tank below the lowest water level, on the opposite side of the baffle from the pump suction line.

If a line strainer is used in the system install it in the inlet line to the supply tank.

To reduce aeration and turbulence, install a completely submerged baffle plate to separate the incoming and outgoing liquids.

Install a vortex breaker in the supply tank, over the outlet port to the pump.

Place a cover over the supply tank, to prevent foreign objects from falling into it.

### Hose and Routing

Size the suction line at least one size larger than the pump inlet, and so that the velocity will not exceed 1-3 ft/sec (0.3 to 0.9 m/s):

For pipe in inches: Velocity (ft/sec) =  $0.408 \times \text{GPM} / \text{Pipe ID}^2$

For pipe in mm: Velocity (m/sec) =  $21.2 \times \text{LPM} / \text{Pipe ID}^2$

Keep the suction line as short and direct as possible. A maximum of 3 feet (1 m) is recommended.

Use flexible hose and/or expansion joints to absorb vibration, expansion, or contraction.

If possible, keep the suction line level. Do not have any high points to collect vapor unless these high points are vented.

To reduce turbulence and resistance, do not use 90° elbows. If turns are necessary in the suction line, use 45° elbows or arrange sweeping curves in the flexible inlet hose.

If a block valve is used, be sure it is fully opened so that the flow to the pump is not restricted. The opening should be at least the same diameter as the inlet plumbing ID.

Do not use a line strainer or filter in the suction line unless regular maintenance is assured. If used, it should have a free-flow area of at least three times the free-flow area of the inlet.

Install piping supports where necessary to relieve strain on the inlet line and to minimize vibration.

Loctite is a registered trademark of Loctite Corporation.  
Scotchbrite is a registered trademark of 3M Company.

## Inlet Piping (Pressure Feed)

Provide for permanent or temporary installation of a vacuum/pressure gauge to monitor the inlet vacuum or pressure. Pressure at the pump inlet should not exceed 250 psi (17 bar); if it could get higher, install an inlet pressure reducing regulator. Do not supply more than one pump from the same inlet line.

## Inlet Calculations

### Acceleration Head

#### Calculating the Acceleration Head

Use the following formula to calculate acceleration head losses. Subtract this figure from the NPSHa, and compare the result to the NPSHr of the Hydra-Cell pump.

$$H_a = (L \times V \times N \times C) \div (K \times G)$$

where:

$H_a$  = Acceleration head (ft of liquid)

$L$  = Actual length of suction line (ft) — not equivalent length

$V$  = Velocity of liquid in suction line (ft/sec) [ $V = \text{GPM} \times (0.408 \div \text{pipe ID}^2)$ ]

$N$  = RPM of crank shaft

$C$  = Constant determined by type of pump — use 0.066 for the D-10 and G-10 Hydra-Cell pumps

$K$  = Constant to compensate for compressibility of the fluid — use: 1.4 for de-aerated or hot water; 1.5 for most liquids; 2.5 for hydrocarbons with high compressibility

$G$  = Gravitational constant (32.2 ft/sec<sup>2</sup>)

### Friction Losses

#### Calculating Friction Losses in Suction Piping

When following the above recommendations (under “Inlet Piping”) for minimum hose/pipe I.D. and maximum length, frictional losses in the suction piping are negligible (i.e.,  $H_f = 0$ ) if you are pumping a water-like fluid.

When pumping more-viscous fluids such as lubricating oils, sealants, adhesives, syrups, varnishes, etc., frictional losses in the suction piping may become significant. As  $H_f$  increases, the available NPSH (NPSHa) will decrease, and cavitation will occur.

In general, frictional losses increase with increasing viscosity, increasing suction-line length, increasing pump flow rate, and decreasing suction-line diameter. Changes in suction-line diameter have the greatest impact on frictional losses: a 25% increase in suction-line diameter cuts losses by more than two times, and a 50% increase cuts losses by a factor of five times.

Consult the factory before pumping viscous fluids.

#### Minimizing Acceleration Head and Frictional Losses

To minimize the acceleration head and frictional losses:

- Keep inlet lines less than 3 ft (1 m) long
- Use at least 1-1/2 in. (38 mm) I.D. inlet hose
- Use soft hose (low-pressure hose, non collapsing) for the inlet lines
- Minimize fittings (elbows, valves, tees, etc.)
- **Use a suction stabilizer on the inlet.**



# D/G-10 Installation

## Net Positive Suction Head

NPSHa must be equal to or greater than NPSHr. If not, the pressure in the pump inlet will be lower than the vapor pressure of the fluid — and cavitation will occur.

### Calculating the NPSHa

Use the following formula to calculate the NPSHa:

$$\text{NPSHa} = P_t + H_z - H_f - H_a - P_{vp}$$

where:

$P_t$  = Atmospheric pressure

$H_z$  = Vertical distance from surface liquid to pump center line (if liquid is below pump center line, the  $H_z$  is negative)

$H_f$  = Friction losses in suction piping

$H_a$  = Acceleration head at pump suction

$P_{vp}$  = Absolute vapor pressure of liquid at pumping temperature

NOTES:

- In good practice, NPSHa should be 2 ft greater than NPSHr
- All values must be expressed in feet of liquid

### Atmospheric Pressure at Various Altitudes

| Altitude<br>(ft) | Pressure<br>(ft of H <sub>2</sub> O) | Altitude<br>(ft) | Pressure<br>(ft of H <sub>2</sub> O) |
|------------------|--------------------------------------|------------------|--------------------------------------|
| 0                | 33.9                                 | 1500             | 32.1                                 |
| 500              | 33.3                                 | 2000             | 31.5                                 |
| 1000             | 32.8                                 | 5000             | 28.2                                 |

## Discharge Piping

### Hose and Routing

Use the shortest, most-direct route for the discharge line.

Select pipe or hose with a **working pressure** rating of at least 1.5 times the maximum system pressure. EXAMPLE: Select a 1500-psi W. P.-rated hose for systems to be operated at 1000-psi-gauge pressure.

Use about 6 ft. (1.8 m) of flexible hose between the pump and rigid piping to absorb vibration, expansion or contraction.

Support the pump and piping independently. Size the discharge line so that the velocity of the fluid will not exceed 7-10 ft/sec (2-3 m/sec):

For pipe in inches: Velocity (ft/sec) = 0.408 x GPM/Pipe ID<sup>2</sup>

For pipe in mm: Velocity (m/sec) = 21.2 x LPM/Pipe ID<sup>2</sup>

**NOTE: Pumps with non-metallic pumping head are limited to 250 psi (17 bar) maximum working pressure rating.**

### Pressure Regulation

**Install a pressure regulator or unloader in the discharge line.** Bypass pressure must not exceed the pressure limit of the pump.

Size the regulator so that, when fully open, it will be large enough to relieve the full capacity of the pump without over-pressurizing the system.

Locate the valve as close to the pump as possible and ahead of any other valves.

Adjust the pressure regulating valve to no more than 10% over the maximum working pressure of the system. Do not exceed the manufacturer's pressure rating for the pump or regulator.

Route the bypass line to the supply tank, or to the suction line as far as possible from the pump (to reduce the chance of turbulence and cavitation).

If the pump may be run for a long time with the discharge closed and fluid bypassing, install a thermal protector in the bypass line (to prevent severe temperature buildup in the bypassed fluid).

**CAUTION: Never install shutoff valves in the bypass line or between the pump and pressure regulator.**

Provide for permanent or temporary installation of a pressure gauge to monitor the discharge pressure at the pump.

For additional system protection, install a safety relief valve in the discharge line, downstream from the pressure regulator.

# D/G-10 Installation

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## Before Initial Start-Up

Before you start the pump, be sure that:

- All shutoff valves are open, and the pump has an adequate supply of fluid.
- All connections are tight.
- The oil level is 1/4 in. (6 mm) above the cast surface in the upper oil reservoir.
- The relief valve on the pump outlet is adjusted so the pump starts under minimum pressure.
- All pulleys and belts are properly aligned, and belts are tensioned according to specification.
- All pulleys, belts and shaft couplings have adequate safety guards.

## Initial Start-Up Procedure

1. Turn on power to pump motor.
2. Check inlet pressure or vacuum. To maintain maximum flow, inlet vacuum must not exceed 7 in. Hg at 70° F (180 mm Hg at 21° C). Inlet pressure must not exceed 250 psi (17 bar).
3. Listen for any erratic noise, and look for unsteady flow. If pump does not clear, refer to Troubleshooting Section.
4. If system has air lock and pump fails to prime:
  - a. Turn off power.
  - b. Remove pressure gauge or plug from tee fitting at pump outlet (refer to illustration on page 5).

**NOTE: Fluid may come out of this port when the plug is removed. Provide an adequate catch basin for fluid spillage, if required. Fluid will come out of this port when the pump is started, so we recommend that you attach adequate plumbing from this port so fluid will not be sprayed or lost. Use high-pressure-rated hose and fittings from this port. Take all safety precautions to assure safe handling of the fluid being pumped.**

- c. Jog system on and off until fluid coming from this port is air-free.
  - d. Turn off power.
  - e. Remove plumbing that was temporarily installed, and reinstall pressure gauge or plug.
5. Adjust discharge pressure regulator to desired operating and bypass pressures. Do not exceed maximum pressure rating of pump.
  6. After pressure regulator is adjusted, set safety relief valve at 100 psi (7 bar) higher than desired operating pressure. To verify this setting, adjust discharge pressure regulator upward until relief valve opens. Follow recommendations in NOTE (step 4b) for handling fluid that will come from relief valve.
  7. Reset discharge pressure regulator to desired system pressure.
  8. Provide return line from relief valve to supply tank, similar to bypass line from pressure regulator.

# D/G-10 Maintenance

**NOTE:** The numbers in parentheses are the Reference Numbers on the exploded view illustrations found in this manual and in the Parts Manual.

## Daily

Check oil level and condition of oil. The oil level should be 1/4 in. (6 mm) from the top of the fill port.

Use the appropriate Hydra-Oil for the application (contact Wanner Engineering if in doubt).

**CAUTION:** If you are losing oil but don't see any external leakage, or if the oil becomes discolored and contaminated, one of the diaphragms (20) may be damaged. Refer to the Fluid-End Service Section. Do not operate the pump with a damaged diaphragm.

**CAUTION:** Do not leave contaminated oil in the pump housing or leave the housing empty. Remove contaminated oil as soon as discovered, and replace it with clean oil.

## Periodically

Change the oil after the first 100 hours of operation, and then according to the guidelines below.

