Operator's Manual

Novatec P60-5 for Biomet Ltd

Ultrasonic Cleaning System - Serial No: CO 71 06

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Part 1 Introduction

1.1 Description

The system comprises five process stages mounted in a box section stainless steel framework. The cleaning tanks and the top surround are manufactured from polished AISI316 stainless steel. The framework is clad in brushed polished stainless steel panels and doors.

Under all wet areas of the machine are bund trays to contain water spills. Level switches in the bund trays isolate water feed to the machine and an alarm is be displayed if triggered.

The complete system is fitted with a top enclosure manufactured from anodised aluminium, toughened glass and stainless steel. The front of the enclosure is fitted with sliding glass doors. These doors are toughened safety glass and include safety interlocks.

The process is automated by means a two axis robot mounted to the rear of the system. This index's the component carriers from tank to tank at the end of the programmed cycle times.

Ultrasonic cleaning takes place in stage 1.

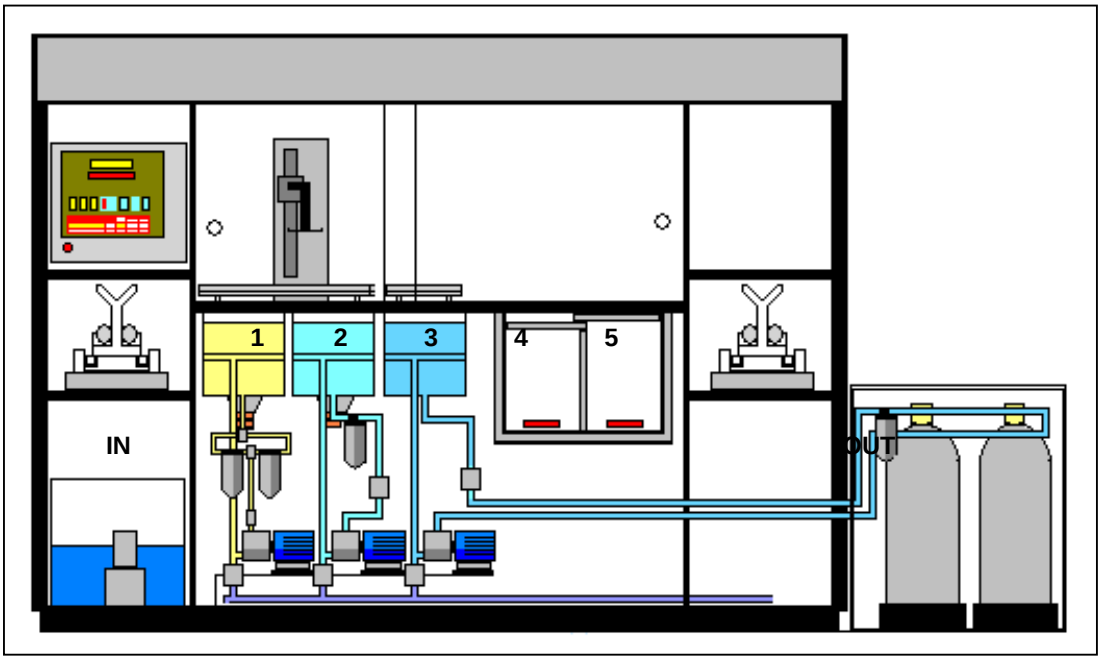
After ultrasonic cleaning the components are rinsed in factory water which is fed to tank three via an in-line heating system. The rinse water is filtered continuously and for a timed period during the rinse cycle, water is added to the tank to displace existing water and thereby remove chemicals carried over from tank two.

During cleaning and rinsing the carriers in stages 1 to 3 the carriers are oscillated vertically through 30mm to enhance the process. The oscillation speed will be adjustable so that the optimum speed can be selected to remove general contaminants and particularly polishing compound.

At the end of the tank three rinse cycle the carrier is automatically transferred to tank four where the components are rinsed in warm deionised water. This rinse water is constantly polished by circulation through activated carbon and a mixed resin bed, which remove organic an ionic contaminants respectively.

After cleaning and rinsing, the components are dried in either stage 4 or 5 hot air dryers.

1.2 Process Overview



Process Stage	1 Clean	2 Rinse	3 DI Rinse	4 Dry Hot Air	5 Dry Hot Air
Ultra-Sonics	40kHz	40kHz			
Heating °C	0-70	Amb.	0 - 50	0-90	0-90
Filtration	5				
Oscillation	Yes	Yes	Yes		
Air Purge		Yes			
Flow Control	Yes	Yes			
Weir Overflow	Yes	Yes	Yes		
Max Time Minutes	10	10	10	10	10

Part 2 Installation & Start-up

2.1 Siting the Machine

The machine should be sited on a flat surface to enable the weir overflows to tanks to operate efficiently. Try to choose a location that already has a water supply and a low level drain connection nearby.

2.2 Connecting the Services

- Check pipe-work integrity following transport and installation – make sure all connections and fittings appear to be sound.
- Connect water supply and return to the 1" BSP pipes at the back of the machine. Do not turn on the water supply at this stage.
- Connect the dump tank pump output to a suitable waste pipe (Pump rated at 80 Litres / Minute).
- Connect a 415V 32 Amp Three phase & neutral supply to the machine.
- Connect a compressed air supply to the connection on the rear of the machine and check that the pressure is set to 6 bar.

Part 3 Safety Precautions

THIS EQUIPMENT MUST ONLY BE OPERATED BY COMPETENT PERSONEL, IN ACCORDANCE WITH THE MANUFACTURERS PROCEDURES AND QUIDE LINES AS DETAILED IN THIS MANUAL.

MACHINE HEALTH AND SAFETY PRECAUTIONS MUST BE READ BEFORE OPERATING THIS EQUIPMENT.

THIS EQUIPMENT MUST BE INSTALLED BY AND CONNECTED TO SUPPLIES –POWER, WATER ETC. BY TRAINED PERSONEL IN ACCORDANCE WITH THE APPLICABLE LOCAL AND NATIONAL CODES OF PRACTICE.

- **WARNING! DO NOT wear any loose clothing while operating this machinery.**
- **WARNING! DO NOT place hands or any other part of your body into the Ultrasonic Tanks while they are in operation.**
- **WARNING! DO NOT place hands or other parts of your body into the Drying Tank.**
- **WARNING! DO NOT place hands or any other parts of your body into any of the machines Process Tanks when they are in operation.**
- **WARNING! DO NOT let any cleaning chemicals come into contact with skin – Always wear appropriate safety clothing and handle cleaning chemicals in accordance with the Manufacturer's Health and Safety Data Sheets.**
- **WARNING! DO NOT remove the machine panels when the machine is in use.**
- **WARNING! DO NOT put your hands or any objects into the gap on the right hand side of the system transfer beam, and the left-hand side of the system transfer beam. The transfer beam is the device that supports the lens carrier during the process.**
- **WARNING! DO NOT put your hands or any objects near any moving part of the machine.**
- **WARNING!** Before any maintenance work is performed on the system always isolate the electrical supplies to the system (if necessary refer to the Electrical Schematic of the machine).
- **WARNING!** We recommend that only a qualified electrician works inside the Electrical Control Panel.

- **WARNING!** Avoid excessive splashing of liquids around the top surround. This can cause ingress of water into the automation mechanical components, resulting in failure.
- **WARNING!** If there is an indication of a problem with the machine isolate the electrical supplies to the system (if necessary refer to the Electrical Schematic or relevant section of this Manual). If you are unable to resolve the problem then contact the Supplier.
- **WARNING!** DO NOT attempt to process more than one batch at any one time until the previous carrier has moved from the Loading Stage.

- Description of **WARNING** Labels

CAUTION! Hot Surfaces – keep hands and other parts of the body clear of this area.

CAUTION! Pinch or trap point – keep hands and other parts of the body clear of this area.

IF IN DOUBT ABOUT ANY MATTER WITH REGARDS TO THE SAFE OPERATION OF THIS EQUIPMENT, PLEASE CONTACT THE SUPPLIER.

Part 4 About Ultra-Sonics

4.1 Ultrasonic

Ultrasonic energy is energy in the form of sound waves – or mechanical vibrations - at too high a frequency to be heard by the human ear. When present in a tank of cleaning liquid these waves cause each particle of liquid to be alternately stretched and compressed at the frequency of operation. At 40 kHz this happens 40,000 times each second.

Ultra-sonic waves in this application are produced by means of three transducers bonded to the base of each of the ultra-sonic tanks. These transducers convert the electrical energy supplied by a generator in the control box into ultra-sonic vibratory energy.

Ultra-sonic energy produces a number of effects but three of these STREAMING, DEGASSING and CAVITATION are of particular significance in ultra-sonic cleaning.

4.2 Streaming

When the base of the ultra-sonic tank vibrates it produces a force that causes the liquid to flow away from it. This results in a flow of liquid to the surface. This is what causes the waves you see on the surface of the liquid in the ultra-sonic tank. Streaming is useful because it assists in dispersing loosened contaminant from the surface of the lenses.

4.3 Degassing

Most liquids contain dissolved gas. This is in the form of vast numbers of minute finely dispersed bubbles. When these bubbles are exposed to ultra-sonic energy they expand and compress at the applied frequency (in this case 35-40,000 time each second). Bubbles larger that a particular size associated with the operating frequency will allow smaller bubbles to enter them as they expand. These bubbles continue to grow until they are large enough to float to the surface.

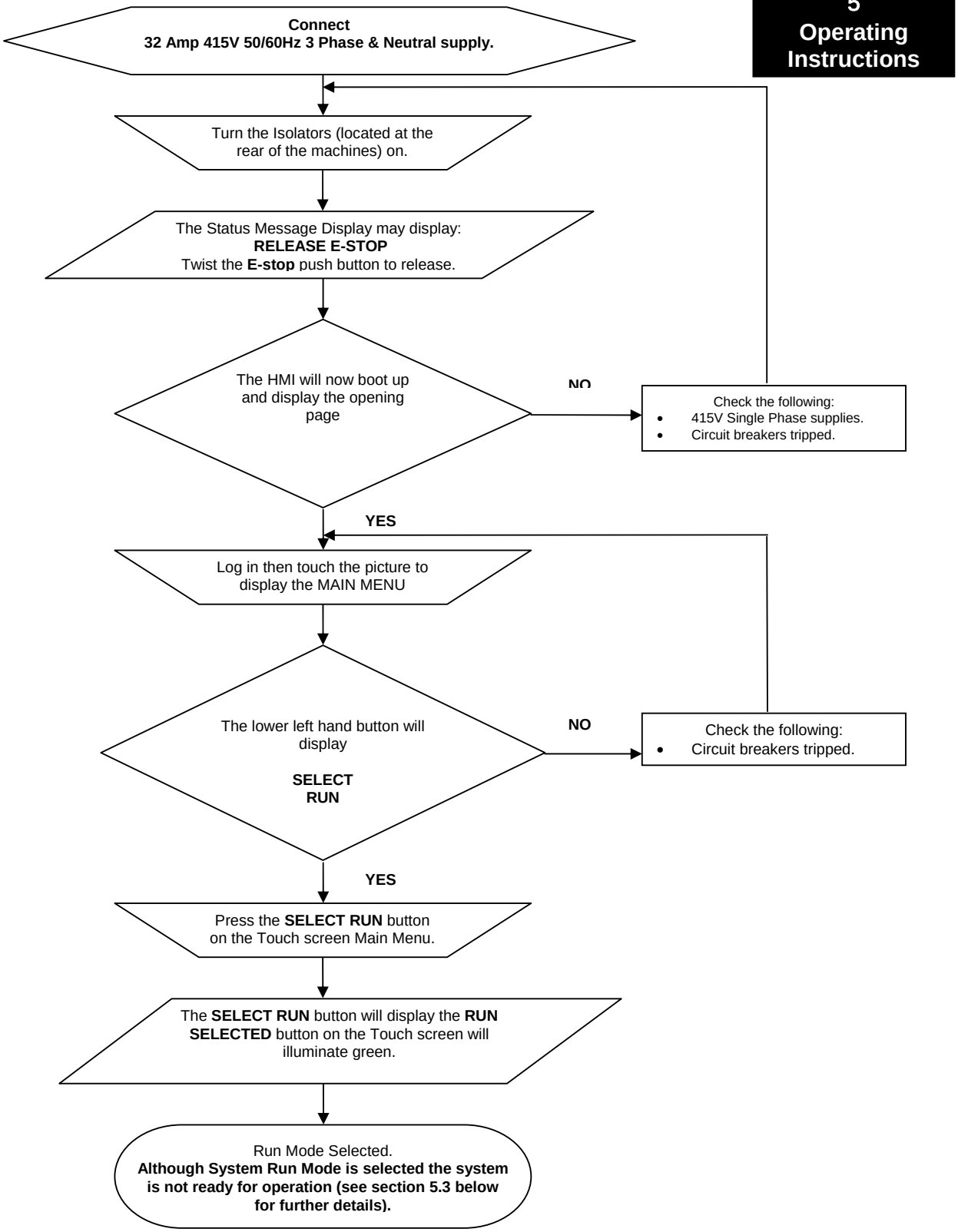
The liquid is degassed when all of the large bubbles have been released. The water-based chemicals recommended for use in ultrasonic cleaning only take a few seconds to degas. During this start-up part of the process you will see and hear that the ultra-sonic energy is slightly muted.

4.4 Cavitation

Bubbles smaller than those removed in the degassing phase perform the cleaning. During the stretching phase they grow and during the compression phase they burst. It is the bursting bubbles that produce the scrubbing action used to clean the substrates

PART 5 Operating Instructions

5. System Start-up and System Run mode Flow Chart



5.1 System Ready and System Start-up

Once System Run Mode has been selected (as above in section 5.2) the system is not ready for operation until the following automatic Start-up sequences have been completed:

1. **System Cold Start-Up**
   The message **SYSTEM COLD START-UP SEQUENCE** will now be displayed on the **System Status** (green) message display, until the water in all stages has reached the correct operating temperature. (The system typically requires 60 minutes to achieve operating temperature).

2. **Ultra-Sonic De-gas**
   The Message **SYSTEM COLD START ULTRA-SONIC DE-GAS** will now be displayed on the System Status (green) message display, until the Ultra-sonics have run for the defined de-gas period. (The System Default Ultra-sonic De-gas time period is 10 minutes).