### Hours Between Oil Changes @ Various Process Fluid Temperatures

| Pressure                      | RPM   | <90°F<br>(32°C) | <139°F<br>(60°C) | <180°F<br>(82°C) |
|-------------------------------|-------|-----------------|------------------|------------------|
| <b>Metallic Pump Head</b>     |       |                 |                  |                  |
| <650 psi (45 bar)             | <1200 | 6,000           | 4,500            | 3,000            |
|                               | <1800 | 4,000           | 3,000            | 2,000            |
| <1000 psi (69 bar)            | <1200 | 4,000           | 3,000            | 2,000            |
|                               | <1800 | 2,000           | 1,500            | 1,000            |
| <b>Non-Metallic Pump Head</b> |       |                 |                  |                  |
| <250 psi (17 bar)             | <1200 | 4,000           | 3,000            | —                |
|                               | <1800 | 2,000           | 1,500            | —                |
| <b>Slurry Duty Pump Head</b>  |       |                 |                  |                  |
| <300 psi (21 bar)             | <1200 | 4,000           | 3,000            | —                |
|                               | <1800 | 2,000           | 1,500            | —                |

**NOTE:** Minimum oil viscosity for proper hydraulic end lubrication is 16-20 cST (80-100 SSU).

**NOTE:** Use of an oil cooler is recommended when process fluid and/or hydraulic end oil exceeds 180°F (82°C) for Metallic Pump Head models or when hydraulic end oil exceeds 180°F (82°C) for Non-Metallic and Slurry Duty Pump Head models.

When changing, remove the drain plug cap (34) at the bottom of the pump so all oil and accumulated sediment will drain out.

**CAUTION:** Do not turn the drive shaft while the oil reservoir is empty.

Check the inlet pressure or vacuum periodically with a gauge. If vacuum at the pump inlet exceeds 7 in. Hg (180 mm Hg), check the inlet piping system for blockages. If the pump inlet is located above the supply tank, check the fluid supply level and replenish if too low.

**CAUTION:** Protect the pump from freezing. Refer also to the "Shutdown Procedure".

## Shutdown Procedure During Freezing Temperatures

Take all safety precautions to assure safe handling of the fluid being pumped. Provide adequate catch basins for fluid drainage and use appropriate plumbing from drain ports, etc., when flushing the pump and system with a compatible antifreeze.

1. Adjust discharge pressure regulating valve so pump runs under minimum pressure. Stop pump.
2. Drain supply tank; open any draincocks in system piping and collect drainage; remove plug (3) from manifold and collect drainage.
3. Close draincocks in system piping and replace manifold plug.
4. Fill supply tank with enough antifreeze to fill system piping and pump.  
**NOTE:** Disconnect the system return line from the supply tank and connect it to a separate reservoir.
5. Start pump and allow it to run until system is filled with antifreeze. **NOTE:** If the system has an air lock and the pump fails to prime, follow step 4 of the Initial Start-up Procedure to clear the air.
6. When mostly antifreeze is flowing from system return line, stop pump. Connect system return line back to supply tank and circulate antifreeze for short period.
7. It is also good practice to change oil in hydraulic end before storage for an extended period. This will remove any accumulated condensation and sediment from oil reservoir. Drain and refill hydraulic end with appropriate Hydra-Oil and operate pump for short period to assure smooth performance.

# D/G-10 Service (Fluid End)

**NOTE:** The numbers in parentheses are the Reference Numbers on the exploded view illustrations found in this manual and also in the Parts Manual.

This section explains how to disassemble and inspect all easily-serviceable parts of the pump. Repair procedures for the hydraulic end (oil reservoir) of the pump are included in a later section of the manual.

**CAUTION:** Do not disassemble the hydraulic end unless you are a skilled mechanic. For assistance, contact Wanner Engineering (TEL 612-332-5681 or FAX 612-332-6937) or the distributor in your area.

**CAUTION:** The two bolts (29; 25 or 44) that screw through the back of the housing into the cylinder casting hold the casting over the hydraulic end of the pump. Do not remove them except when repairing the hydraulic end.

## 1. Remove Manifold (6), Valve Plate (16)

a. Remove all nuts (31) and bolts (4) around the manifold. Do not remove two bolts (29; 25 or 44) that are installed through back of pump housing.

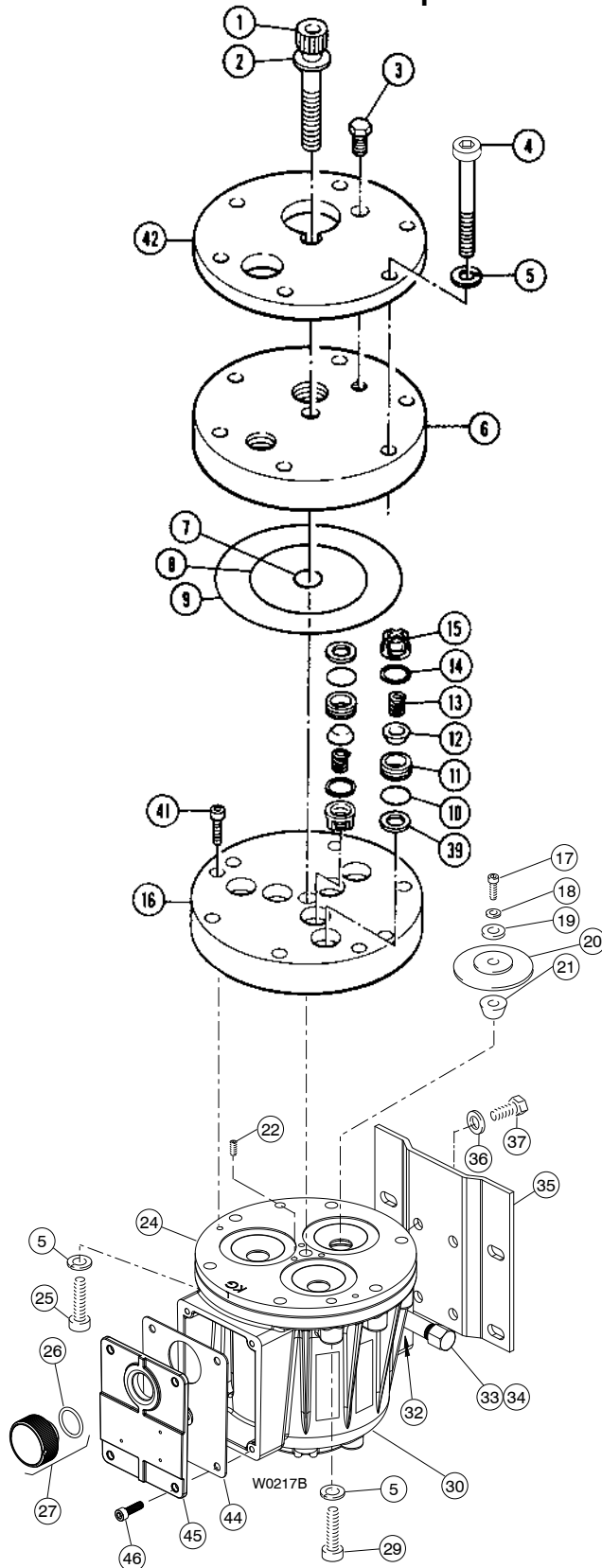
b. Use 3/8-in. (10-mm) hex Allen wrench to remove center bolt (1) and its washer (2).

**CAUTION:** Do not turn the pump drive shaft while the manifold and valve plate are off the pump, except when removing diaphragms or repriming the hydraulic cells.

c. Remove manifold (6), and support plate (42) [non-metallic pump head only]. Valve plate (16) will remain on cylinder casting (24).

d. Inspect manifold for warping or wear around inlet and outlet ports. If wear is excessive, replace manifold. To check if manifold is warped, remove O-rings and place straightedge across it. Warped manifold should be replaced.

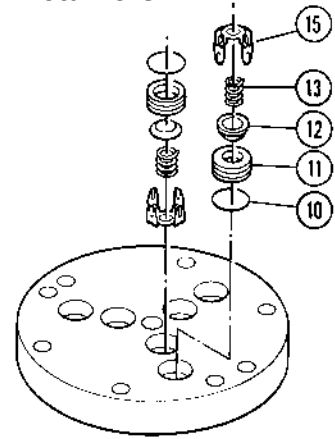
**Model D-10/G-10  
With Non-Metallic Pump Head\***



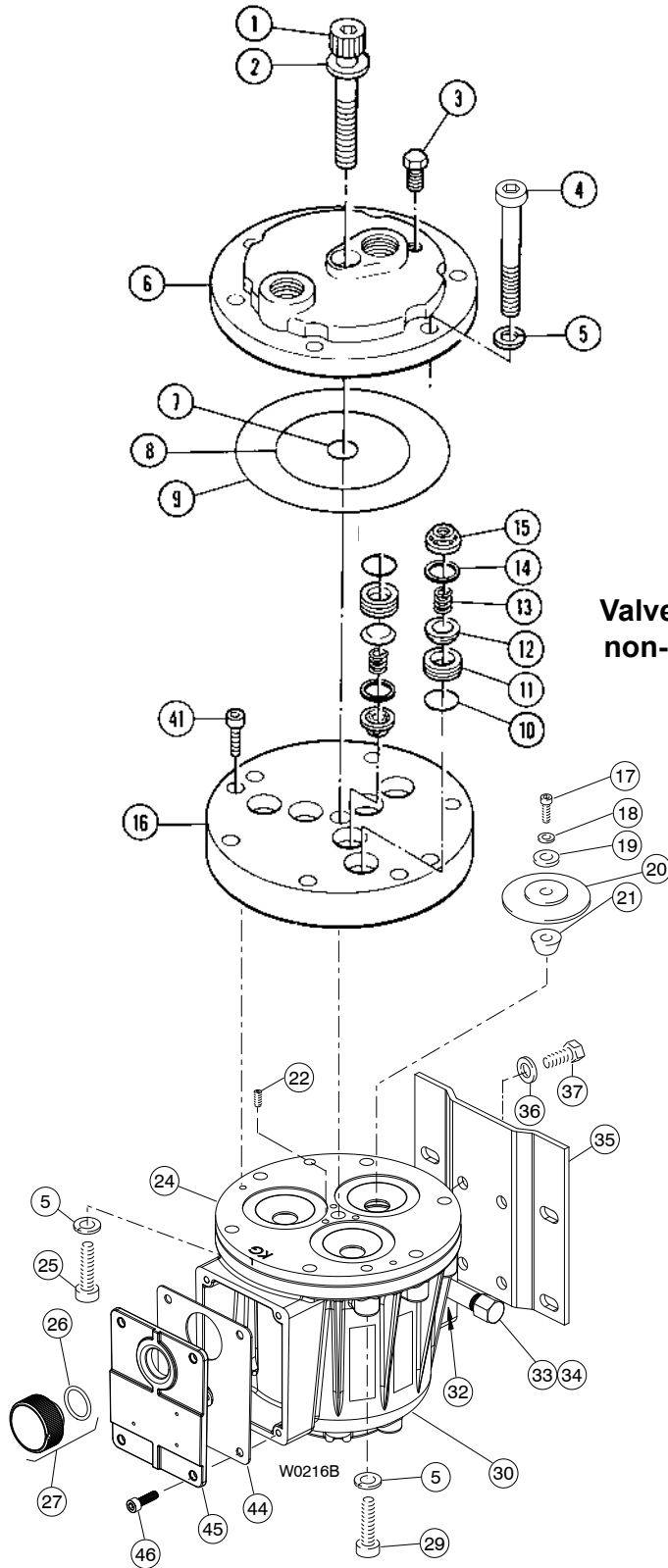
**\*NOTE:** For non-metallic slurry duty pumps, see the insert to this manual for fluid valve service (Step 2), then proceed to Step 3 in this manual for remaining service steps.

# D/G-10 Service (Fluid End)

## Valve Assemblies with Metal Retainers



## Valve Assemblies with non-Metallic Retainers



# D/G-10 Service (Fluid End)

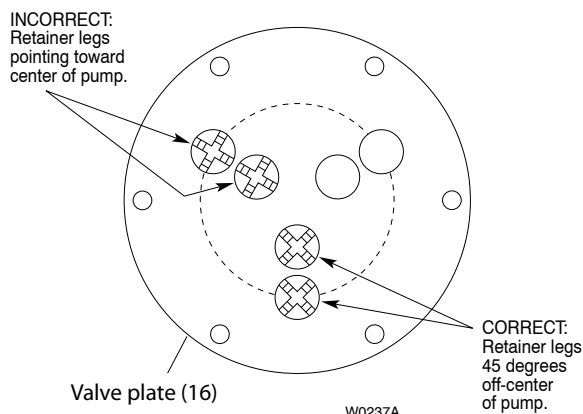
## 2. Inspect Valves (10-15, 39)

**\*NOTE:** For non-metallic slurry duty pumps, see the insert to this manual for fluid valve service (Step 2), then proceed to Step 3 in this manual for remaining service steps.

The three inlet and three outlet valve assemblies are identical (but face in opposite directions). Inspect each valve as follows:

- Check spring retainer (15), and replace if worn.  
**Note: if your pump has either abrasive duty valve assemblies or a non-metallic pump head there will be a plastic dampening washer (39) at the bottom of each seat. Inspect each one for wear or cracks and replace if necessary.**
- Check valve spring (13). If it is shorter than new spring, replace it (don't just stretch old spring).
- Check valve poppet (12). If worn excessively, replace it.  
**NOTE: If your pump has plastic spring retainers, there is a tetra seal (flat O-ring, 14) between the retainer (15) and valve seat (11).**
- Remove valve seat (11). Seat remover is included in Wanner Tool Kit. Inspect valve seat for wear, and replace it if necessary.
- Reinstall valve assemblies:
  - Clean valve ports and shoulders with emery cloth, and lubricate them with lubricating gel or petroleum jelly.
  - Install O-ring (10) on valve seat (11).
  - Inlet (3 center valves).** Insert spring retainer (15) into valve plate, then insert spring (13), valve (12), and valve seat (11). If pump has plastic spring retainers, flat O-ring (14) goes between retainer and seat. Insert dampening washer (39) if included in valve assembly.
  - Outlet (3 outer valves).** Insert dampening washer (39) if included in valve assembly. Insert valve seat, valve, and spring, then retainer. If pump has **plastic** retainers, install flat O-ring between retainer and seat. If pump has **metal** spring retainers in outlet valves, position them so leg does not point toward center of pump (refer to illustration below).

### Valve Retainer Orientation In Valve Plate



## 3. Inspect and Replace Diaphragms (20)

If necessary to service the diaphragms, remove the two socket-head cap screws (41) that secure the valve plate (16) to the cylinder casting (24). Inspect the valve plate in the same manner as you did the manifold.

- Lift diaphragm by one edge, and turn pump shaft until diaphragm pulls up. This will expose machined cross-holes in plunger shaft behind diaphragm.
- Insert Allen wrench through one of holes, to hold diaphragm up. Proper size tool is included in Wanner Tool Kit.
- Remove screw (17), O-ring (18), and follower (19) in center of diaphragm.
- Remove diaphragm, and inspect it carefully. Ruptured diaphragm generally indicates pumping system problem, and replacing only diaphragm will not solve larger problem. Inspect diaphragm for following:
  - Half-moon marks.** Usually caused by cavitation of pump (refer to "Troubleshooting" section).
  - Concentric circular marks.** Usually caused by cavitation of pump (refer to "Troubleshooting" section).
  - Small puncture.** Usually caused by sharp foreign object in fluid, or by ice particle.
  - Diaphragm pulled away** from center screw or from cylinder sides. Usually caused by fluid being frozen in pump, or by over pressurization of pump.
  - Diaphragm becoming stiff** and losing flexibility. Usually caused by pumping fluid that is incompatible with diaphragm material.
  - Slice in ridge of diaphragm.** Occurs when Viton diaphragm is operated at cold temperatures.
  - Diaphragm edge chewed away.** Usually caused by over pressurizing system.
- Inspect plunger (21) for any rough surfaces or edges. **Do not** remove plunger from plunger shaft. Smooth surfaces and edges as necessary with emery cloth or fine file.  
**CAUTION: If a diaphragm has ruptured and foreign material or water has entered the oil reservoir, do not operate the pump. Check all diaphragms, then flush the reservoir completely (as outlined below) and refill it with fresh oil. Never let the pump stand with foreign material or water in the reservoir, or with the reservoir empty.**
- Install new diaphragm (or reinstall old one, as appropriate), ridge side out.
- Clean screw (17) and remove any oil from it. Apply medium-strength threadlocker to screw. Reinstall screw and follower (19), and a new O-ring (18). Tighten to 18 in.-lbs (2.0 N-m).
- Repeat above inspection procedure (and replacement, if necessary) with other two diaphragms.

# D/G-10 Service (Fluid End)

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## 4. Flush Contaminant from Hydraulic End

(only if diaphragm has ruptured)

- Remove oil drain cap (34) and allow all oil and contaminate to drain out.
- Fill reservoir with kerosene or solvent, manually turn pump shaft to circulate kerosene, and drain.

**CAUTION: If you have EPDM diaphragms, or if food grade oil is in the reservoir, do not use kerosene or solvents. Instead, flush with the same lubricant that is in the reservoir. Pumps with EPDM diaphragms have an "E" as the 7th digit of the Model No.**

- Repeat flushing procedure (step b).
- Fill reservoir with fresh oil, manually turn pump shaft to circulate oil, and drain once again.
- Refill reservoir. If oil appears milky, there is still contaminate in reservoir. Repeat flushing procedure until oil appears clean.

## 5A. Prime Hydraulic Cells on Standard Pumps

- With pump horizontal, and fluid-end head removed, fill reservoir with correct Hydra-oil for application. Have catch basin for oil that leaks from behind diaphragms when priming. Catch oil and dispose of it properly; **do not reuse it**.
- All air in oil within hydraulic cell (behind diaphragms) must be forced out by turning shaft (which pumps piston). Shaft rotator is included in Wanner Tool Kit. Turn shaft until bubble-free flow of oil comes from behind all diaphragms. Watch oil level in reservoir; if it gets too low during priming, air will be drawn into pistons (inside hydraulic end) and will cause pump to run rough.
- Wipe excess oil from cylinder casting (24) and diaphragms (20).
- Ensure that oil is 1 inch (25 mm) from top of fill port.
- Replace oil fill cap (27).

## 5B. Priming Hydraulic Cells for Kel-Cell Pumps

**NOTE: Providing oil prime to Kel-Cell fitted pumps requires pressure be applied to the diaphragms. This can be done manually, with the system head pressure, or with pressurized air if available. Review all methods below to determine the procedure most suitable.**

### Method #1 (system head pressure *less* than 2 psi)

- Install valve plate (16) but without outlet valves installed (or else remove outlet valves; leave seats installed) on cylinder housing. Tighten two socket-head screws (41).
- Fill reservoir with correct Hydra-oil to fill port.
- With blunt pointer (eraser end of pencil), reach in through each outlet valve port and push follower-diaphragm backwards. Note air bubbles coming out at oil fill port. Now turn shaft about 1/2 turn.
- Repeat depressing diaphragms and rotating shaft (approximately 4-6 times) until no more air bubbles escape and oil has dropped about 1 inch (25 mm) from top of fill port. Hydraulic cells are now primed. Replace oil fill cap.
- Install outlet valve assemblies in each outlet valve port. See Parts Manual for correct assembly order. You may have to tip pump (head upward) in order to keep valve centered on seat and allow retainer to fit all way into port flush.
- Install manifold (6) and complete installation.

### Alternative Method #1:

With pump horizontal, and fluid-end head removed, fill reservoir with correct Hydra-oil for application. Have catch basin for oil that leaks from behind diaphragms when priming. Catch oil and dispose of it properly; **do not reuse it**.

- All air in oil within hydraulic piston behind diaphragms must be forced out by turning shaft (which pumps piston). Shaft rotator is included in the Hydra-Cell Tool Kit. Keep pressure on diaphragms while turning shaft until bubble-free flow of oil comes from behind all diaphragms. Maintain oil level in reservoir. Do not allow oil level to be lower than reservoir.
- Quickly attach loaded valve plate (16) (before oil runs out past diaphragms) with socket head screws (41), but do not tighten completely. Leave gap between valve plate and cylinder housing. Turn shaft 2-3 turns to finish forcing out air behind diaphragms. Hydraulic cells are now primed. Now finish tightening valve plate with two socket head screws and add pump manifold.
- Wipe excess oil from around pump head.
- Check that oil level is 1 inch (25 mm) from top of fill port.
- Replace oil fill cap and complete installation.

# D/G-10 Service (Fluid End)

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## Method #2 (head pressure *greater* than 2 psi)

This simple and clean method of priming Hydra-cells requires an inlet head pressure of at least 5 feet (1.5 m) or 2 psi (.14 bar). Pressure source is required to hold diaphragms back while piston moves to force out air.

*Completely assemble* pump and fill reservoir with correct Hydra-oil to fill port.

- a. **When tank head pressure is being used to prime**, install pump back into system and connect tank supply line to pump inlet. Pump discharge line may be connected at this time, but end of line must be open to allow air to pass out.
- b. Slowly turn pump shaft by hand and watch for bubbles exiting oil reservoir fill opening. This will take several rotations; when no more bubbles come out and reservoir level has dropped about 1 in. (25 mm), hydraulic cells are primed.
- c. Replace oil fill cap and complete installation.
- d. **When compressed air is being used to prime**, insert clean air hose to pump inlet and restrict pump outlet. Turn shaft quarter turn and then apply air pressure into manifold to put pressure on diaphragms. This will force air out from inside pistons and bubbles will appear at reservoir opening. Repeat for several rotations until no more air bubbles come out and reservoir level has dropped about 1 in. (25 mm). Hydraulic cells are now primed.
- e. Replace oil fill cap and complete installation.