3. **Robot Home Cycle**
   The Message **ROBOT HOME CYCLE** will now be displayed, until the Robot has fully completed a home cycle. The Robot home cycle is the process to datum or zero the Robot's positional counters, this cycle is activated each time the:
   - Run mode is selected when Auto mode is selected.
   - System is returned to Auto mode from Manual mode while in Run mode.
   - System Reset is operated (see section 6.6).
   - Robot Reset is operated (see section 6.6).
   - Green **Home** button is pressed on the hand held control when Manual Mode is selected.

Once the above sequences have been completed and the System is healthy, the message **SYSTEM READY** will be displayed on the System Status (green) message display now the system is ready to run (see section 5.6 before loading any baskets into the system).

Each of the above sequences is activated when Run mode is selected or when the Start Timer is selected to start the System. The system is not ready for operation until each sequence has been completed (the System start-up sequence can be overridden as below in section 5.4, although this is only recommended during commission).

If the System is left in stand-by mode, the System can be set to start automatically via a Start Timer within the System Configuration Menu on the Touch screen (see section 6.5 to set the Start Timer and also to set the real time clock to the correct local time).

5.2 System Start-up Override

The System Start-up can be overridden, once in Run Mode (as above in section 5.2) by pressing and holding the white **System Status** push button for a period of 5 seconds, until the white **System Status** indicator illuminates.

5.3 System Status Indicator

The white **System Status** indicator is extinguished or off.

- System not Ready, System Start-up in operation.
- System Ready and Load Conveyor is full.

The white **System Status** indicator is illuminated.

- Automatic start-up and ultra-sonic degas completed.
- Automatic start-up and ultra-sonic degas completed and the Load conveyor is not full.

The white **System Status** indicator is flashing.

- Load conveyor indexing basket to Load station.

The white **System Status** indicator is flashing with an audible alarm.

- The Unload station is occupied, remove basket from unload station.

5.4 System Program

Before baskets can be placed onto the Load conveyor the following selections must be made:

- **System Process**: One of the six System Programs must be selected (the System Program is a predefined sequence of process times used as the baskets are indexed through the Cleaning Machine).

Once the required System Program selections have been made, the bar code for the batch must be scanned. Point the barcode reader at the target and a red line will illuminate on the router sheet. Aim the red line at the barcode and press the trigger. The red line will disappear and a green dot will replace it to acknowledge that the bar code has been successfully captured. Now attach the router to the work basket and place it on the load conveyor. ***Make sure that the basket is placed against the backstops***. The router number will be displayed on the screen at the load conveyor mimic position.

IMPORTANT: Do not move the basket once it is on the conveyor. This will disrupt the load pitch and could cause the baskets to crash (pile-up) at the load station.

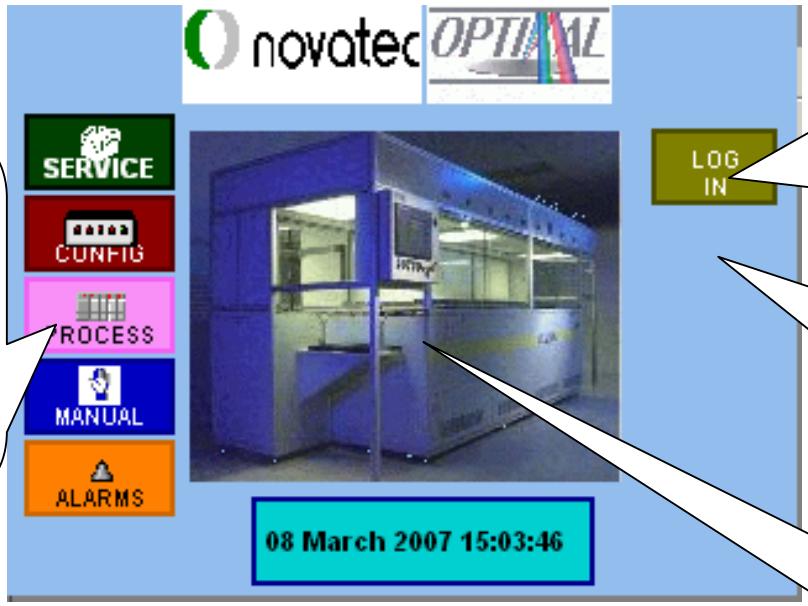
IMPORTANT: It is possible to configure the system to capture the recipe using a LOAD button on the main menu. This configuration would normally be selected in the event of a barcode reader failure. More information follows on subsequent pages.

IMPORTANT: If Basket arrives at the Load station and has no System Program selected the audible alarm will sound and the System Alarm (red) message display will display LOAD STATION NO PROCESS SELECTED. The Load conveyor will not accept any load cycles until this basket is removed from the load station.

The System Program once entered remains valid for all further baskets placed onto the load conveyor. Until such a time that the next basket requires a different System Program and this is entered.

These selections are chosen from the Push buttons on the process selection Menu (See below). Also the System Program for the baskets currently being processed can be viewed (See below).

5.5 Start- up Sequence

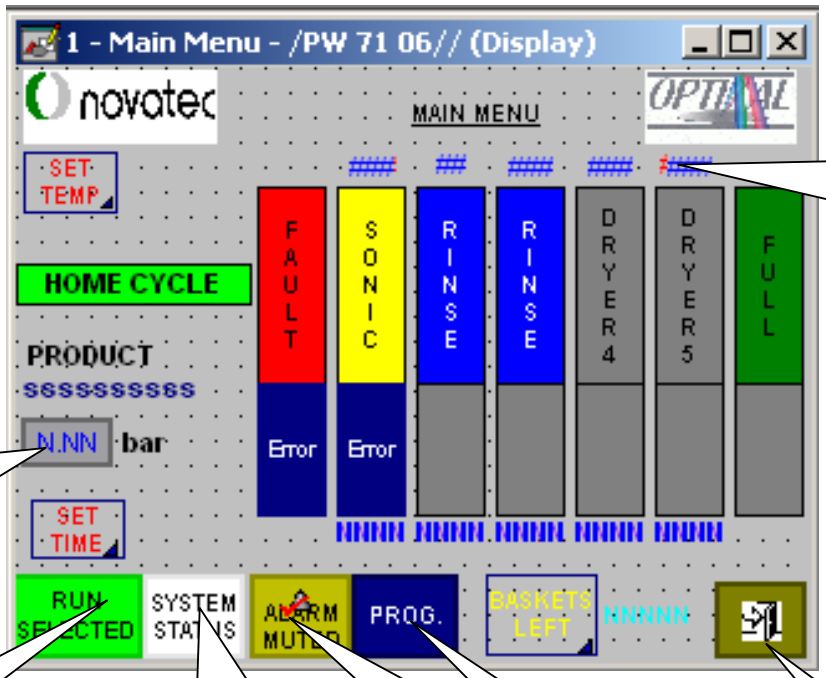


Step.1
Touch here to log in with ID and Password. ID levels are:
- Associate
- Maintenance
- Engineer
- Optimal

The 5 buttons shown here are accessible after log-in to the authorised ID level. Please see following page for access authority

Step 2
The **LOG IN** button will extinguish after successful log-in and this button will appear.

Step 3
After **LOG IN** touch the picture in the centre of the screen to display the **MAIN MENU**



Temperatures 'Actual' and 'Set' Touch here to change the set-point

This is the back pressure from stage 1 filter

Press this button to switch the machine from stand-by to **RUN** mode. The button will illuminate and the cold start-up sequence initiated

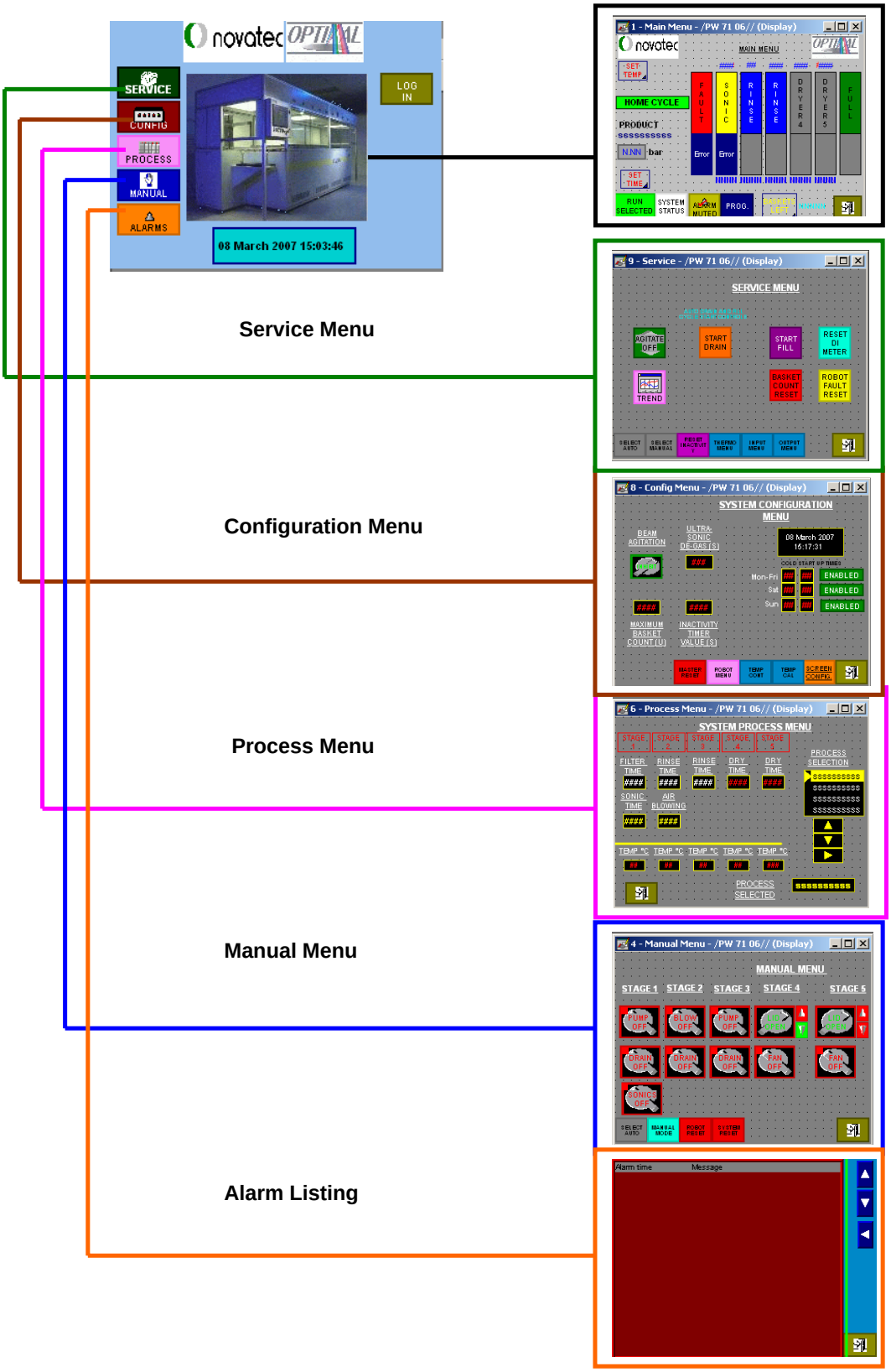
This button will illuminate at the end of the cold start up sequence when the machine is **READY**. To override this press and hold it for 10 seconds

An audible alarm will sound in the event of a warning or fault. Touch here to mute the alarm if the problem is understood and being dealt with.

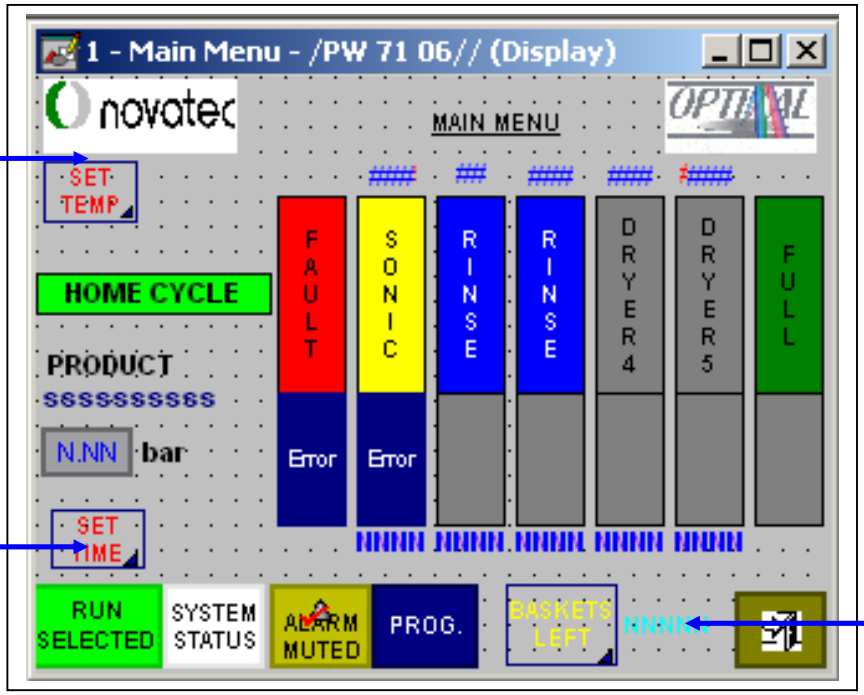
Press here to select the required program

Press this button to exit from this screen and return to the Start screen above

5.6 Menus Accessible from the Start Screen



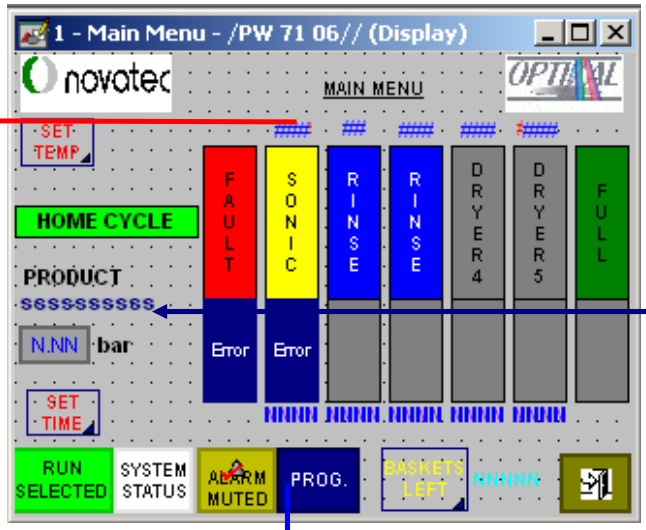
5.7 Main Menu Controls

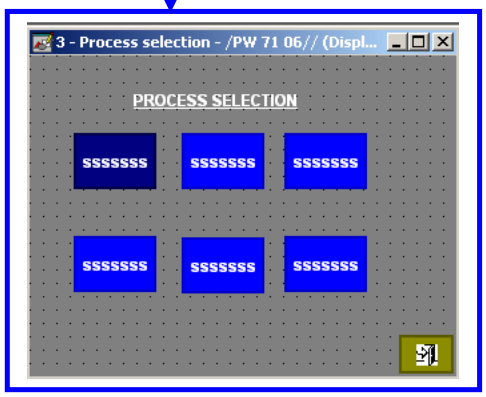


Process Times
Press this button to toggle between set time (red) and the actual time remaining (blue)

Process Temperatures
Press this button to toggle between the set temperatures (red) and the actual temperatures (blue)

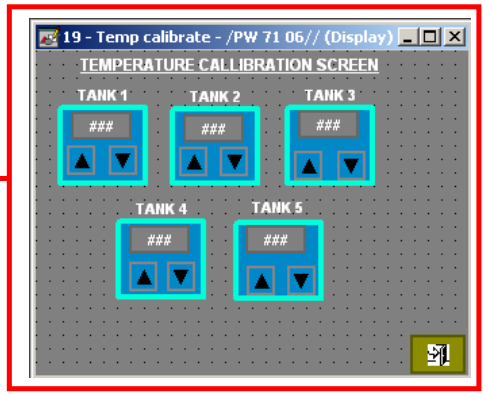
Basket Count
Press this button to toggle between the baskets left before chemical change (Yellow) and the baskets already counted (Blue)





PROGRAM BUTTON
Pressing the program button will display this page. There are six processes in the system memory. Select the required process and return to the main menu.

The current (selected) process for the product type will be displayed in the top right hand side of the main menu next to '**Product'**

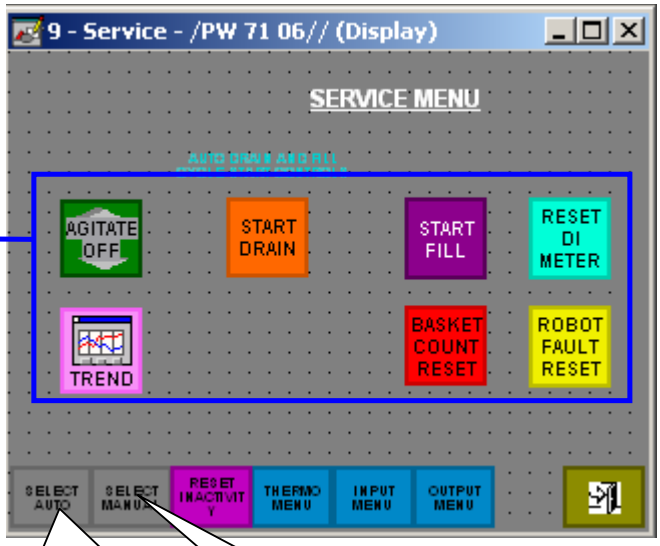


TEMPERATURE SETTING
By touching a displayed temperature on the MAIN MENU and having logged in with the engineer's password this page will be displayed.

The upper temperature is the SET POINT and the lower is the ACTUAL. Scroll up and down to change the set point or touch the displayed set point to enter the new figure using a numeric key pad

Part 6
Process & Configuration

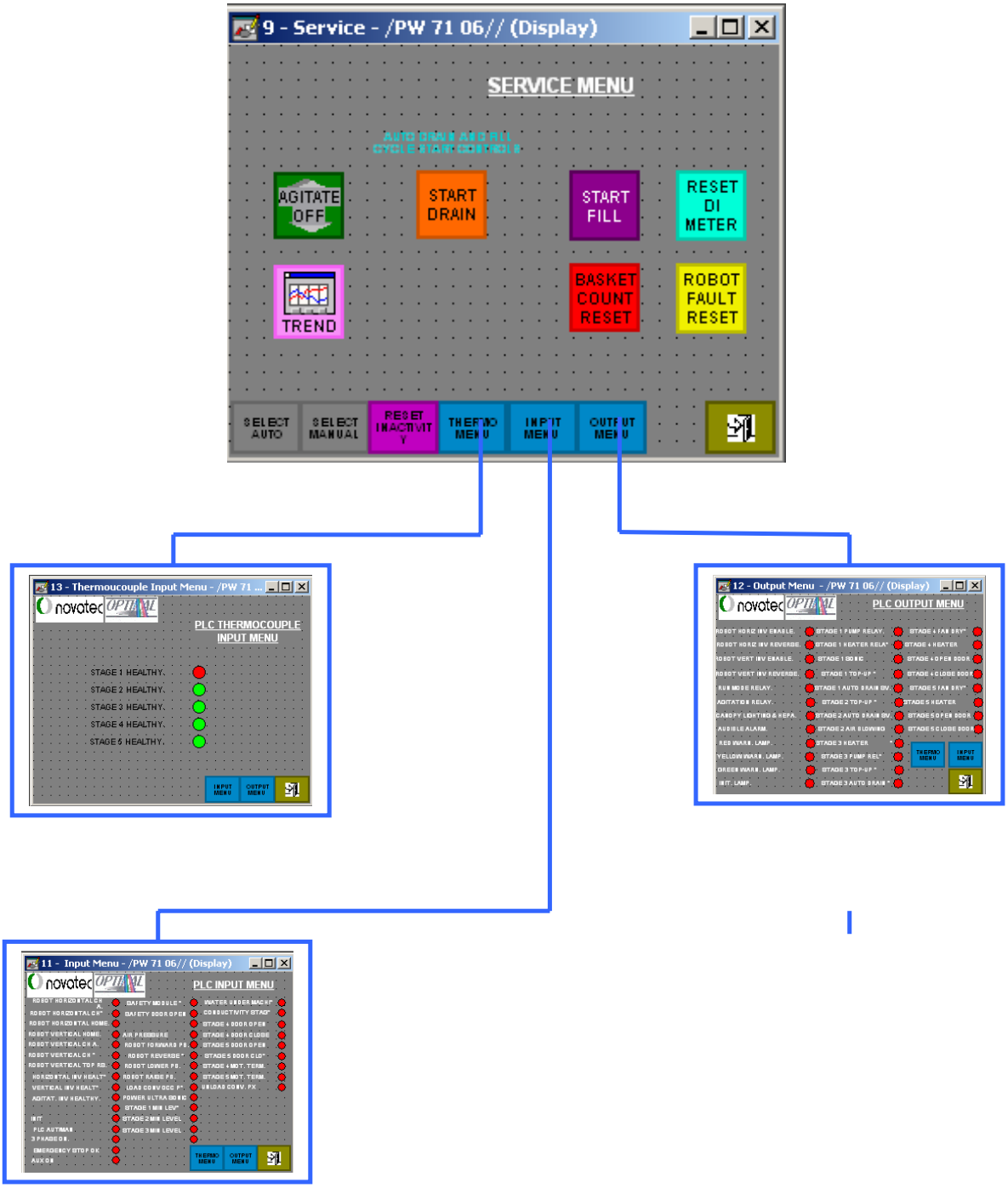
6.1 Service Menu



Auto Mode
The selected mode button will illuminate. To select Auto MODE press this button.
Once in AUTO MODE the system is controlled by the PLC and the manual control buttons are ignored. It is necessary to select this for the machine to operate automatically

Manual Mode
This mode can only be selected if the machine is unoccupied. Once selected (assuming the machine is in RUN MODE) the switches in the MANUAL MENU page will be activated.

TREND.	Press to display the temperature trends
START DRAIN	Press to open all the drain valves and completely drain all tanks
START FILL	Press to initiate automatic filling.
AGITATE	Press to test the agitation mechanism. The motor will only be powered whilst the button is held
BASKET COUNT RESET	Press to reset the basket count displayed on the MAIN MENU
RESET DI METER	Press to reset the DI meter after 15 minute poor water quality time out Press to reset Duplex filter to Filter A



Inputs and outputs can be monitored from the service menu. The thermocouple menu shows that the thermocouples are healthy when green and red if there is a problem.

The most relevant inputs and outputs are displayed to help with fault diagnosis in the event of a problem. When green it is on and when red it is off

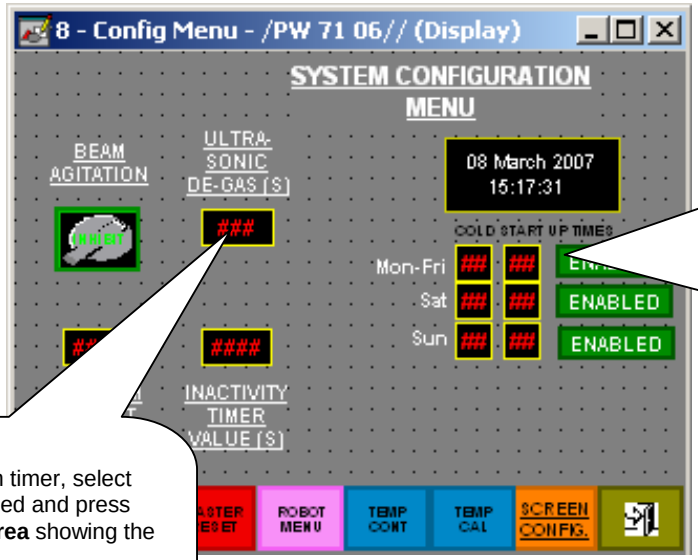
6.2. Configuration Menu

The Edit Configuration Menu can only be accessed once the correct password has been successfully entered (see section 5.8). The Edit Configuration Menu can be selected from the Touch Screen's Main Menu (See section 5.1). The following can be modified from the Edit Configuration Menu.

Ultra-Sonic Degass:
This is the time period (in seconds) that the Ultra-sonic are degassed, after System cold start-up sequence.

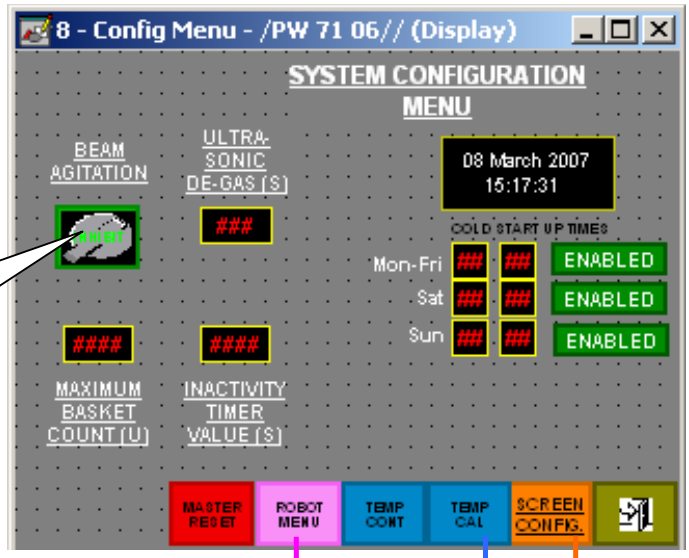
Day of Week Number:
This displays a number which represents the day of the week, example 0 = Sunday, 1 = Monday, etc. The current day of the week is displayed above under Current Time & Day title.

Cold Start-Up Times (see section 5.3):
These are system start times which can be used to automatically start the system before the system is required for operation. The start-up time is set typically 1 hour before the time that the system is required for operation.
There are three sets of start-up times:
Monday – Friday
Saturday
Sunday
The system must be left in stand-by mode with the required cold start-up time for the required day of the week enabled for the cold start-up times to automatically start the system.



Cold Start-Up Times
1. To modify the start-up time, press the **black display area** showing the current value (the hours & minutes are adjusted separately). A numerical keypad will appear on the screen.
2. Using the numerical keypad type in the new value then press the return button.
3. To enable or disable the required start-up time press the red or green push button, the text will indicate the state selected

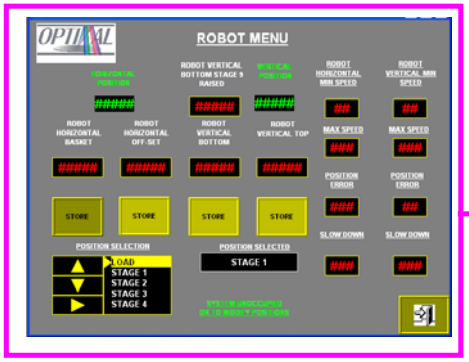
System Timers
1. To modify a System timer, select the time to be modified and press the **black display area** showing the current time value.
A numerical keypad will appear on the screen.
2. Using the numerical keypad type in the new value then press the return button.