## 6. Reinstall Pumping Head

### MODEL D-10

**NOTE: Use bolt (29) protruding through cylinder casting at 10 o'clock position to locate valve plate on cylinder casting. Place "blind hole" on valve plate over this bolt.**

- a. Reinstall valve plate (16), with valve assemblies installed as outlined above, onto cylinder casting. Recheck that blind hole is over protruding bolt at 10 o'clock position. Install socket-head cap screws (41) and secure valve plate to cylinder casting.
- b. Reinstall O-rings (7,8,9) on rear side of manifold. Use petroleum jelly or lubricating gel to hold them in place.
- c. Reinstall manifold onto valve plate. Be sure drain plug (3) is at the bottom of manifold.  
**NOTE: on pumps with non-metallic head position support plate (42) onto manifold with ports and bolt holes aligned properly.**
- d. Insert all bolts (4), washers (5), and nuts (31). Hand tighten.
- e. Reinstall center bolt (1) with its washer (2), and torque to 45 ft-lbs.
- f. Alternately tighten perimeter bolts (4) until all are secure. Torque to 45 ft-lbs.
- g. Recheck all bolts for tightness.

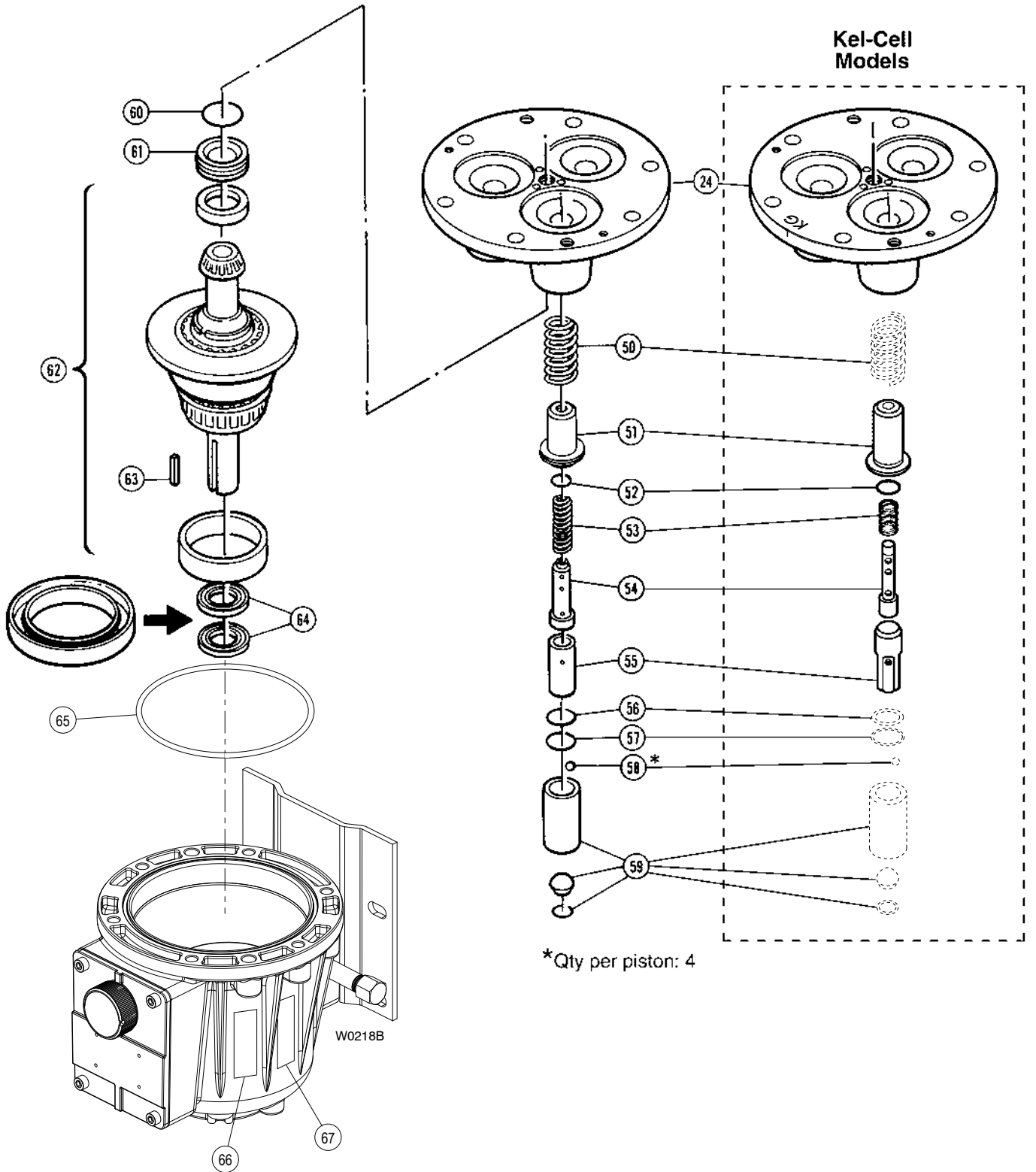
### MODEL G-10

**NOTE: Use the bolt (29) protruding through the cylinder casting at the 10 o'clock position to locate the valve plate on the cylinder casting. Place the "blind hole" on the valve plate over this bolt.**

- a. Reinstall valve plate (16), with valve assemblies installed as outlined above, onto cylinder casting. Recheck that blind hole is over protruding bolt at 10 o'clock position. Install two socket-head cap screws (41) and secure valve plate to cylinder casting.
- b. Reinstall O-rings (7,8,9) on rear side of manifold. Use petroleum jelly or lubricating gel to hold them in place.
- c. Reinstall manifold onto valve plate. Be sure drain plug (3) is at bottom of manifold.  
**NOTE: on pumps with non-metallic head position support plate (42) onto manifold with ports and bolt holes aligned properly.**
- d. Insert all six bolts (4) around edge of manifold. Reinstall pump center bolt (1) with its washer (2).
- e. Alternately tighten perimeter bolts (4) until all are secure. Torque to 54 N-m.
- f. Tighten pump center bolt. Torque to 54 N-m.
- g. Recheck all bolts for tightness.



# D/G-10 Service (Hydraulic End)



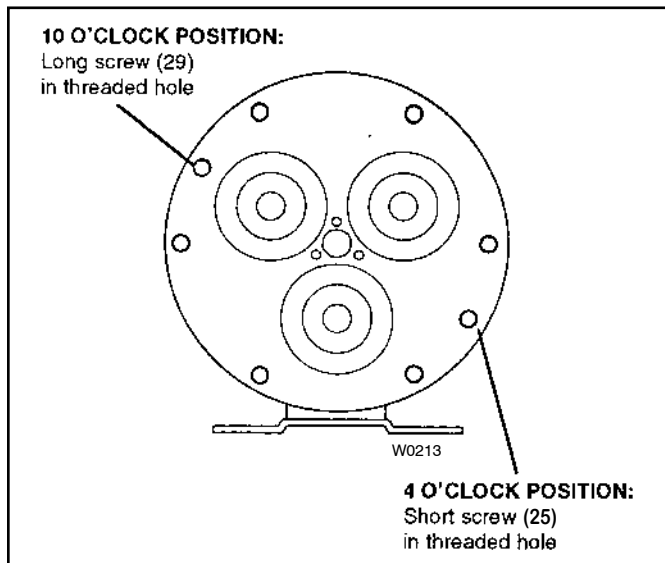
# D/G-10 Service (Hydraulic End)

**NOTE:** The numbers in parentheses are the Reference Numbers on the exploded view illustrations found in this manual and also in the Parts Manual.

**CAUTION:** Do not disassemble the hydraulic end of the pump unless you are a skilled mechanic. For assistance, contact Wanner Engineering (TEL 612-332-5681 or FAX 612-332-6937) or the distributor in your area.

**CAUTION:** The two bolts (29; 25 or 44) that screw through the back of the housing into the cylinder housing (24) hold the housing to the pump housing. Do not remove them except when repairing the hydraulic end.

**NOTE:** The following service procedures refer several times to the Wanner Tool Kit (P/N A03-175-1101). We strongly urge you not to try to repair the hydraulic end of the pump without using the tools in this kit (available from Wanner or your local distributor).



## 1. Remove Pump Housing

- Remove head of pump, and diaphragms, as outlined in the Fluid-End Service Section.
- Drain oil from pump housing by removing drain plug (34).
- Set hydraulic end of pump face-down on cylinder housing (24), onto smooth, clean surface.
- Check shaft for sharp burrs. Smooth any burrs, to prevent scarring housing seals (64) when you disassemble pump.
- Remove bolts (29; 25 or 44) that secure housing to cylinder casting. Piston return springs (50) will force cylinder housing and housing apart.

**NOTE:** When reassembling later, note that one bolt (29) is 1/4 in. (5 mm) longer than the other (25 or 44). The longer bolt must be installed in the 10 o'clock position of the cylinder housing (24).

- Lift off housing (30).
- Inspect cam and bearings (62), and bearing race in rear of housing. If bearings are pitted or binding, or if housing race is worn, replace them both.

## 2. Disassemble Pistons

- With pump housing removed (see above), turn unit over and set it on flat surface, piston side down.
- With diaphragms removed (see Fluid-End Service Section), reinsert follower screw (17) into hole in one of valve plungers (54). Tap screw lightly with hammer and plunger (21) should slip off valve plunger (54).  
Hydraulic piston assembly (50-59) can now be disassembled. Inspect all parts, and replace all O-rings and any other parts that are worn or damaged.
- Repeat step b. for remaining pistons.

**NOTE:** When you reassemble the hydraulic piston, use new plungers (21). They are press-fit onto the valve plungers (54) and are not reusable.

## 3. Reassemble Pistons

- Drop ball (58) into each opening in bottom of piston assembly (59).
- Insert retaining washer (57) and O-ring (56) to hold balls in place.
- Insert valve plunger (54) into valve cylinder (55). Slide spring (53) over plunger, inside valve cylinder.
- Insert O-ring (52) into spring retainer (51).
- Slide assembled valve cylinder, plunger, and spring (53-55) into spring retainer (51).
- Slide complete cylinder-and-retainer assembly (51-55) into piston assembly (59).
- Insert return spring (50) into piston assembly, wide end first. This is tight fit, and can best be done by turning spring in counterclockwise.
- Repeat above procedure for other two pistons.

## 4. Reassemble Pump Housing and Cylinder Housing

**NOTE:** Inspect the shaft seals (64) before continuing. If they look damaged in any way, replace them (remove by pounding them out from inside the pump housing). Both seals should be replaced at the same time. Clean the bore in the housing using emery cloth or ScotchBrite™.

- Place cylinder housing (24) face-down on flat surface.
- Insert assembled pistons (50-59) into cylinder housing. Holes on foot end of pistons should all point toward center of casting.
- Note location of outer ring of holes in cylinder housing and in pump housing flange (in particular, holes where bolts (29) and (25 or 44) will be installed).
- Stand camshaft assembly (62) on cylinder housing (24).  
**CAUTION:** The pilot bearing MUST be properly nested in the bearing race during assembly. If misaligned, the bearing will be damaged and the pump will fail within the first hours of operation.