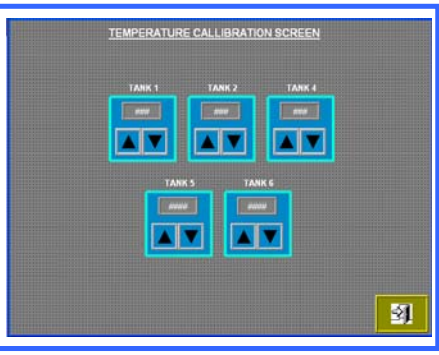
Beam Agitation
Press this button to enable or inhibit beam agitation on tanks 1 to 3

Robot Menu

This page is used to configure the robot. The page is described in more detail later



Temperature Calibration
Use this screen to calibrate the temperatures in each tank. The display will show the pre-calibrated temperature at the thermocouple. For accurate temperature control we recommend that a calibrated instrument is used to measure the actual temperature in the position at which the components would normally sit and this screen is used to off-set the temperature on the screen accordingly



Screen Configuration
To gain access to the touch screen configuration menu press this button. This will gain access to various touch screen settings including time & date, contrast, etc. Do not modify any of these settings without first contacting Optimal.
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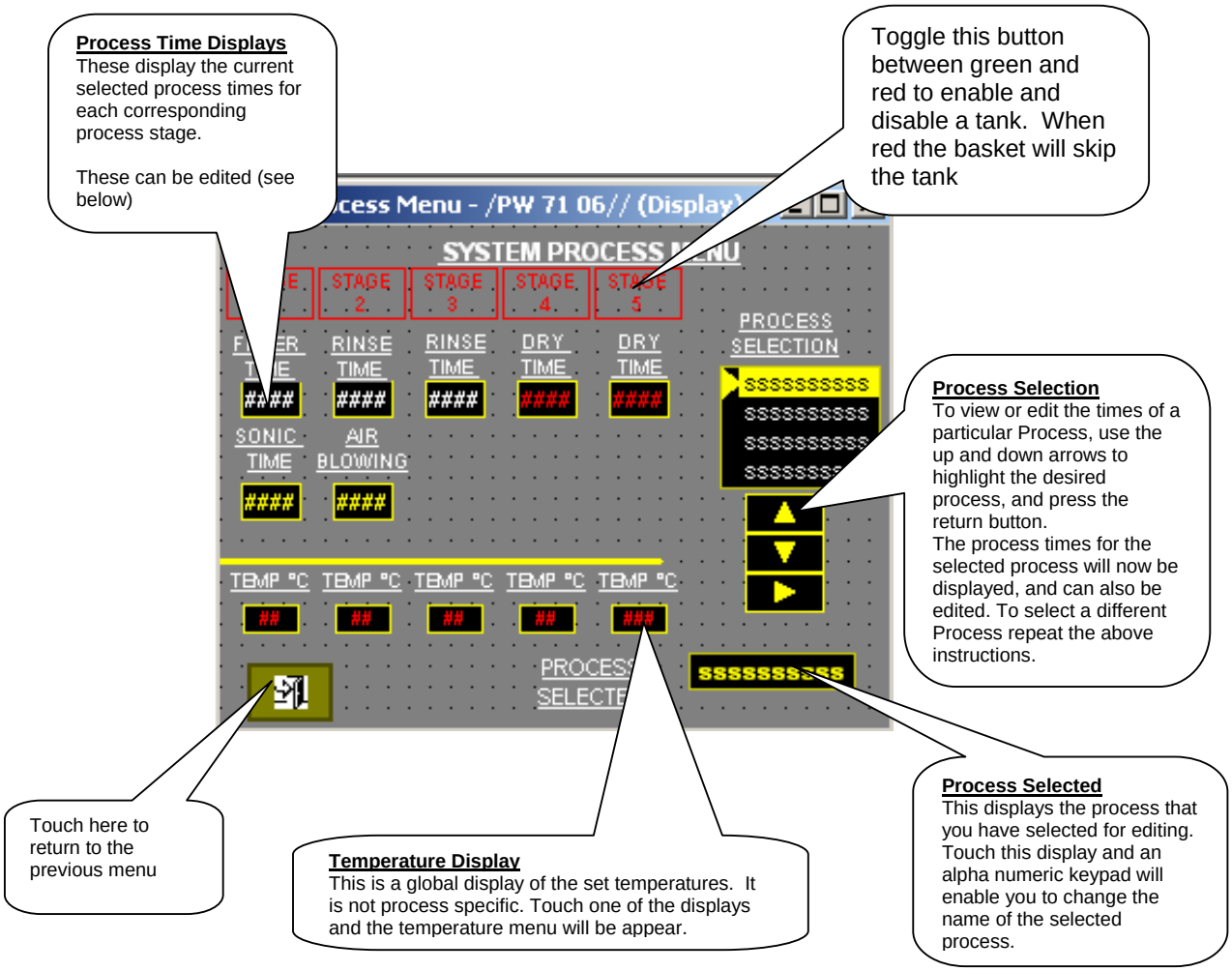
6.3. Process Menu

The Process Menus can only be accessed once the correct password has been successfully entered on the start screen. The Process Menu allows access to each of the six processes for the Cleaning Machine (See below).



Each System Process consists of a series of process times used in the various stages of the Cleaning Machines. These process times can be modified from the Process Menu for each individual Program (See below for detailed description of each programmable time).

6.4. System Process Times

Stages 1 Filter
This is the time period that the basket will be rinsed in flowing filtered water.
The Basket will be transferred to the next stage by the Robot when this process time has elapsed. This is true for all inter-stage transfers.

Stages 1 Sonic
This is the time period that the Basket will be ultrasonically cleaned.
The filtration pump will stop and the ultrasonics will run, when the time period has expired the ultrasonics will switch off and the water pump will start.

Stage 2 Rinse
This is the time period that the stage two solenoid valve will open for and allow water to enter the tank, displacing existing water to drain

Stage 2 Air Blowing
This sets the duration that the air agitation is on

Stage 3 Rinse:
This is the time period that the basket will be rinsed in flowing filtered de-ionised water.

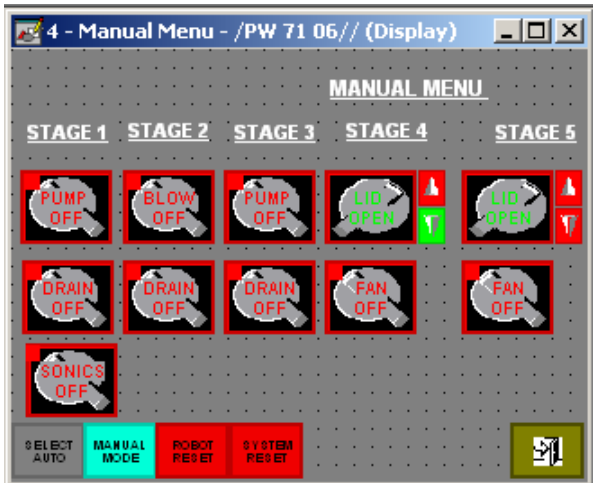
Stage 4 and 5 Dry:
This is the time period that the basket will be dried. There are two dryers and the robot will automatically select the unoccupied one. This enables the drying process time to be double that of the longest cleaning or rinse time without affecting the production capacity of then machine

6.5 Manual Menus

The Manual Menu's can only be accessed once the correct password has been successfully entered (see section 5.8). Manual Menu can be selected from the Touch Screen's Main Menu (See section 5.1). If manual control is required this must be selected from the Main menu (see section 5.1), before manual mode can be selected the system must be unoccupied or no baskets currently being processed through the System.

Various functions of the Cleaning System can be manual controlled, once manual node has been selected (see below).

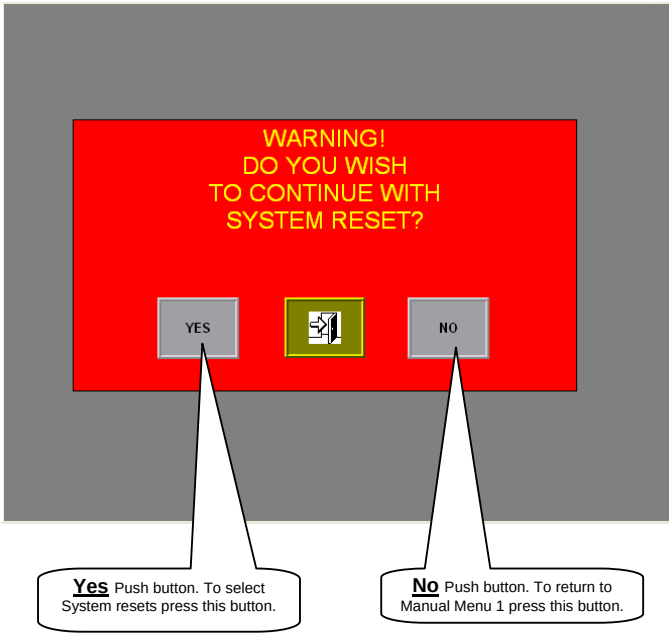
Manual Controls
These push buttons control the machine function, when in manual mode.



System Reset Control:
The Systems can be reset. Resetting the System will reset all current automatic operations and entered basket data to zero. When the Reset push button is pressed a warning message is displayed (see example below) if you wish to continue with system reset, Yes or No can be selected. If Yes is selected the System will be reset and the Main Menu will be displayed, if No is selected the display will return to the Manual Menu.

Robot Reset Control:
The Robot can be reset. Resetting the Robot will reset all current automatic Robot operations, Faults and data to zero. When the Reset push button is pressed a warning message is displayed (see example below) if you wish to continue with system reset, Yes or No can be selected. If Yes is selected the System will be reset and the Main Menu will be displayed, if No is selected the display will return to the Manual Menu.

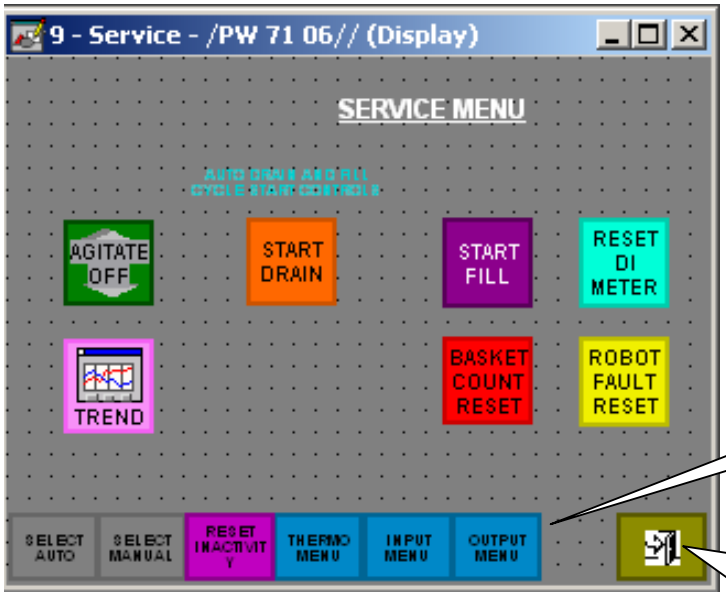
Example System Reset Warning Message



6.6 Service Menu

The Service Menu can only be accessed once the correct password has been successfully entered (see section 5.8).. If manual control is required this must be selected.

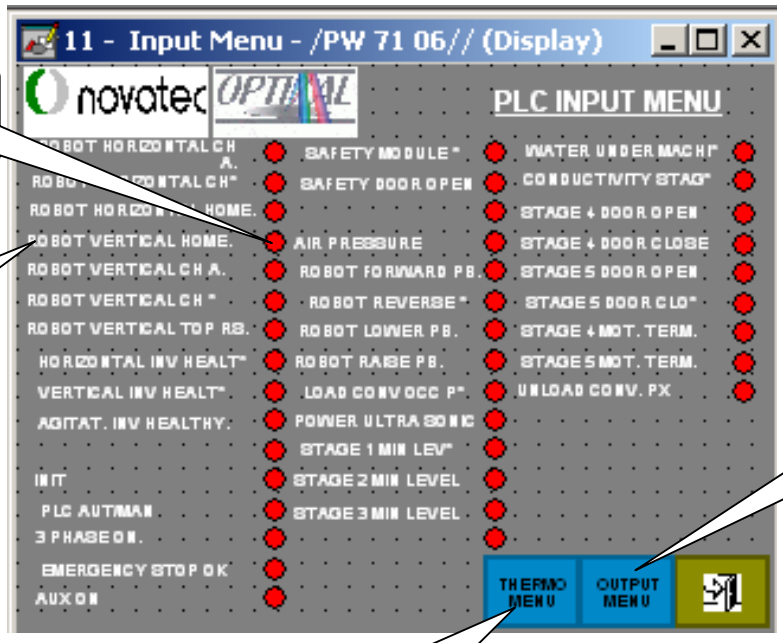
Service Menu:
The Function of the Service Menu is to enable higher level operations the Cleaning machine.
The Service Menu also enables access the Input and Output diagnostics menu's (see below).



Input and Output Menu's
To view these menu's press the corresponding button.

Main Menu
To return to the Main Menu press this button.

Example Input Menu:



PLC Input status indicator.
Red = OFF
Green = ON

PLC Input description.

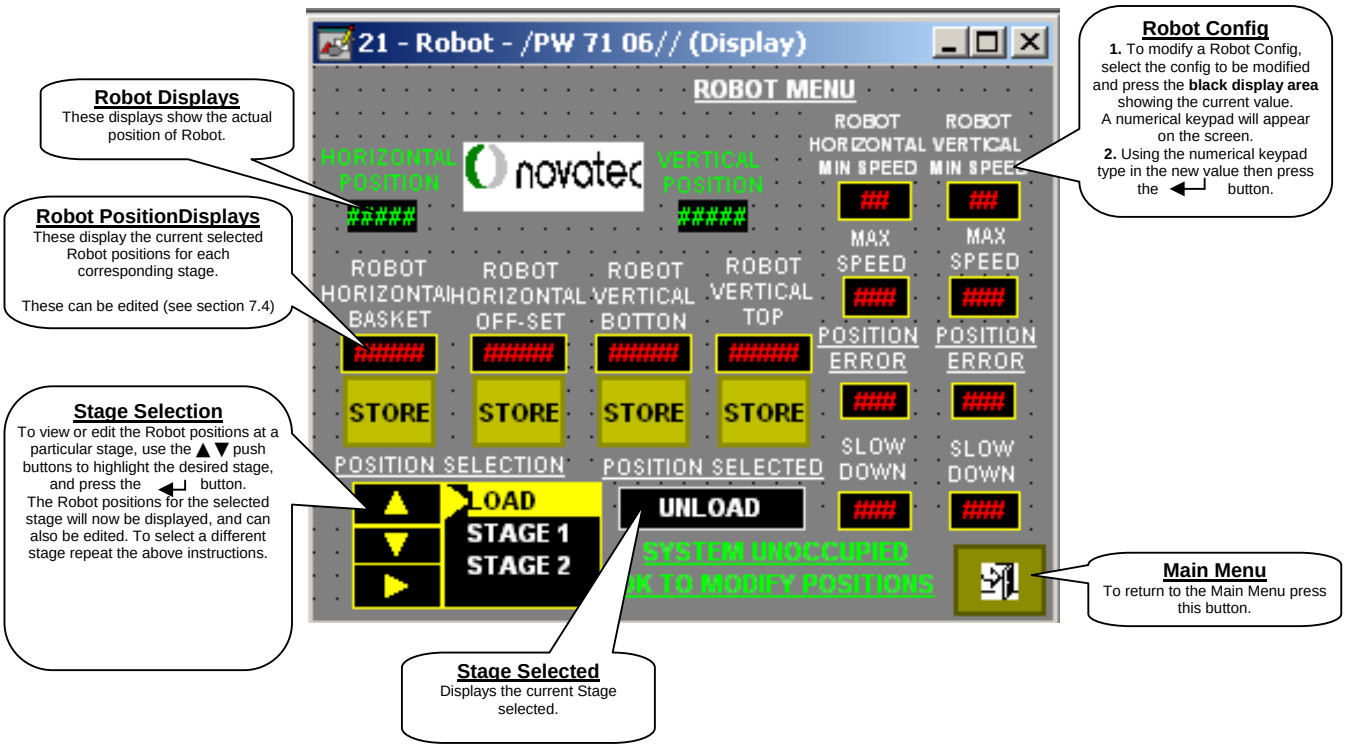
Output Menu
Go to the output Menu 2 press this button.

Thermocouple Menu
Go to the therrmocouple Menu press this button.

Part 7 Robot Menu

7.1 Process Menu

The Robot Menu can only be accessed once the correct password has been successfully entered (see section 5.8). The Robot Menu can be selected from the Touch Screen's Main Menu (See section 5.1).
The Robot Menu allows access to the robot positional data and configuration (See below).



There are various configuration settings for the Robot system, these setting can be modified (See below for detailed description of each configuration setting).

7.2 Robot Positions

Robot Horizontal Basket:
This is the horizontal position that the Robot moves to, too pick up or drop off a basket.

Robot Horizontal Off-Set
This is the horizontal position that the Robot moves to before picking up or after dropping off a basket.

Robot Vertical Bottom:
This is the vertical position that the Robot moves to, too drops off or picks up a Basket.

Robot Vertical Top:
This is the vertical position that the Robot moves to after picking up or dropping off a basket.

Robot Vertical Top stage 4:
This is the vertical position that the Robot moves to for picking up a basket from stage 4 only.

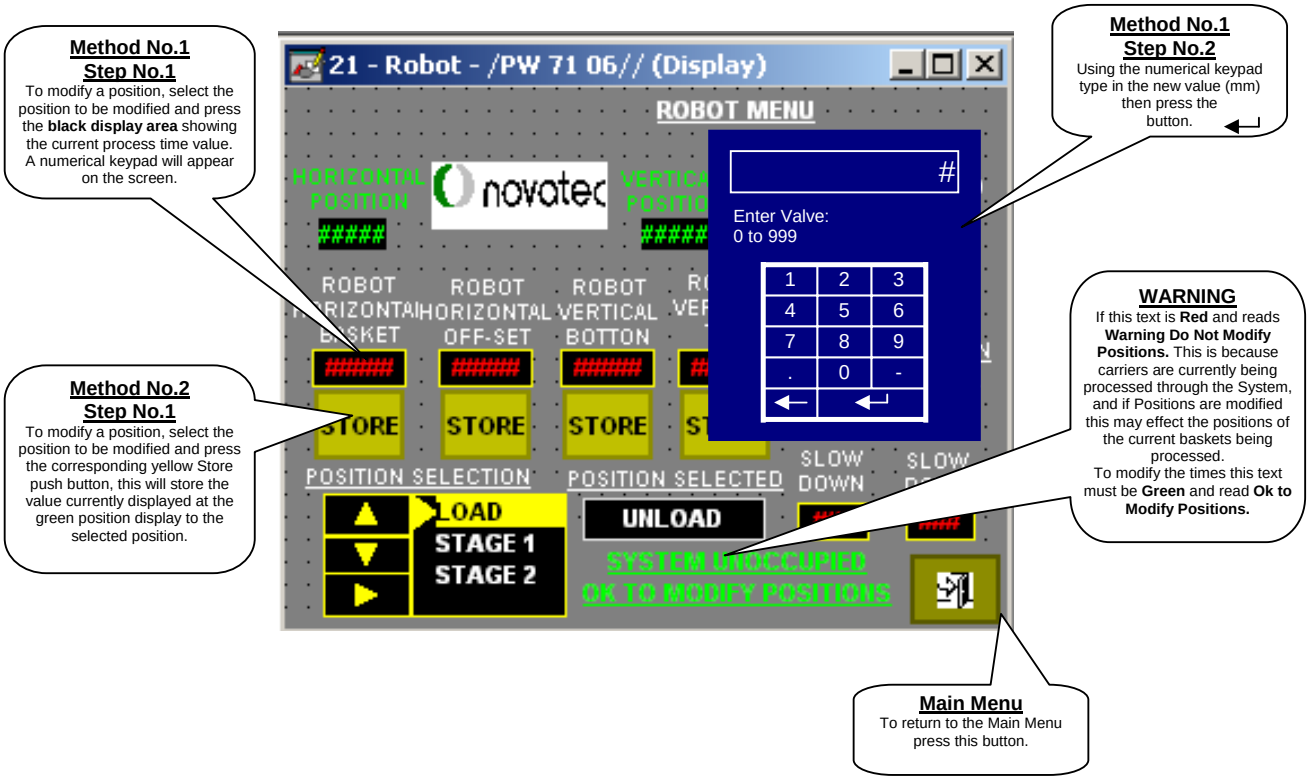
Min Speed:
This is the minimum speed or slow speed used by the Robot system.

Max Speed:
This is the Maximum speed or fast speed used by the Robot system.

Position Error:
This is the position tolerance of the Robot system in mm. When the Robot system moves the Robot automatically to a position this position is checked against the actual position requested. If the actual position moved to is within the requested position + or – the Position Error value no action is taken, but if the actual position moved to is outside the requested position + or – the Position Error value then the Robot system automatically corrects the position until the actual position moved to is within the requested position + or – the Position Error value.
Example:
Requested position= 998
Position Error= 3
Position tolerance 995 to 1001
Actual Position= between 995 & 1001, result position OK.
Actual Position= less than 995 or greater than 1001, result position error correct position.

Slow Down:
This is the distance in mm required to slow down. When the Robot automatically moves Max speed is requested, but when the Robots actual position is at or within the Slow Down distance of the position requested the minimum speed is then selected.

7.3 Modifying Robot Position Data



The Robot positional data will normally have been entered during the initial system configuration. This data should only be modified if instructed by Optimal.
The following method is the recommended means of entering Robot position data, from the Main menu select manual and then run mode (see section 5.1 & 5.7). Plug in the Robot hand held controller and press the Home (red) push Button. Wait until the Robot Home cycle has been completed and select the Robot menu (see section 7.1). Using the stage selection select the stage you wish to modify (see section 7.1), the positions for this stage will now be displayed. Using the four directional (green) push buttons on the Hand Held Controller the Robot can be manual driven to the position which requires modification, the actual position (displayed on the green display) can now be entered. This can be entered using one of two methods shown above method No.1 step 1 & 2 or Method No.2 step1. This
Process can then be repeated to modify other positions if required.

Part 8
Electrical Schematics

ELECTRIC BOARD SUMMARIZING TABLE

POWER RATING: Vn = 400V
FREQUENCY: f = 50Hz
POWER SUPPLY: 18KW
ORIGIN AND TYPE OF POWER SUPPLY LINES 400V
ELECTRIC BOARD STRUCTURE: 16137+16411
MINIMUM PROTECTION DEGREE: IP55

PLANNING	OPERATING VOLTAGE 400V 230V	REGULATIONS	PROTECTION
SERIES P 140.06	CONTROL VOLTAGE 24VDC		
INT. ORDER 71SE-06	SIGNAL VOLTAGE		
CUSTOMER			

REV.	REVISION	DATE	SIGN.

	DATE	SIGNATURE
DISEG.	26/01/2007	P.M.
CHECK.		
APPR.		

REPLACED BY:

REPLACED ON:

ORIGIN

NOVATEC S.r.l.

PLURITANK 60

71SE-06.DWG

PAGE 1

T.F. 32

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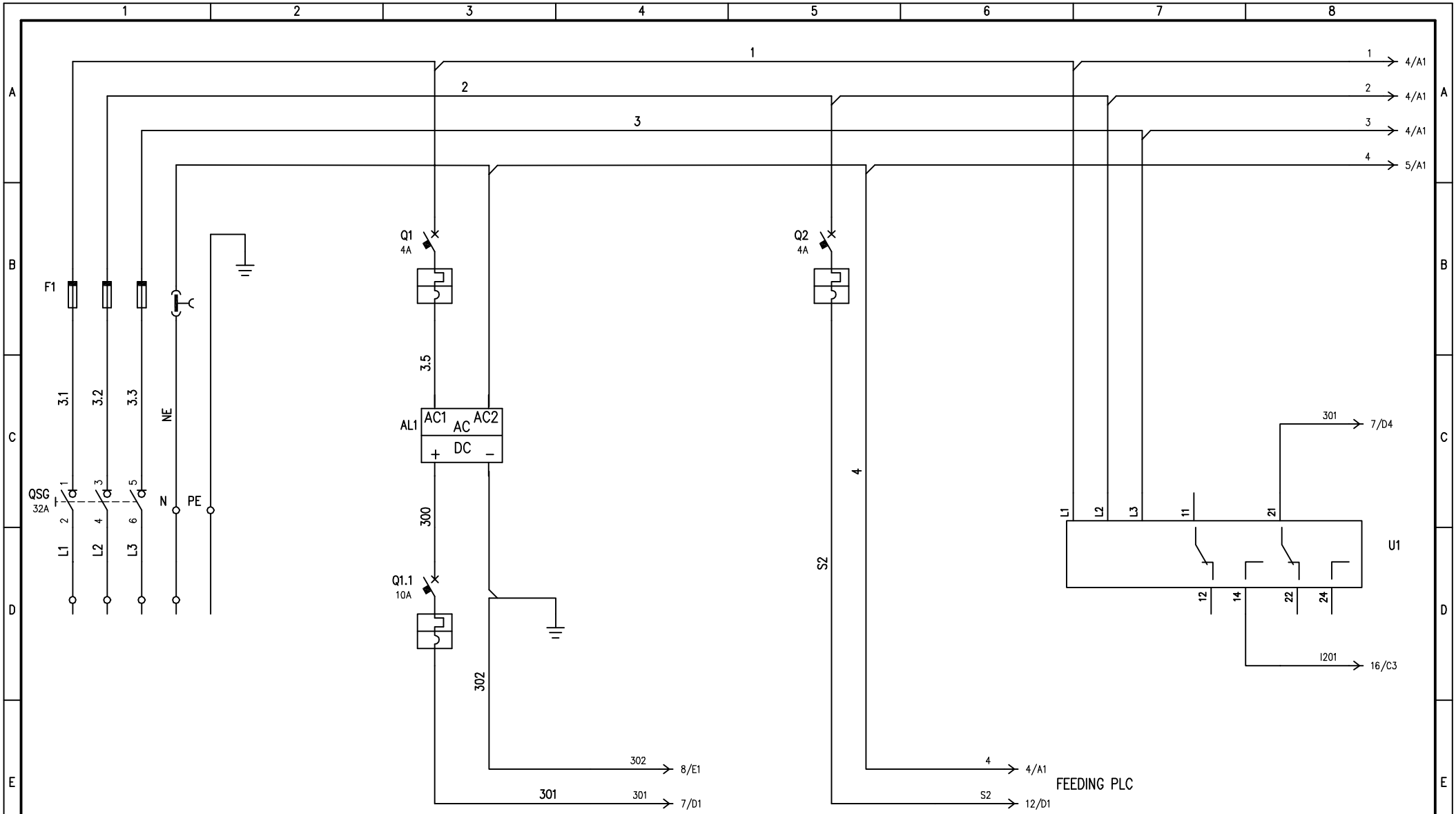
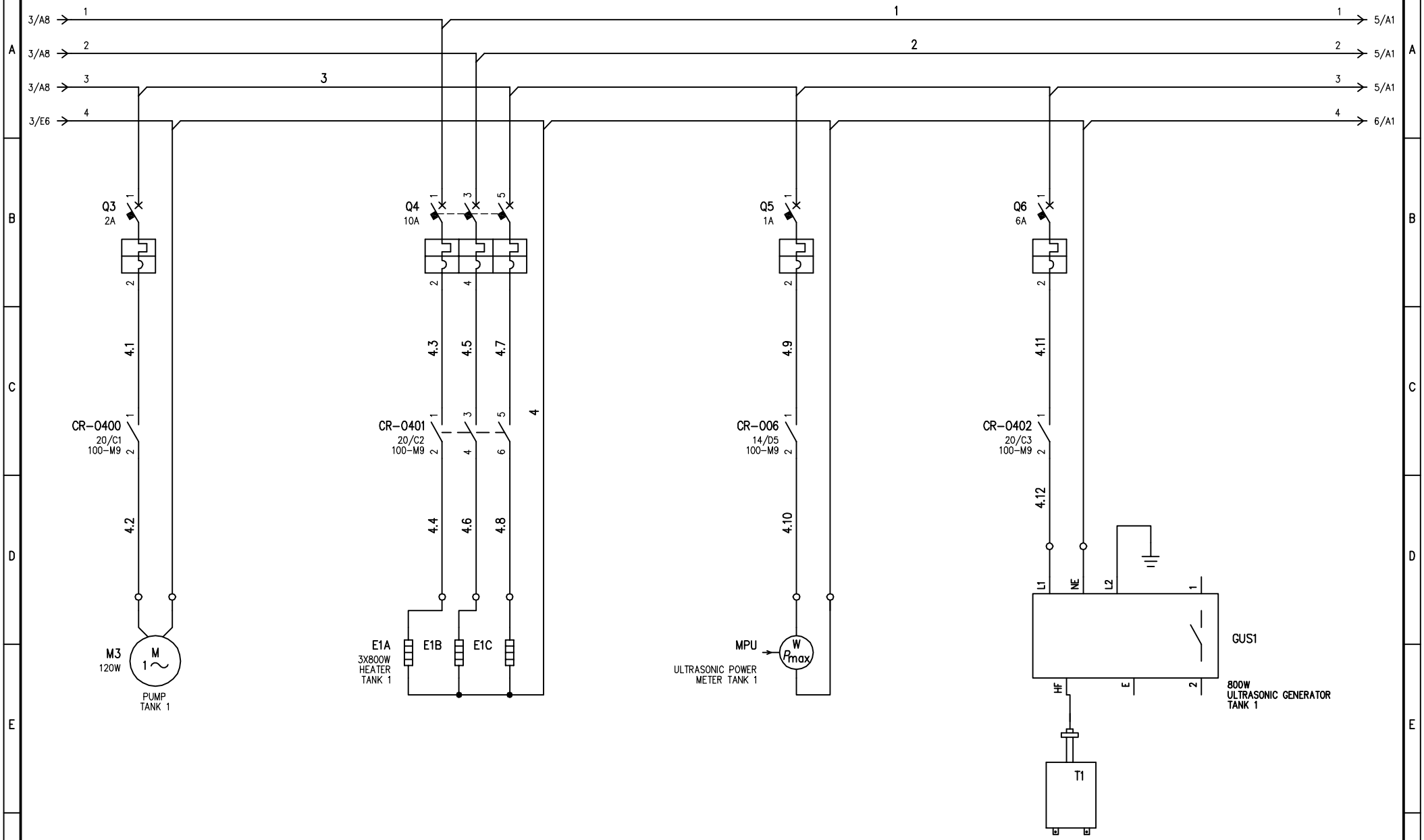
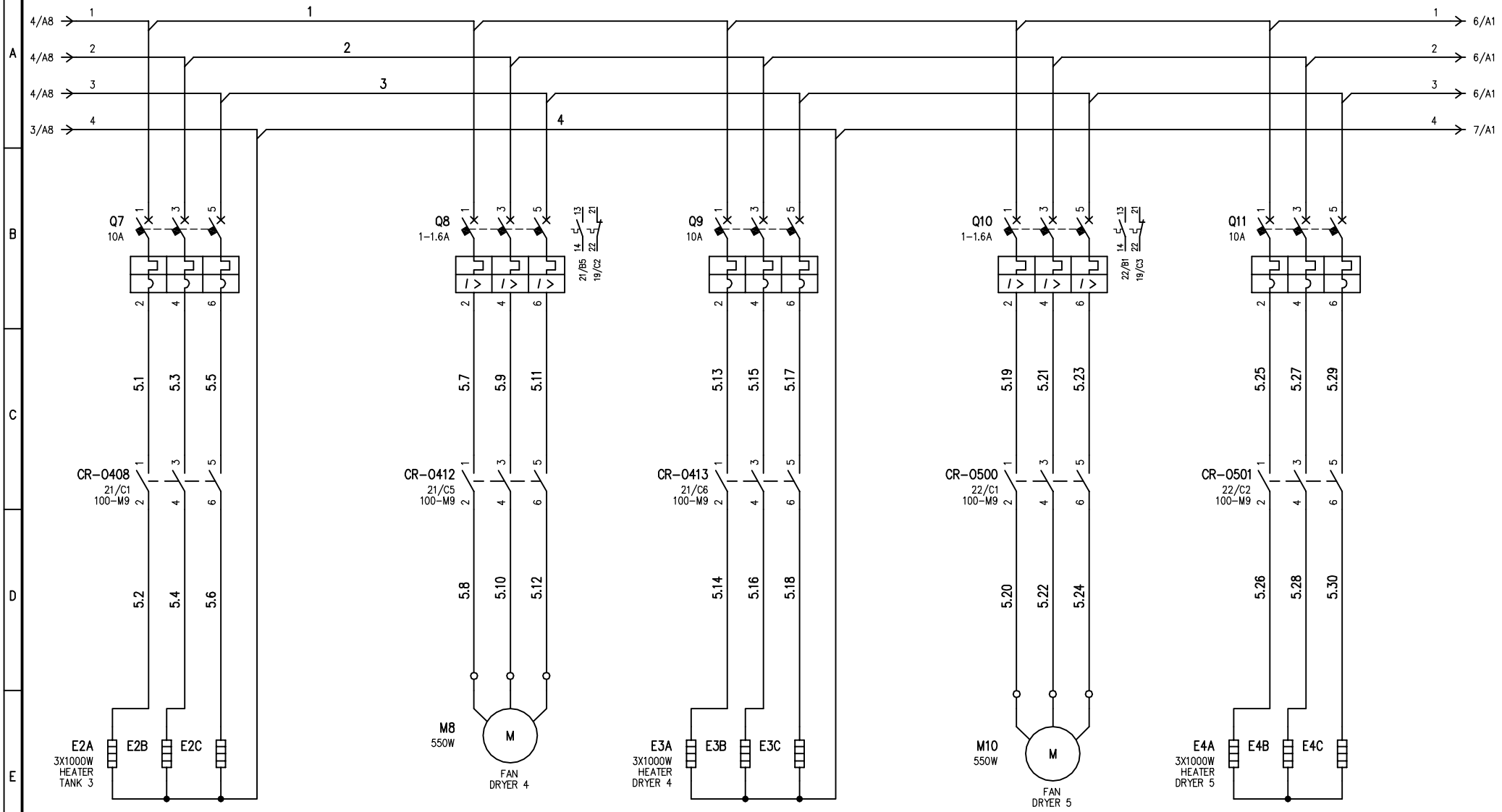
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	INDEX PLURITANK 60	71SE-06.DWG	2	