# D/G-10 Service (Hydraulic End)

- e. Using petroleum jelly or grease to retain it, install O-ring (65) and slide housing (30) down over shaft. Be sure holes in housing and the cylinder housing are properly aligned.
- f. Install two assembly studs from Tool Kit, washers and nuts on threaded studs, but don't tighten yet. You may want to insert two or more bolts (4) into unthreaded holes of housing and cylinder housing to help align parts.
- g. Alternately tighten the nuts of assembly studs to evenly draw housing down to cylinder housing. Be sure O-ring (65) stays in place.  
Also, as you tighten nuts keep checking shaft alignment by turning shaft (use rotator in Wanner Tool Kit). If shaft begins to bind and become difficult to turn, back off nuts and realign shaft. When housing is tight against cylinder housing, you should be able to turn shaft smoothly.
- h. After pump housing and cylinder housing are together, insert bolt (25) with lock washer (5) (at 4 o'clock position) through pump housing and into cylinder housing. Repeat with bolt (29) in 10 o'clock position. Tighten evenly and then remove assembly studs.
- i. Turn shaft again to check its alignment.

## 5. Replace Shaft Seals

- a. Apply thin film of grease on seal protector tool (part of Wanner Tool Kit). Slide both seals onto tool, with spring side of seals toward open end of tool.  
Apply heavier coat of grease between seals and press together.
- b. Apply coating of Loctite® High-Performance Pipe Sealant with PTFE, or comparable product, to outer surface of both seals and inside surface of the opening in pump housing where seals will rest.
- c. Apply light film of grease to drive shaft. Slide seal protector tool (with two seals) over end of shaft.
- d. Slide seal inserter tool (from Wanner Tool Kit) over seal protector tool, and press seals completely into place. Tap tool with soft mallet to firmly seat seals.

## 6. Adjust Cam Shaft Endplay

- a. Remove three set screws (22) from cylinder casting (24), and clean them.
- b. Insert center bolt (1) into hole in center of cylinder casting. Turn it in to move bearing adjusting plate (61) and cup tight against bearing cone.
- c. Back out center bolt two full turns, then turn it back in again until it is tight against adjusting plate (61).
- d. Back out the center bolt exactly 1/4 of a turn.
- e. With plastic mallet (or regular mallet and wooden board) to prevent damage to shaft, rap end of shaft 3 or 4 times. This will provide about 0.006 in. (0.15 mm) endplay in shaft.
- f. Apply removable threadlocker to threads of three cleaned set screws (22).  
Screw three set screws (22) into cylinder casting until they contact bearing adjusting plate (61).
- g. Remove center bolt (1).

## 7. Install Plungers

**NOTE: If the plungers (21) have been removed from the valve plungers (54), do not reuse them. Install new ones instead.**

- a. Rotate pump shaft so piston is at top-dead-center position.
- b. Place plunger on exposed screw end of plunger guide tool (from Wanner Tool Kit). Larger-diameter side of plunger should face tool.
- c. Screw guide (with plunger) into valve plunger (54) until tight.
- d. Hold single bottom handle of guide, and turn double top handle to force plunger to seat on valve plunger. This is press-fit. When installed, plunger should be tight against shoulder of valve plunger.  
**NOTE: Do not remove the plunger guide until the diaphragm is installed (see below).**
- e. Install diaphragm as outlined below, then repeat procedure for other two plungers and diaphragms.

## 8. Reinstall Diaphragms

- a. With plunger guide tool still screwed into valve plunger (54), pull valve plunger up until cross-holes in valve plunger are exposed.
- b. Insert diaphragm Allen wrench (from Wanner Tool Kit), through top hole — to hold plunger (21) away from cylinder casting. This will also keep valve plunger from turning when diaphragm is being installed.
- c. Place diaphragm (20) onto plunger (21) ridge-side out.
- d. Center diaphragm follower (19) on diaphragm.
- e. Place O-ring (18) onto follower screw (17).
- f. Apply small amount of threadlocker to threads of follower screw.
- g. Insert follower screw (with O-ring) through diaphragm follower (19) and diaphragm (20), and screw it into valve plunger (54).
- h. Hold plunger holder, and torque follower screw to 18 in.-lbs (2.0 N-m).
- i. Repeat above procedure for plungers and diaphragms of other two cylinders.
- j. Fill reservoir with fresh oil and prime pump, as outlined in Fluid-End Service Section.

## 9. Reassemble Pump Head

Reassemble pump head as outlined in Fluid-End Service Section.

# D/G-10 Troubleshooting

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## Cavitation

- Inadequate fluid supply because:
  - Inlet line collapsed or clogged
  - Clogged line strainer
  - Inlet line too small or too long
  - Air leak in inlet line
  - Worn or damaged inlet hose
  - Suction line too long
  - Too many valves and elbows in inlet line
- Fluid too hot for inlet suction piping system.
- Air entrained in fluid piping system.
- Aeration and turbulence in supply tank.
- Inlet vacuum too high (refer to the Inlet Calculations paragraph of the Installation Section).

## Symptoms of Cavitation

- Excessive pump valve noise
- Premature failure of spring or retainer
- Volume or pressure drop
- Rough-running pump
- Premature failure
- Piston return spring failure

## Drop in Volume or Pressure

A drop in volume or pressure can be caused by one or more of the following:

- Air leak in suction piping
- Clogged suction line or suction strainer
- Suction line inlet above fluid level in tank
- Inadequate fluid supply
- Pump not operating at proper RPM
- Relief valve bypassing fluid
- Worn pump valve parts
- Foreign material in inlet or outlet valves
- Loss of oil prime in cells because of low oil level
- Ruptured diaphragm
- Cavitation
- Warped manifold from over pressurized system
- O-rings forced out of their grooves from over-pressurization
- Air leak in suction line strainer or gasket
- Cracked suction hose.
- Empty supply tank
- Excessive aeration and turbulence in supply tank
- Worn and slipping drive belts
- Worn spray nozzles
- Cracked cylinder casting

## Pump Runs Rough

- Worn pump valves
- Air lock in outlet system
- Oil level low
- Wrong weight of oil for cold operating temperatures (change to lighter weight)
- Cavitation
- Air in suction line
- Restriction in inlet/suction line
- Hydraulic cells not primed after changing diaphragm
- Foreign material in inlet or outlet valve
- Damaged diaphragm
- Fatigued or broken valve spring
- Broken piston return spring

## Premature Failure of Diaphragm

- Frozen pump
- Puncture by a foreign object
- Elastomer incompatible with fluid being pumped
- Pump running too fast
- Excess pressure
- Cavitation
- Broken piston return spring

## Water (or Process Fluid) in Oil Reservoir

- Condensation
- Ruptured diaphragm
- Hydraulic cell not properly primed after diaphragm replacement
- Frozen pump
- Diaphragm screw O-ring missing or cracked
- Cracked cylinder casting

# D/G-10 Troubleshooting

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## Water (or Process Fluid)

### Pulsations

**NOTE: Small pulsations are normal in single-acting pumps with multiple pumping chambers.**

- Foreign object lodged in pump valve
- Loss of prime in hydraulic cell because of low oil level
- Air in suction line
- Valve spring broken
- Cavitation
- Aeration or turbulence in supply tank

### Valve Wear

- Normal wear from high-speed operation
- Cavitation
- Abrasives in the fluid
- Valve incompatible with corrosives in the fluid
- Pump running too fast

### Loss of Oil

- External seepage
- Rupture of diaphragm
- Frozen pump
- Diaphragm screw O-ring missing or cracked
- Worn shaft seal
- Oil drain piping or fill cap loose.
- Valve plate and manifold bolts loose

### Premature Failure of Valve Spring or Retainer

- Cavitation
- Foreign object in the pump
- Pump running too fast
- Spring/retainer material incompatible with fluid being pumped
- Excessive inlet pressure.

### **Limited Warranty**

Wanner Engineering, Inc. extends to the original purchaser of equipment manufactured by it and bearing its name, a limited one-year warranty from the date of purchase against defects in material or workmanship, provided that the equipment is installed and operated in accordance with the recommendations and instructions of Wanner Engineering, Inc. Wanner Engineering, Inc. will repair or replace, at its option, defective parts without charge if such parts are returned with transportation charges prepaid to Wanner Engineering, Inc., 1204 Chestnut Avenue, Minneapolis, Minnesota 55403.

This warranty does not cover:

1. The electric motors (if any), which are covered by the separate warranties of the manufacturers of these components.
2. Normal wear and/or damage caused by or related to abrasion, corrosion, abuse, negligence, accident, faulty installation or tampering in a manner which impairs normal operation.
3. Transportation costs.

This limited warranty is exclusive, and is in lieu of any other warranties (express or implied) including warranty of merchantability or warranty of fitness for a particular purpose and of any non contractual liabilities including product liabilities based on negligence or strict liability. Every form of liability for direct, special, incidental or consequential damages or loss is expressly excluded and denied.



**WANNER ENGINEERING, INC.**

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**Parts Manual**  
**G10-991-2402B**

# Hydra-Cell<sup>®</sup>

## INDUSTRIAL PUMPS

**Model: G-10**  
*with metallic pump head*

**IMPORTANT**

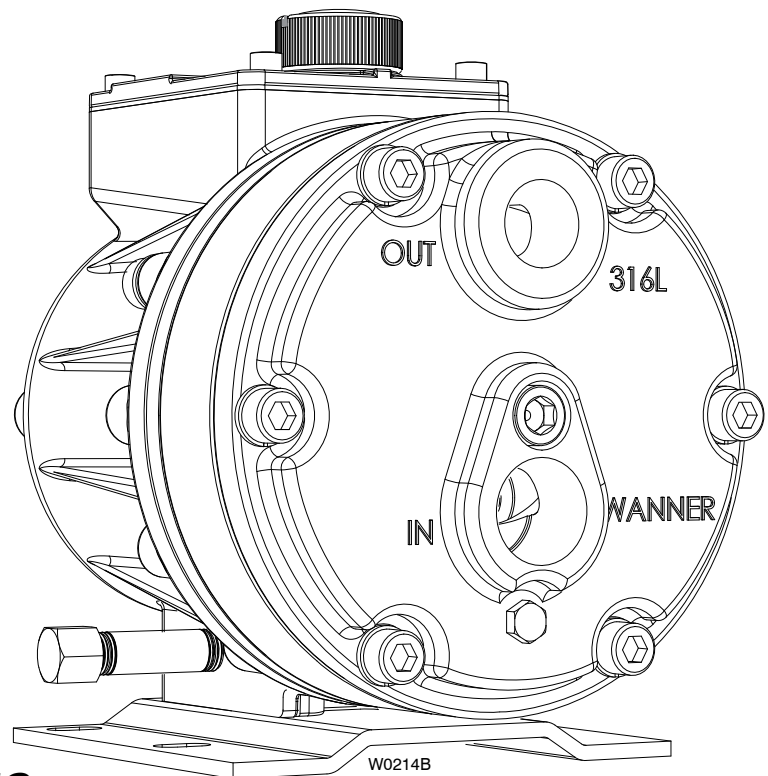
Record your pump model number and serial number here for easy reference:

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date of Purchase \_\_\_\_\_

When ordering parts or making inquiries about this pump, please mention the model and serial numbers.