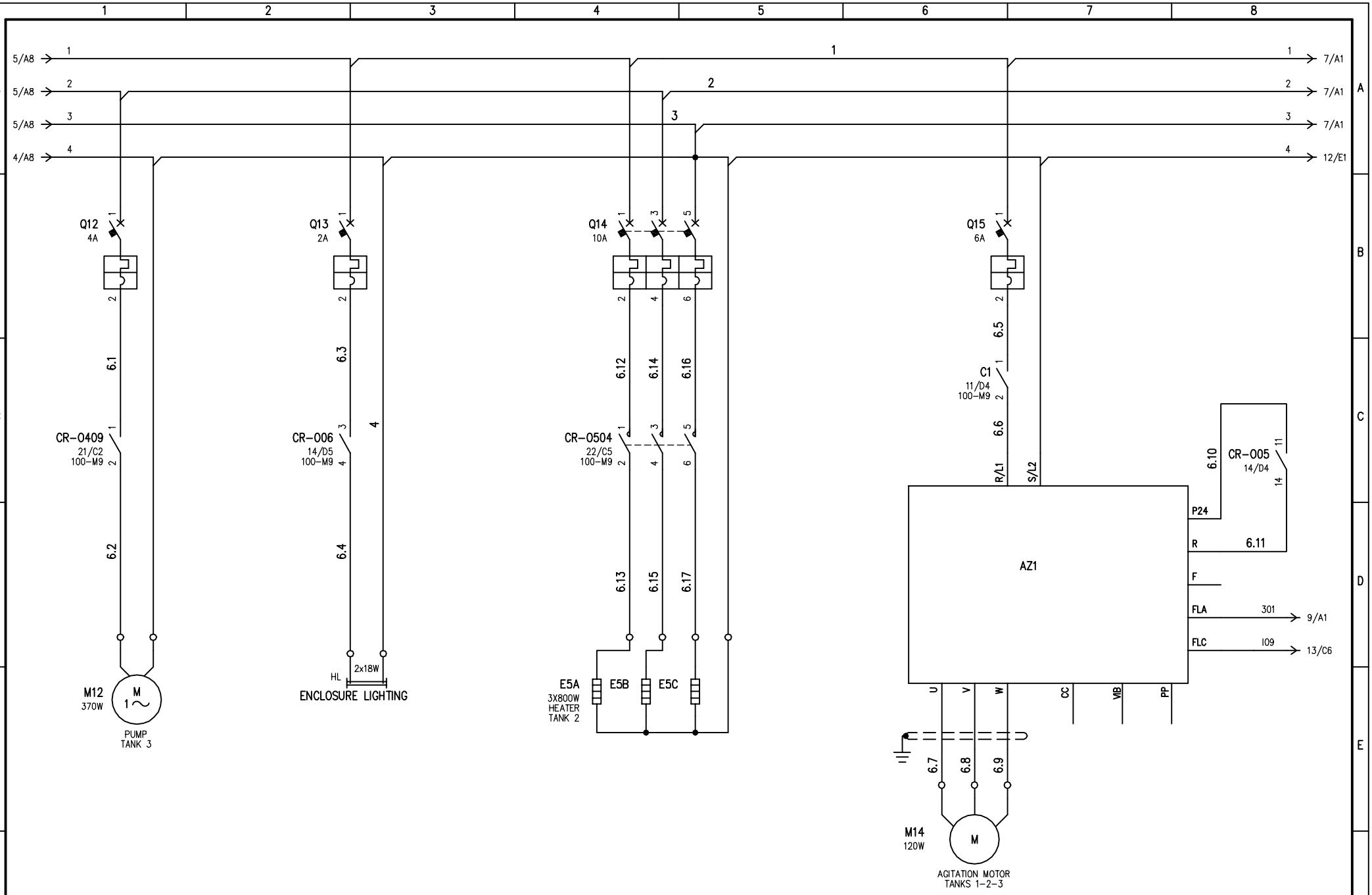
novatec	NOVATEC S.r.l. reserves to itself – according to the rules– the property of this drawing with prohibition to reproduce or divulge it without its written authorization	DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
		26/01/2007	P.M.	POWER DIAGRAM PLURITANK 60	71SE–06.DWG	3	



novatec	NOVATEC S.r.l. reserves to itself – according to the rules– the property of this drawing with prohibition to reproduce or divulge it without its written authorization	DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE / REV
		26/01/2007	P.M.	POWER DIAGRAM PLURITANK 60	71SE-06.DWG	4



novatec	NOVATEC S.r.l. reserves to itself – according to the rules– the property of this drawing with prohibition to reproduce or divulge it without its written authorization	DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE / REV
		26/01/2007	P.M.	POWER DIAGRAM PLURITANK 60	71SE-06.DWG	5



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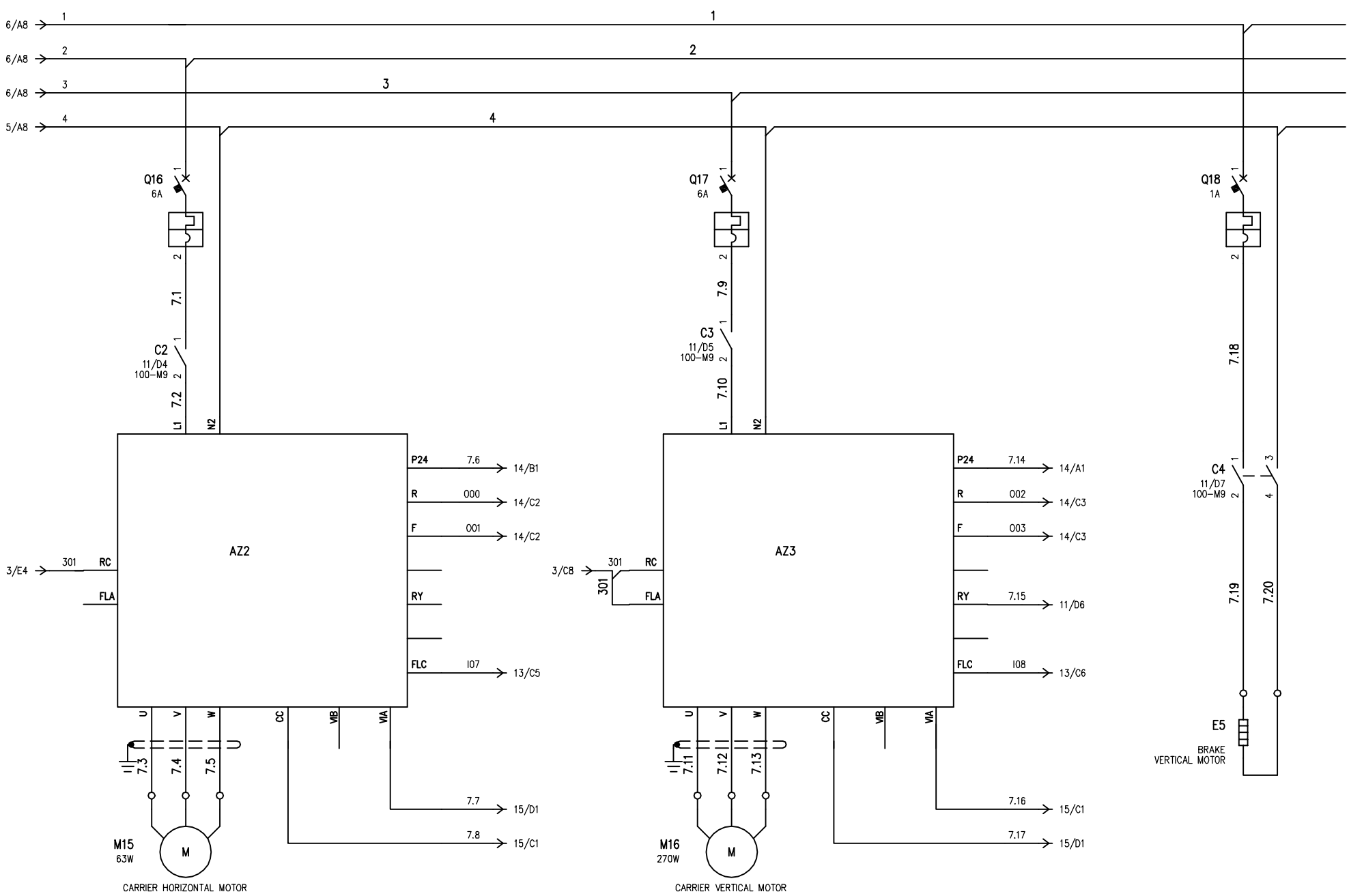
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	POWER DIAGRAM PLURITANK 60	71SE-06.DWG	6	



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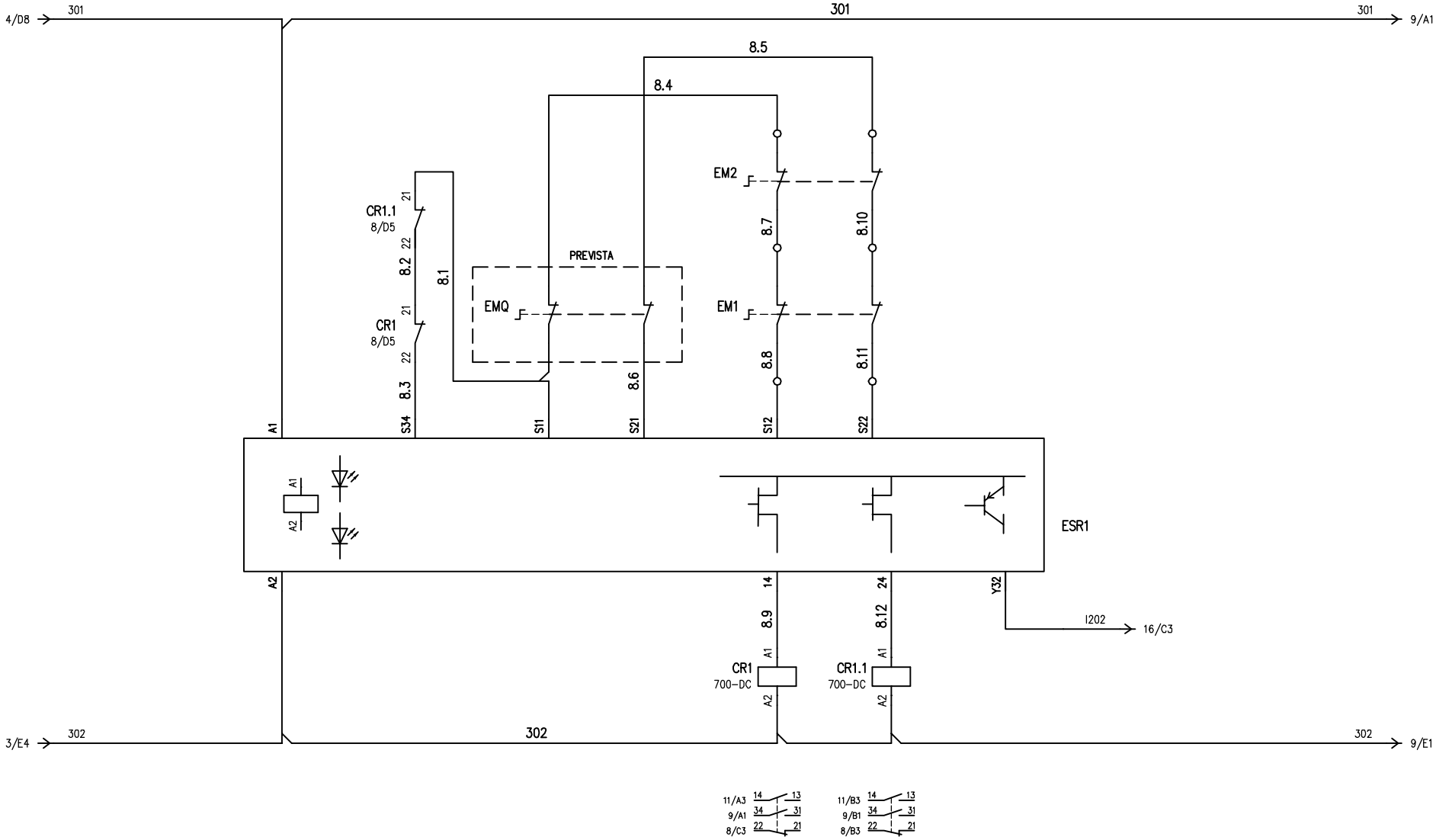
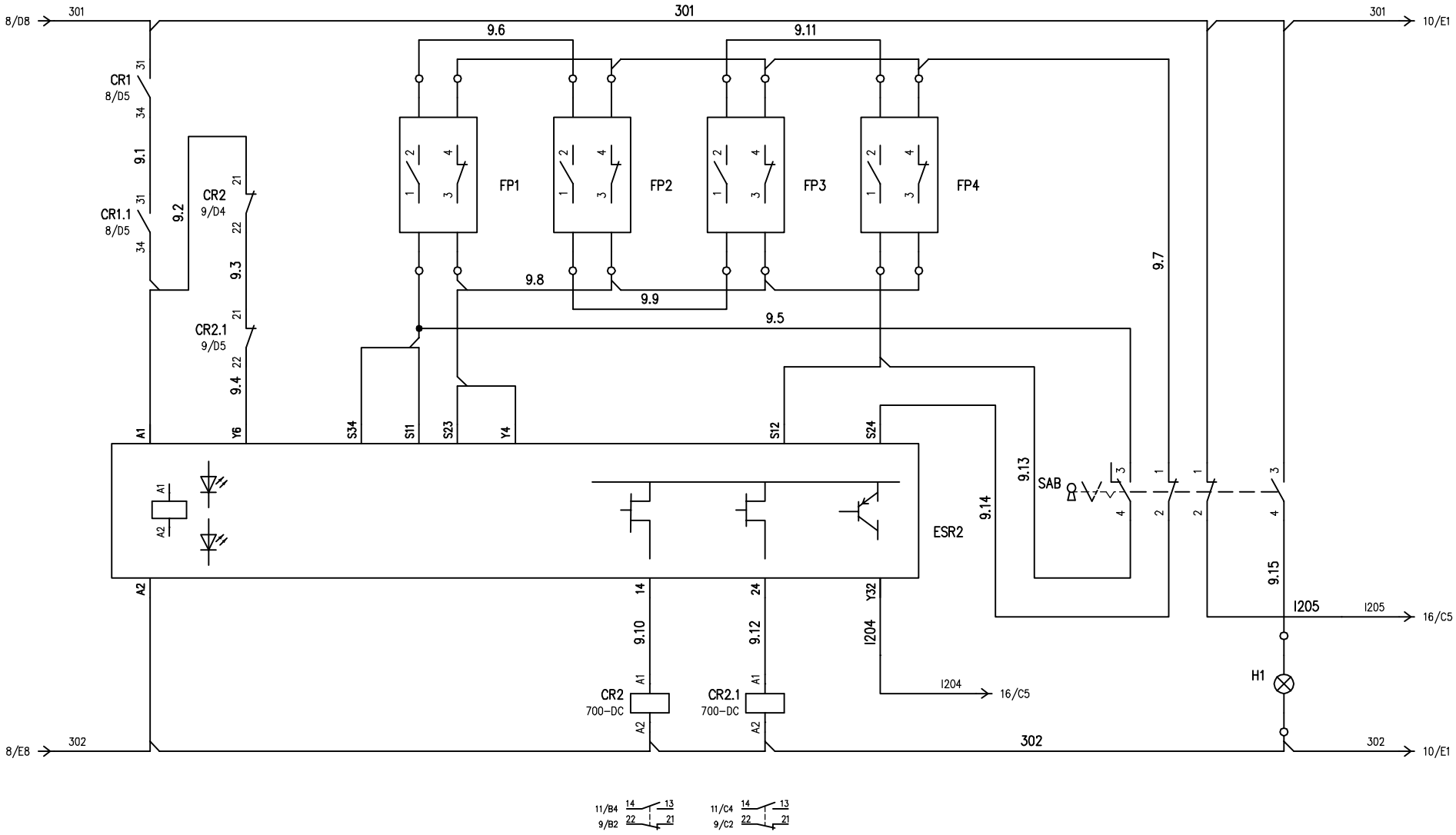
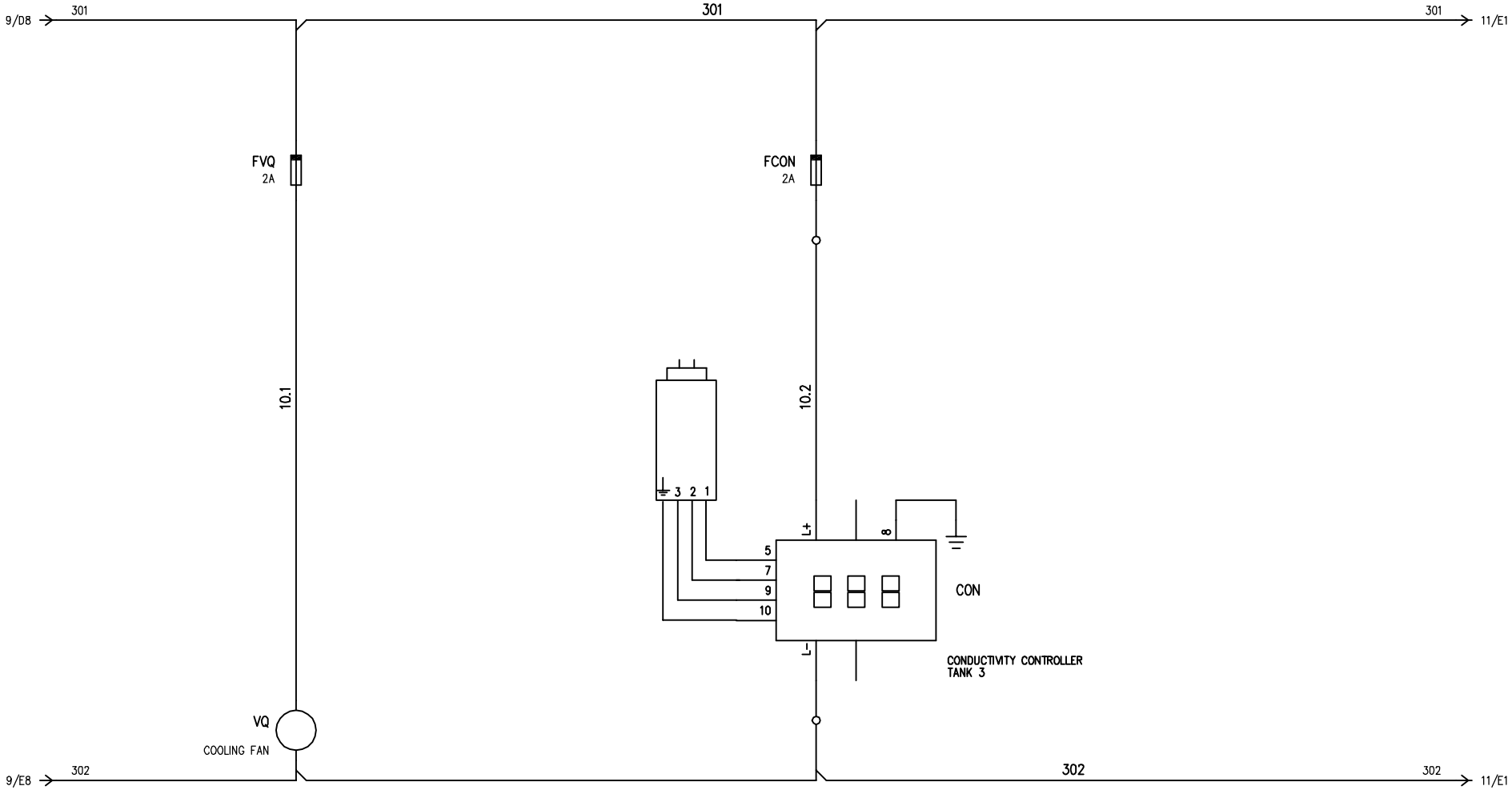
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	POWER DIAGRAM PLURITANK 60	71SE-06.DWG	7	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	EMERGENCIES DIAGRAM PLURITANK 60	71SE-06.DWG	8	



novatec	NOVATEC S.r.l. reserves to itself – according to the rules– the property of this drawing with prohibition to reproduce or divulge it without its written authorization	DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE / REV
		26/01/2007	P.M.	SAFETY DEVICES DIAGRAM PLURITANK 60	71SE-06.DWG	9