**WANNER ENGINEERING, INC.**

1204 Chestnut Avenue, Minneapolis, MN 55403

TEL: (612) 332-5681 FAX: (612) 332-6937

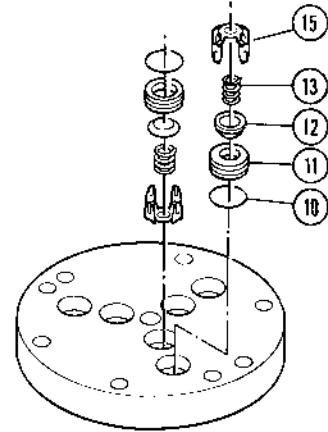
TOLL-FREE FAX [US only]: (800) 332-6812

[www.hydra-cell.com](http://www.hydra-cell.com)

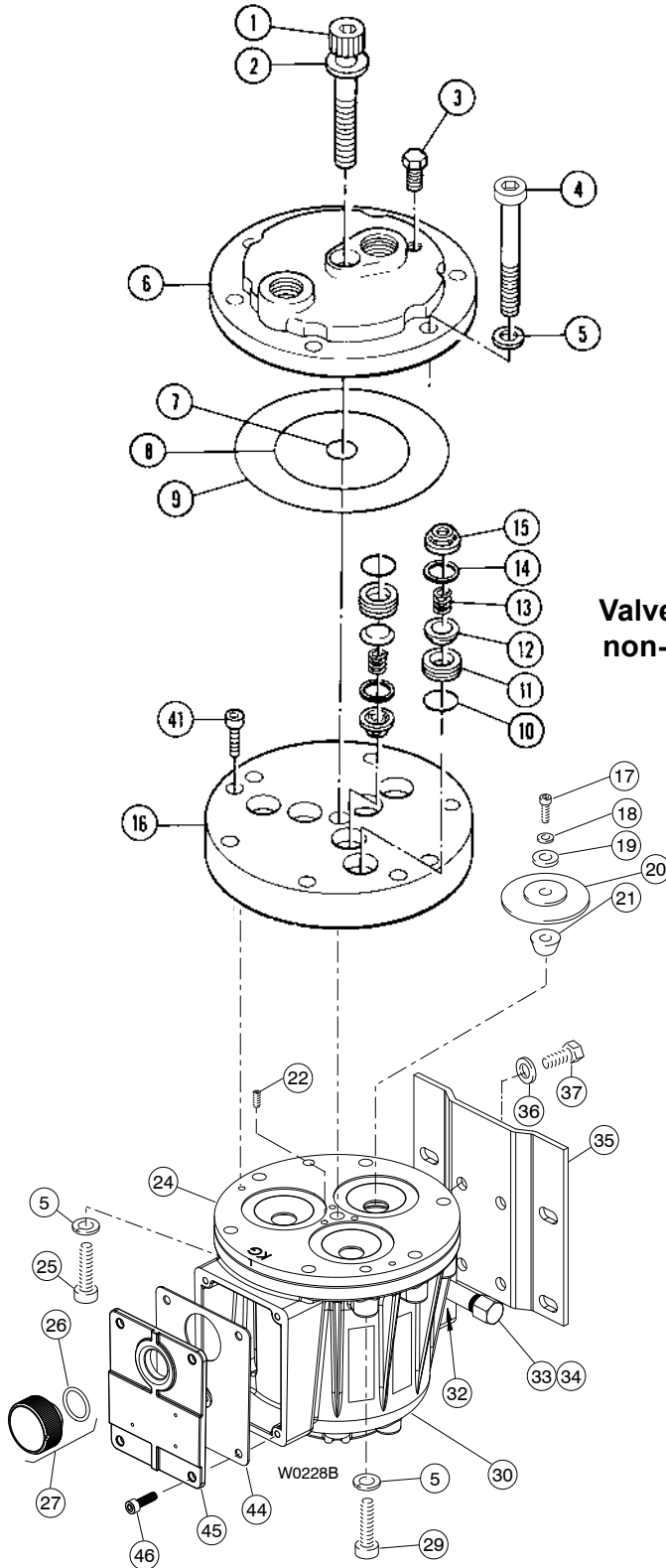
email: [sales@wannereng.com](mailto:sales@wannereng.com)

# G-10 Fluid End (with metallic pump head)

## Valve Assemblies with Metal Retainers



## Valve Assemblies with non-Metallic Retainers





# G-10 Fluid End (with metallic pump head)

| Ref. No. | Part Number  | Description                                       | Quantity/<br>Pump | Ref. No. | Part Number  | Description                                    | Quantity/<br>Pump |
|----------|--------------|---------------------------------------------------|-------------------|----------|--------------|------------------------------------------------|-------------------|
| 1        | G10-081-2010 | Screw, Cap, soc-hd, 70 mm                         | 1                 | 12       | D10-021-1011 | Valve, Nitronic                                | 6                 |
| 2        | G10-084-1010 | Washer, Flat                                      | 1                 |          | D10-021-1015 | Valve, 17-4 SST, machined, HT                  | 6                 |
| 3        | G10-038-2017 | Plug, Hastelloy C                                 | 1                 |          | D10-021-1016 | Valve, Tungsten carbide                        | 6                 |
|          | G10-038-2211 | Plug, 316 SST                                     | 1                 |          | D10-021-1017 | Valve, Hastelloy C                             | 6                 |
|          |              |                                                   |                   |          | D10-021-3300 | Valve, Ceramic                                 | 6                 |
| 4        | G10-024-2010 | Screw, Soc-hd, 90 mm <sup>1</sup>                 | 6                 | 13       | D10-022-3116 | Valve Spring, 17-7 SST, HT                     | 6                 |
|          | G10-024-2011 | Screw, Soc-hd, 80 mm <sup>2</sup>                 | 6                 |          | D10-022-3117 | Valve Spring, Elgiloy                          | 6                 |
|          |              |                                                   |                   |          | D10-022-3123 | Valve Spring, Hastelloy C                      | 6                 |
| 5        | D11-048-2011 | Washer, Flat <sup>1</sup>                         | 12                | 14       | D10-092-2110 | Tetra Seal, Buna                               | 6                 |
|          | G25-048-2010 | Washer, Split-lock <sup>2</sup>                   | 8                 |          | D10-092-2111 | Tetra Seal, Viton                              | 6                 |
| 6        | G10-004-1002 | Manifold, 316 SST, BSPT                           | 1                 |          | D10-092-2112 | Tetra Seal, Neoprene                           | 6                 |
|          | G10-004-1008 | Manifold, Brass, BSPT                             | 1                 |          | D10-092-2113 | Tetra Seal, EPDM                               | 6                 |
|          | G10-004-1017 | Manifold, Nickel alloy, Hastelloy<br>CW12MW, BSPT | 1                 |          | D10-092-2118 | Tetra Seal, PTFE                               | 6                 |
|          | G10-004-1034 | Manifold, Cast iron, BSPT                         | 1                 | 15       | D10-023-1010 | Retainer, Valve spring, 17-7 SST, HT           | 6                 |
| 7        | D10-083-2110 | O-ring, Center bolt, Buna                         | 1                 |          | D10-023-1017 | Retainer, Valve spring, Hastelloy C            | 6                 |
|          | D10-083-2111 | O-ring, Center bolt, Viton                        | 1                 |          | D10-023-2310 | Retainer, Valve spring, Celcon                 | 6                 |
|          | D10-083-2112 | O-ring, Center bolt, Neoprene                     | 1                 |          | D10-023-2326 | Retainer, Valve spring, Nylon                  | 6                 |
|          | D10-083-2113 | O-ring, Center bolt, EPDM                         | 1                 |          | D10-023-2327 | Retainer, Valve spring, polypropylene          | 6                 |
|          | D10-083-2118 | O-ring, Center bolt, PTFE                         | 1                 |          | D10-023-2328 | Retainer, Valve spring, Kynar                  | 6                 |
| 8        | D10-073-2118 | O-ring, Inner manifold, PTFE                      | 1                 | 16       | D10-003-1011 | Valve plate, Brass                             | 1                 |
|          | D11-073-2120 | O-ring, Inner manifold, Buna                      | 1                 |          | D10-003-1012 | Valve plate, 316 SST                           | 1                 |
|          | D11-073-2121 | O-ring, Inner manifold, Viton                     | 1                 |          | D10-003-1019 | Valve plate, Cast iron                         | 1                 |
|          | D11-073-2122 | O-ring, Inner manifold, Neoprene                  | 1                 |          | D10-003-1027 | Valve plate, Nickel alloy,<br>Hastelloy Cw12MW | 1                 |
|          | D11-073-2123 | O-ring, Inner manifold, EPDM                      | 1                 | 17       | D10-030-2010 | Screw, Flat-hd, SST, 3/8 in.                   | 3                 |
| 9        | D10-074-2118 | O-ring, Outer manifold, PTFE                      | 1                 |          | D10-030-2011 | Screw, Flat-hd, Hastelloy C, 3/8 in.           | 3                 |
|          | D11-074-2120 | O-ring, Outer manifold, Buna                      | 1                 | 18       | D10-047-2110 | O-ring, Follower, Buna-N                       | 3                 |
|          | D11-074-2121 | O-ring, Outer manifold, Viton                     | 1                 |          | D10-047-2111 | O-ring, Follower, Viton                        | 3                 |
|          | D11-074-2122 | O-ring, Outer manifold, Neoprene                  | 1                 |          | D10-047-2112 | O-ring, Follower, Neoprene                     | 3                 |
|          | D11-074-2123 | O-ring, Outer manifold, EPDM                      | 1                 |          | D10-047-2113 | O-ring, Follower, EPDM                         | 3                 |
|          |              |                                                   |                   |          | D10-047-2118 | O-ring, Follower, PTFE                         | 3                 |
| 10       | D10-035-2110 | O-ring, Valve seat, Buna                          | 6                 | 19       | D10-017-1010 | Follower, 316 SST                              | 3                 |
|          | D10-035-2111 | O-ring, Valve seat, Viton                         | 6                 |          | D10-017-1011 | Follower, Hastelloy C                          | 3                 |
|          | D10-035-2112 | O-ring, Valve seat, Neoprene                      | 6                 | 20       | D10-018-2312 | Diaphragm, Neoprene                            | 3                 |
|          | D10-035-2113 | O-ring, Valve seat, EPDM                          | 6                 |          | D10-018-2313 | Diaphragm, EPDM                                | 3                 |
|          | D10-035-2118 | O-ring, Valve seat, PTFE                          | 6                 |          | D10-018-2315 | Diaphragm, Viton XT                            | 3                 |
| 11       | D10-020-1010 | Valve seat, 17-4 SST, HT                          | 6                 |          | D10-018-2318 | Diaphragm, PTFE                                | 3                 |
|          | D10-020-1011 | Valve seat, 316 SST                               | 6                 |          | D10-018-2320 | Diaphragm, Buna-N-XS                           | 3                 |
|          | D10-020-1016 | Valve seat, Tungsten carbide                      | 6                 | 21       | D10-016-1010 | Plunger                                        | 3                 |
|          | D10-020-1017 | Valve seat, Hastelloy C                           | 6                 | 22       | G10-082-2010 | Set Screw, 10 mm                               | 3                 |
|          | D10-020-3300 | Valve seat, Ceramic                               | 6                 |          |              |                                                |                   |

<sup>1</sup> Used on G10 models prior to S/N 216283.

<sup>2</sup> Used on G10 models S/N 216283 and above.

# G-10 Fluid End (with metallic pump head)

| Ref. No. | Part Number  | Description                                             | Quantity/<br>Pump |
|----------|--------------|---------------------------------------------------------|-------------------|
| 24       | K10-002-1020 | Cylinder Housing.....                                   | 1                 |
|          | K10-002-1220 | Cylinder Housing Assembly, Metric <sup>3</sup>          |                   |
|          | K10-002-1242 | Loaded Cylinder Housing, Metric, Neoprene <sup>6</sup>  |                   |
|          | K10-002-1243 | Loaded Cylinder Housing, Metric, EPDM <sup>6</sup>      |                   |
|          | K10-002-1244 | Loaded Cylinder Housing, Metric, Buna N-XS <sup>6</sup> |                   |
|          | K10-002-1245 | Loaded Cylinder Housing, Metric, Viton XT <sup>6</sup>  |                   |
|          | K10-002-1246 | Loaded Cylinder Housing, Metric, PTFE <sup>6</sup>      |                   |
| 25       | G10-029-2010 | Screw, Cap, hex-hd, 25 mm <sup>1</sup> .....            | 4                 |
|          | G10-089-2011 | Screw, Cap, hex-hd, 38 mm <sup>2</sup> .....            | 1                 |
| 26       | D10-080-2110 | O-ring, Oil fill, Buna.....                             | 1                 |
| 27       | D03-039-1030 | Cap with O-ring, Oil fill.....                          | 1                 |
| 29       | G10-087-2010 | Screw, Cap, soc-hd, 30 mm <sup>1</sup> .....            | 1                 |
|          | G10-087-2011 | Screw, Cap, soc-hd, 45 mm <sup>2</sup> .....            | 1                 |
| 30       | G10-001-1050 | Pump Housing, Metric <sup>4</sup> .....                 | 1                 |
|          | G10-001-1215 | Pump Housing Assembly, Metric <sup>5</sup> .....        | —                 |
| 31       | G10-028-2010 | Nut, Hex, M10.....                                      | 6                 |
| 32       | D10-076-2210 | Elbow, Brass, 1/8 in. <sup>1</sup> .....                | 1                 |
|          | D10-076-2250 | Plug, Soc-hd, 1/4 in. <sup>2</sup> .....                | 2                 |
| 33       | D10-077-2210 | Nipple, Brass, 3/8 in. <sup>1</sup> .....               | 1                 |
|          | D10-077-2250 | Nipple, Brass, 1/4 in. <sup>2</sup> .....               | 1                 |
| 34       | D10-078-2210 | Cap, Brass, 1/8 in. <sup>1</sup> .....                  | 1                 |
|          | D10-078-2250 | Cap, Brass, 1/4 in. <sup>2</sup> .....                  | 1                 |
| 35       | D10-025-1010 | Base.....                                               | 1                 |
| 36       | D10-054-2010 | Washer, Shakeproof.....                                 | 4                 |
| 37       | G10-029-2010 | Screw, Cap, hex-hd, 25 mm.....                          | 4                 |
| 41       | G10-088-2010 | Screw, Cap, soc-hd, 30 mm.....                          | 2                 |
| 43       | G10-029-2010 | Screw, Cap, soc-hd, 25 mm <sup>1</sup> .....            | 1                 |
|          | G10-089-2011 | Screw, Cap, soc-hd, 38 mm <sup>2</sup> .....            | 1                 |
| 44       | G10-106-2350 | Gasket, Cover <sup>2</sup> .....                        | 1                 |
| 45       | G10-105-1050 | Cover/Nameplate <sup>2</sup> .....                      | 1                 |
| 46       | G03-088-2010 | Screw, 20 mm <sup>2</sup> .....                         | 4                 |

<sup>1</sup> Used on G10 models prior to S/N 216283.

<sup>2</sup> Used on G10 models S/N 216283 and above.

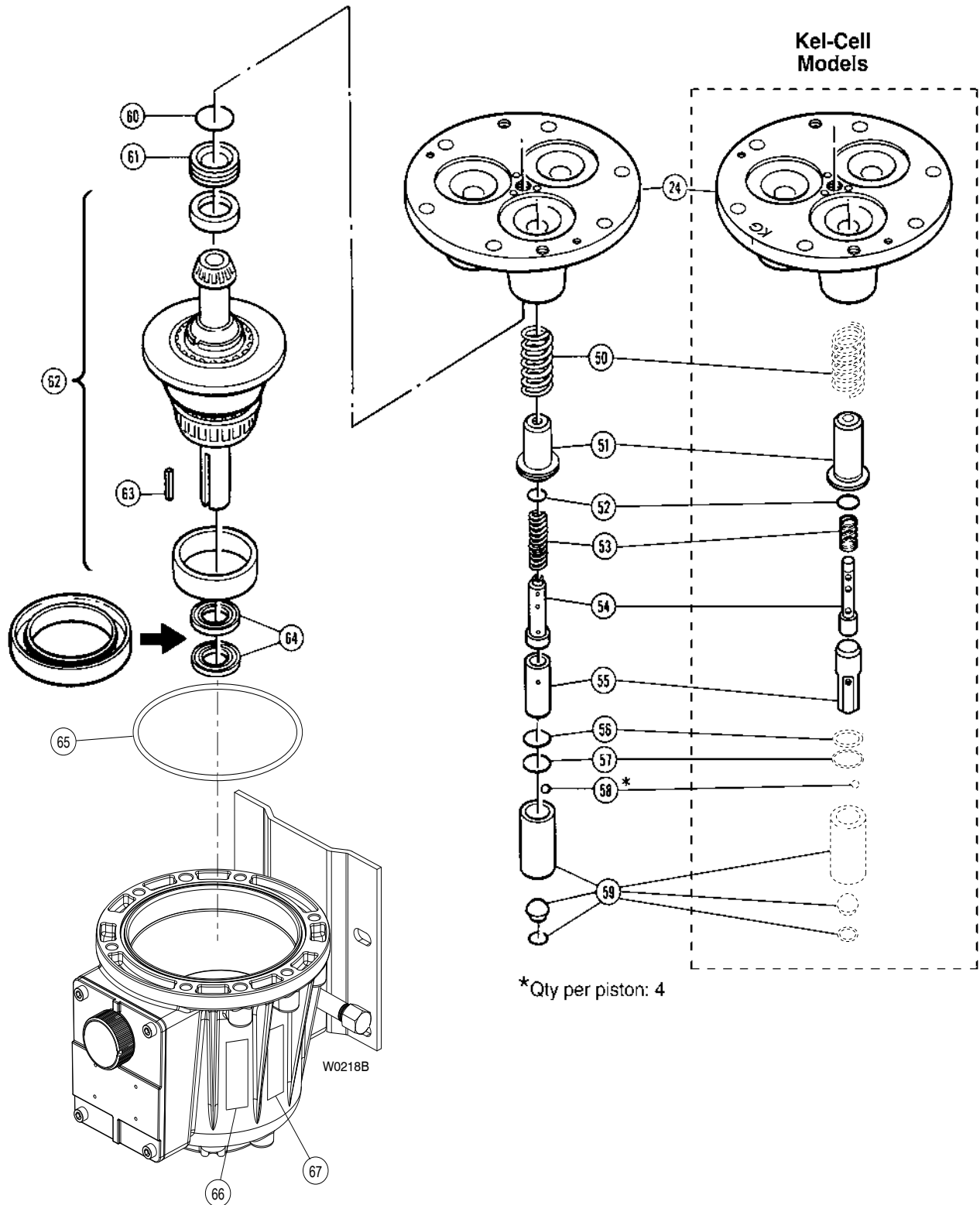
<sup>3</sup> Cylinder Housing Assembly includes casting (24), bearing, adjusting plate (61), O-ring (60), and set screws (22).

<sup>4</sup> Pump housing (metric) includes housing (30), cover (45), gasket (44), and screws (46). Requires new screws (4), washers (5), screws (25), and screw (29).

<sup>5</sup> Pump Housing Assembly includes housing (30), oil drain/plugs (32, 33, 34), cover (45), gasket (44), and screws (46). Requires new screws (4), washers (5), screws (25), and screw (29).

<sup>6</sup> Loaded Cylinder Housing includes Fluid End parts (17 - 22) and Hydraulic End parts (50 - 61).

# G-10 Hydraulic End (with metallic pump head)



# G-10 Hydraulic End (with metallic pump head)

| Ref. No. | Part Number  | Description                                                  | Quantity/<br>Pump |
|----------|--------------|--------------------------------------------------------------|-------------------|
| 50       | D10-019-3110 | Spring, Piston return .....                                  | 3                 |
| 51       | D10-042-1010 | Retainer, Spring .....                                       | 3                 |
|          | K10-042-1010 | Retainer, Spring, Kel-Cell <sup>5</sup> .....                | 3                 |
| 52       | D10-046-2110 | O-ring, Valve cylinder, Buna .....                           | 3                 |
|          | C23-009-2110 | O-ring, Valve cylinder,<br>Buna, Kel-Cell <sup>5</sup> ..... | 3                 |
| 53       | D10-045-3110 | Spring, Sleeve valve .....                                   | 3                 |
|          | D10-045-3111 | Spring, Sleeve valve,<br>PTFE diaphragm .....                | 3                 |
|          | K10-045-3110 | Spring, Sleeve valve, Kel-Cell <sup>5</sup> .....            | 3                 |
| 54       | D10-044-1010 | Valve Plunger .....                                          | 3                 |
|          | K10-044-1010 | Valve Plunger, Kel-Cell <sup>5</sup> .....                   | 3                 |
| 55       | D10-043-1010 | Cylinder, Valve .....                                        | 3                 |
|          | K10-043-1010 | Cylinder, Valve, Kel-Cell <sup>5</sup> .....                 | 3                 |
| 56       | D10-034-2110 | O-ring, Buna.....                                            | 3                 |
| 57       | D10-041-1010 | Washer, Ball retainer.....                                   | 3                 |
| 58       | D10-015-3010 | Ball .....                                                   | 12                |
| 59       | D10-014-1209 | Piston with foot and retainer .....                          | 3                 |
|          | D10-014-1210 | Piston Assembly, Buna <sup>6</sup> .....                     | —                 |
|          | K10-014-1210 | Piston Assembly, Buna, Kel-Cell <sup>5,6</sup> ...           | —                 |
| 60       | D10-075-2110 | O-ring, Bearing adjusting plate, Buna                        | 1                 |
| 61       | D10-012-1010 | Bearing Adjusting Plate.....                                 | 1                 |
| 62       | D10-007-1210 | (X) Cam Assembly, 29.0 lpm<br>@ 1450 rpm <sup>7</sup> .....  | —                 |
|          | D10-007-1211 | (I) Cam Assembly, 12.5 lpm<br>@ 1450 rpm <sup>7</sup> .....  | —                 |
|          | D10-007-1212 | (S) Cam Assembly, 18.9 lpm<br>@ 1450 rpm <sup>7</sup> .....  | —                 |
|          | D10-007-1214 | (E) Cam Assembly, 25.2 lpm<br>@ 1450 rpm <sup>7</sup> .....  | —                 |
| 63       | D10-085-2210 | Key, Shaft.....                                              | 1                 |
| 64       | D10-031-2110 | Seal , Buna.....                                             | 2                 |
| 65       | D10-037-2110 | O-ring, Pump housing, Buna .....                             | 1                 |
| 66       | D10-111-2401 | Label, Caution, freezing.....                                | 1                 |
| 67       | D10-111-2402 | Label, Caution, check oil.....                               | 1                 |

<sup>5</sup> Parts used in Kel-Cell version pumps (Kel-Cell version pumps are indicated by a “K” in the 5th digit of the pump model number).

<sup>6</sup> Piston Assembly includes cylinder, foot, valve plunger, O-rings, spring retainer, and springs (50-59).

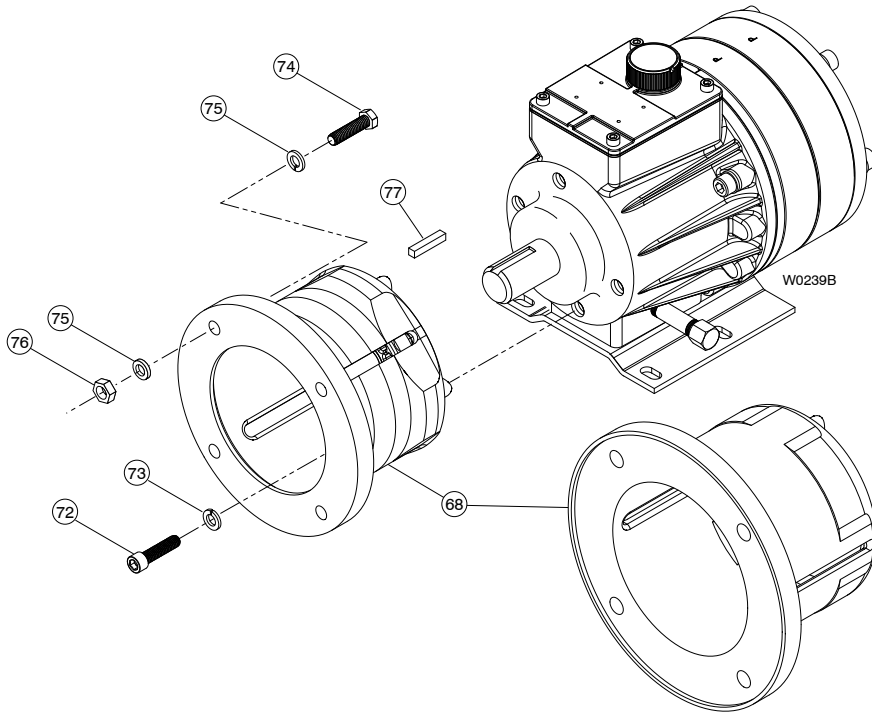
<sup>7</sup> Cam Assembly includes cam, shaft, wobble plate, and bearings. It is only available as an assembly.

# G-10 Adapter Kit (with metallic pump head)

## G-10 Pump/Motor Adapter Kit

For IEC 80-90 B5 Flange Motors (Complete Kit Part No. A04-003-1200)

For IEC 100-112 B5 Flange Motors (Complete Kit Part No. A04-004-1200)



| Ref No. | Description                | A04-003-1200 <sup>1</sup><br>A04-001-1200 <sup>2</sup> | A04-004-1200 <sup>1</sup><br>A04-002-1200 <sup>2</sup> | Qty/Kit |
|---------|----------------------------|--------------------------------------------------------|--------------------------------------------------------|---------|
| 68      | Pump/Motor Adapter         | A04-031-1001 <sup>1</sup><br>A04-032-1051 <sup>2</sup> | A04-030-1001 <sup>1</sup><br>A04-033-1051 <sup>2</sup> | 1<br>1  |
| 69*     | Adapter Baseplate          | A04-025-1010 <sup>1</sup>                              | —                                                      | 1       |
| 70*     | Screw, Cap, Hex-hd         | D10-029-2010 <sup>1</sup>                              | —                                                      | 4       |
| 71*     | Lockwasher, Internal tooth | D10-054-2010 <sup>1</sup>                              | —                                                      | 4       |
| 72      | Screw, Cap, Soc-hd         | G10-089-2010<br>M10                                    | G10-089-2010<br>M10                                    | 4<br>4  |
| 73      | Lockwasher, Split          | G25-048-2011<br>M10                                    | G25-048-2011<br>M10                                    | 4<br>4  |
| 74      | Screw, Cap, Hex-hd,        | A04-046-2010<br>M10                                    | A04-043-2010<br>M12                                    | 4       |
| 75      | Lockwasher, Split          | A04-044-2010<br>M10                                    | M10-111-2000<br>1/2 in.                                | 8       |
| 76      | Nut, Hex                   | A04-047-2010<br>M10                                    | A04-045-2010<br>M12                                    | 4       |
| 77      | Key, Short                 | A04-085-2210                                           | A04-085-2210                                           | 1       |

<sup>1</sup> Used on G10 models prior to S/N 216283.

<sup>2</sup> Used on G10 models S/N 216283 and above.

\* Not shown.

# G-10 Series Replacement Parts Kits (with metallic pump head)

TO ORDER REPLACEMENT PARTS KIT: A Replacement Parts Kit contains 11 digits corresponding to customer-specified design options.

|   |   |   |   |   |   |   |   |   |    |    |
|---|---|---|---|---|---|---|---|---|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|----|----|

| Digit | Order Code | Description                                            |
|-------|------------|--------------------------------------------------------|
| 1-3   | <b>G10</b> | <b>Pump Configuration</b><br>For all G-10 Pumps        |
| 4     |            | <b>Kit Designator</b>                                  |
|       | <b>K</b>   | Complete Fluid End Kit                                 |
|       | <b>D</b>   | Diaphragm Kit                                          |
|       | <b>V</b>   | Valve Kit (diaphragm not included)                     |
| 5-6   | <b>52</b>  | <b>Pump Head Version</b><br>Metallic Pump Head Version |
| 7     |            | <b>Diaphragm &amp; O-ring Material</b>                 |
|       | <b>E</b>   | EPDM                                                   |
|       | <b>G</b>   | Viton®-XT                                              |
|       | <b>J</b>   | PTFE®                                                  |
|       | <b>P</b>   | Neoprene                                               |
|       | <b>T</b>   | Buna-N-XS                                              |
| 8     |            | <b>Valve Seat Material</b>                             |
|       | <b>C</b>   | Ceramic                                                |
|       | <b>D</b>   | Tungsten Carbide                                       |
|       | <b>H</b>   | 17-4 PH Stainless Steel                                |
|       | <b>S</b>   | 316 Stainless Steel                                    |
|       | <b>T</b>   | Hastelloy® C                                           |
|       | <b>X</b>   | Not included in Diaphragm Kit                          |
| 9     |            | <b>Valve Material</b>                                  |
|       | <b>C</b>   | Ceramic                                                |
|       | <b>D</b>   | Tungsten Carbide                                       |
|       | <b>F</b>   | 17-4 PH Stainless Steel – Machined                     |
|       | <b>H</b>   | 17-7 PH Stainless Steel – Stamped                      |
|       | <b>N</b>   | Nitronic 50                                            |
|       | <b>T</b>   | Hastelloy® C                                           |
|       | <b>X</b>   | Not included in Diaphragm Kit                          |
| 10    |            | <b>Valve Springs</b>                                   |
|       | <b>E</b>   | Elgiloy®                                               |
|       | <b>H</b>   | 17-7 PH Stainless Steel                                |
|       | <b>T</b>   | Hastelloy® C                                           |
|       | <b>X</b>   | Not included in Diaphragm Kit                          |
| 11    |            | <b>Valve Spring Retainers</b>                          |
|       | <b>C</b>   | Celcon                                                 |
|       | <b>H</b>   | 17-7 PH Stainless Steel                                |
|       | <b>M</b>   | Kynar®                                                 |
|       | <b>P</b>   | Polypropylene                                          |
|       | <b>T</b>   | Hastelloy® C                                           |
|       | <b>Y</b>   | Nylon (Zytel)                                          |
|       | <b>X</b>   | Not included in Diaphragm Kit                          |

## Kit Contents

| Part Number* | Description            | Qty | Kit Designator |   |   |
|--------------|------------------------|-----|----------------|---|---|
|              |                        |     | K              | D | V |
| D10-018-___  | Diaphragm              | 3   | •              | • |   |
| D10-047-___  | O-ring, Follower       | 3   | •              | • |   |
| D10-074-___  | O-ring, Outer manifold | 1   | •              | • | • |
| D10-073-___  | O-ring, Inner manifold | 1   | •              | • | • |
| D10-083-___  | O-ring, Center bolt    | 1   | •              | • | • |
| D10-035-___  | O-ring, Valve seat     | 6   | •              |   | • |
| D10-020-___  | Valve seat             | 6   | •              |   | • |
| D10-021-___  | Valve                  | 6   | •              |   | • |
| D10-022-___  | Valve spring           | 6   | •              |   | • |
| D10-092-___  | Tetra seal **          | 6   | •              |   | • |
| D10-023-___  | Retainer, Valve spring | 6   | •              |   | • |
| A01-113-3400 | Threadlocker           | 1   | •              | • |   |

\* Last four digits of part numbers with – \_\_\_ refer to specific material of construction.

\*\* Not included with metallic spring retainers.



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