1=YELLOW+PINK 9+10
2=BROWN+GREY 7
3=GREEN+RED 11
⏚=WHITE+BLUE 6

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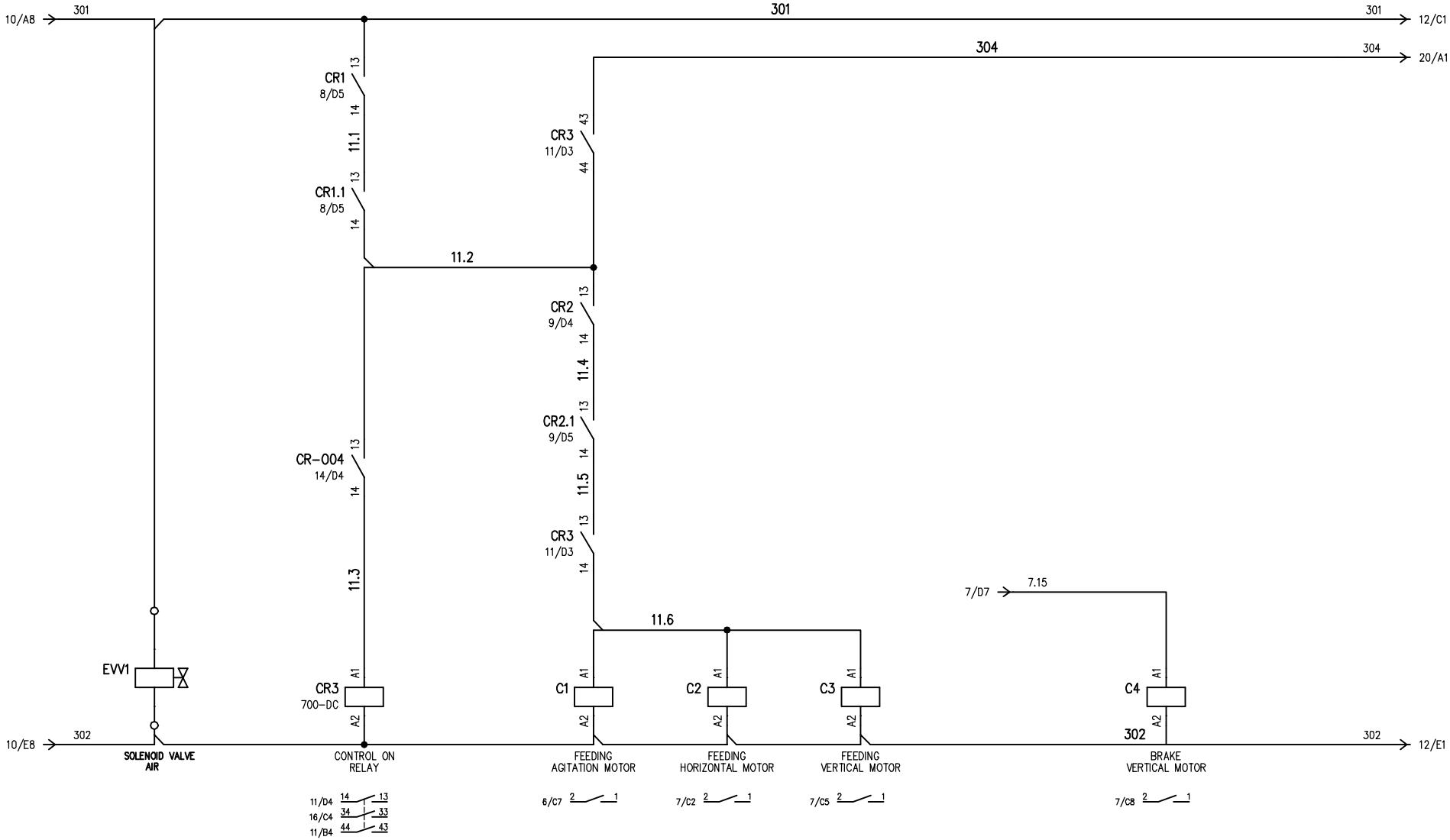
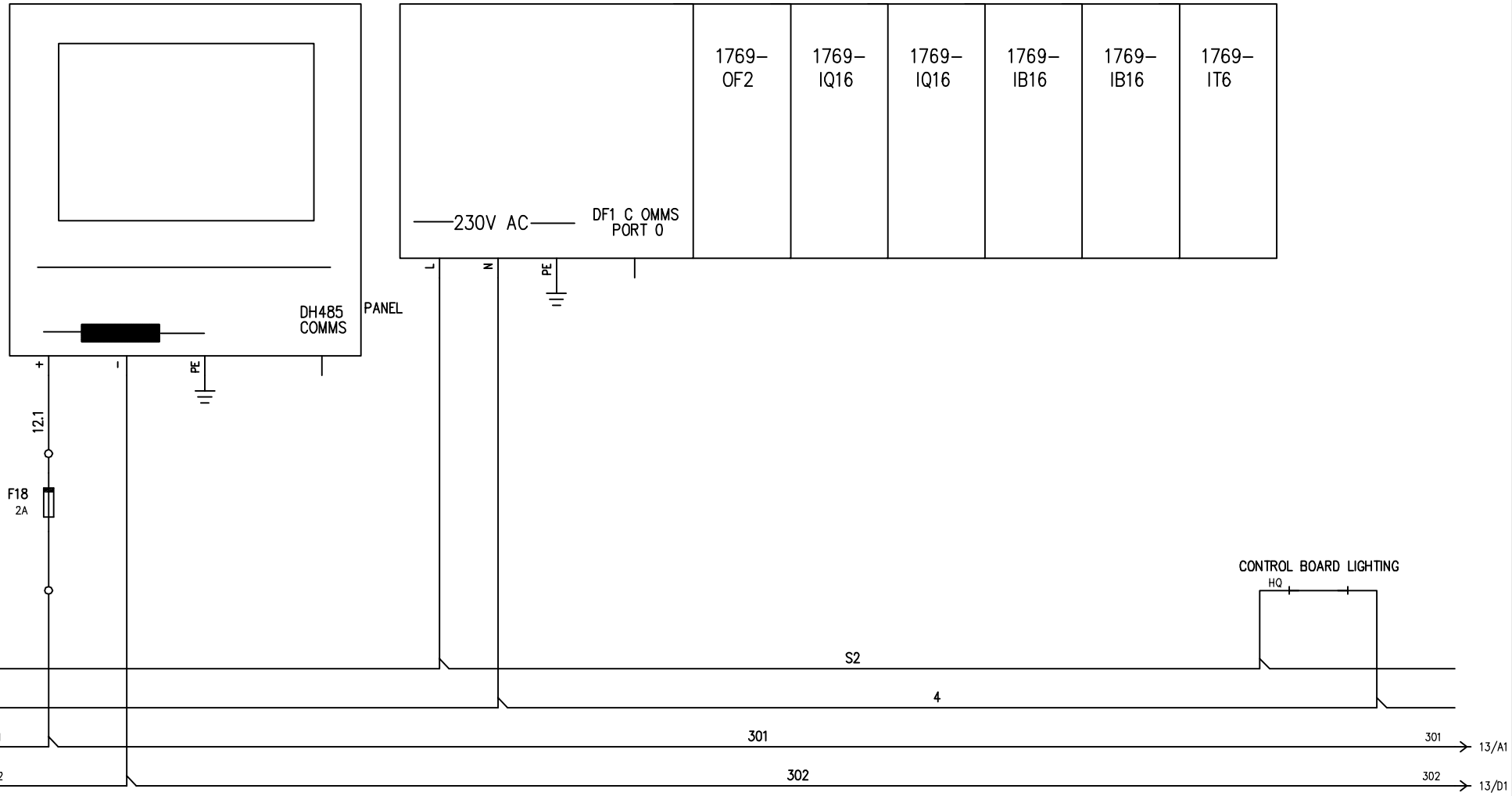
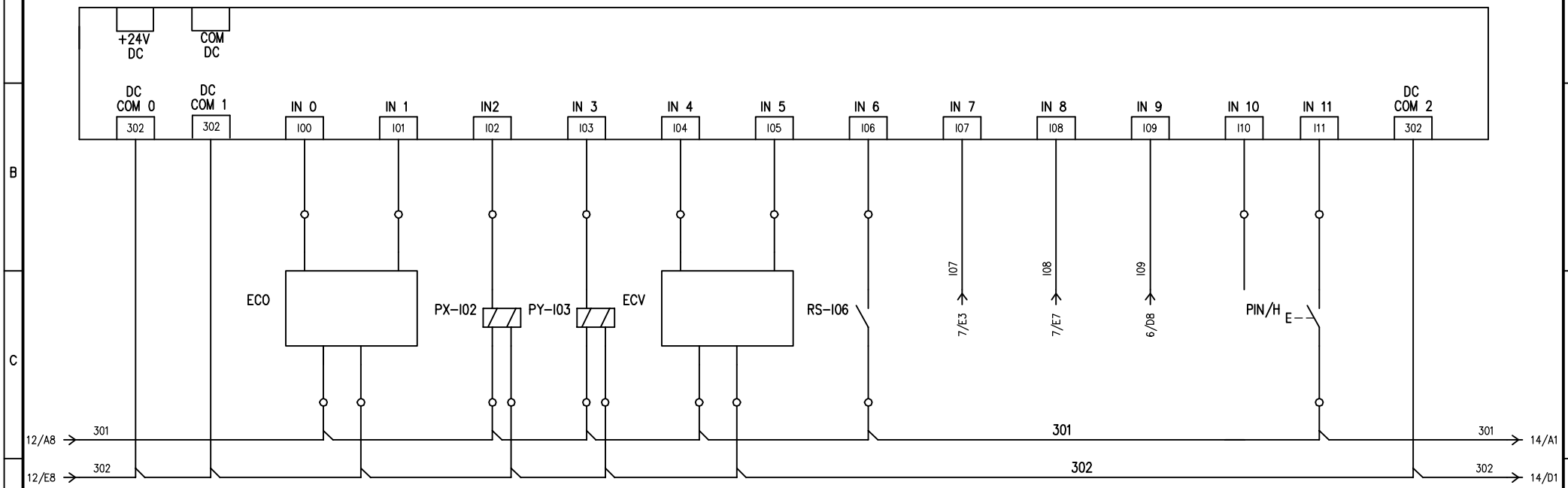
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	AUXILIARY DIAGRAM PLURITANK 60	71SE–06.DWG	10	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	AUXILIARY DIAGRAM PLURITANK 60	71SE–06.DWG	11	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	PLC CONFIGURATION PLURITANK 60	71SE–06.DWG	12	



HORIZONTAL ENCODER

CARRIER HORIZONTAL HOME POSITION

CARRIER VERTICAL HOME POSITION

VERTICAL ENCODER

MAXIMUM UP INTERLOCKS CARRIER

ALARM HORIZONTAL MOTOR CARRIER

ALARM VERTICAL MOTOR CARRIER

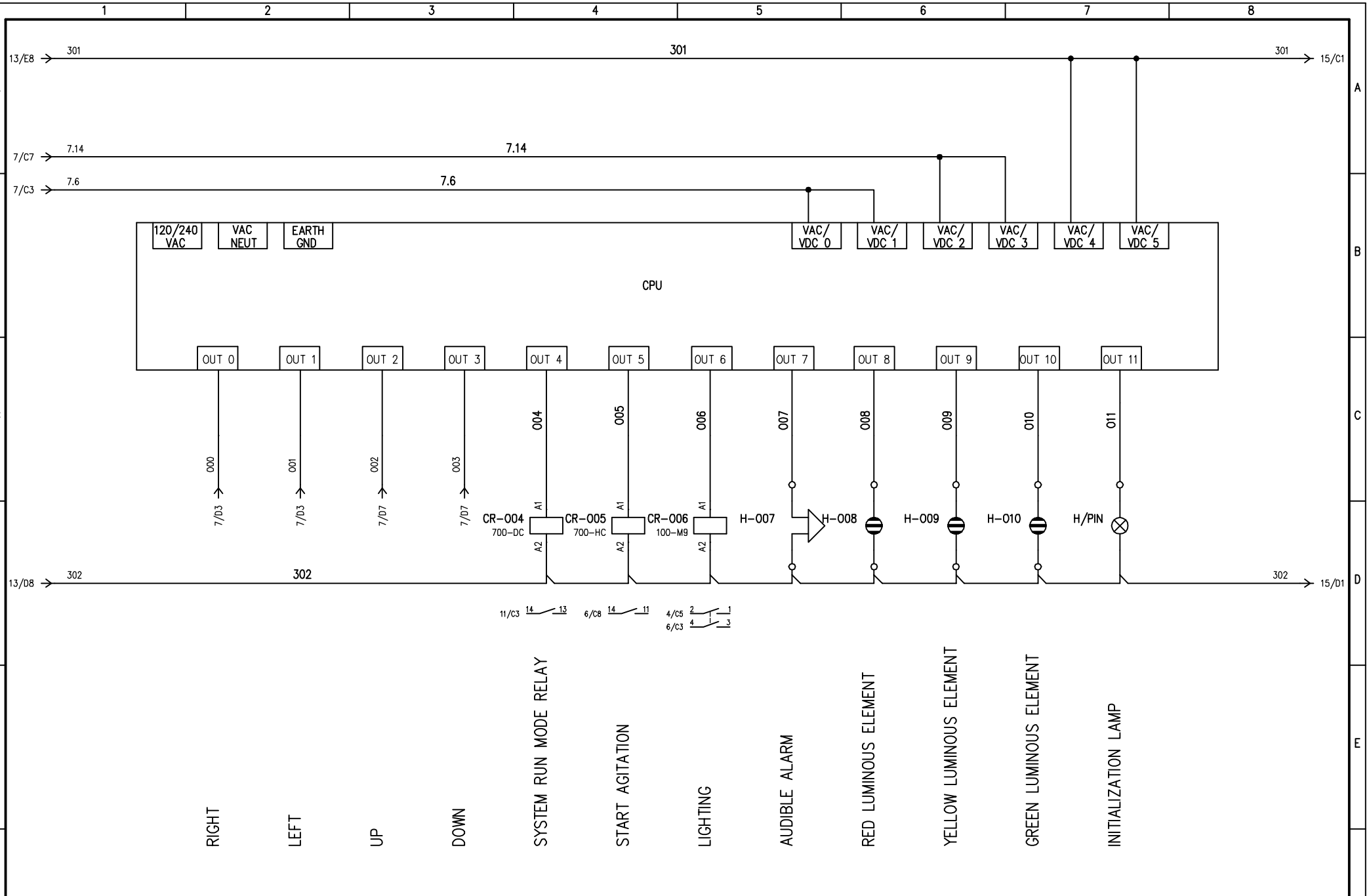
ALARM MOTOR AGITATION

FREE

SYSTEM INITIALIZE

novatec

DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	CPU INPUTS PLURITANK 60	71SE-06.DWG	13	



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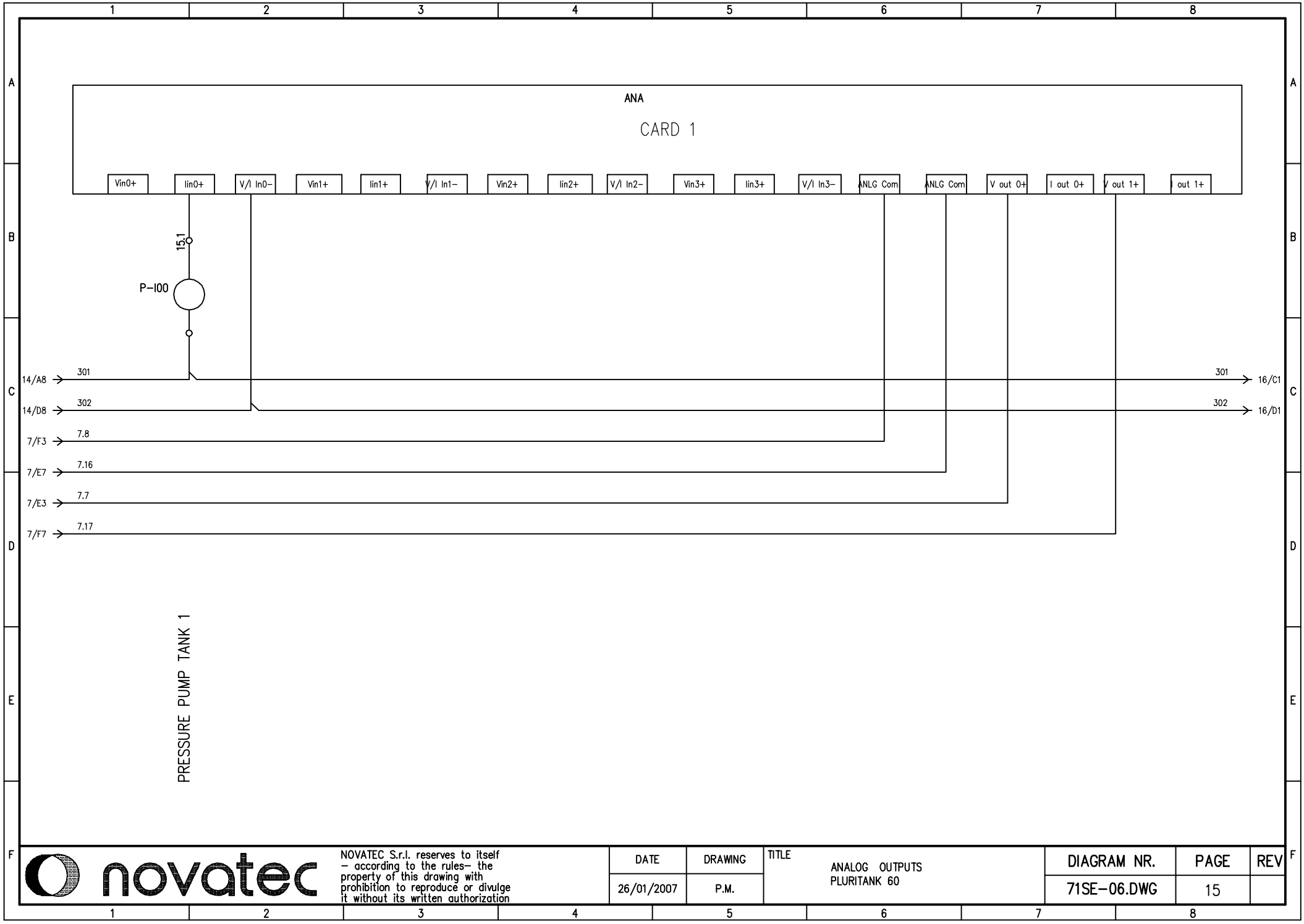
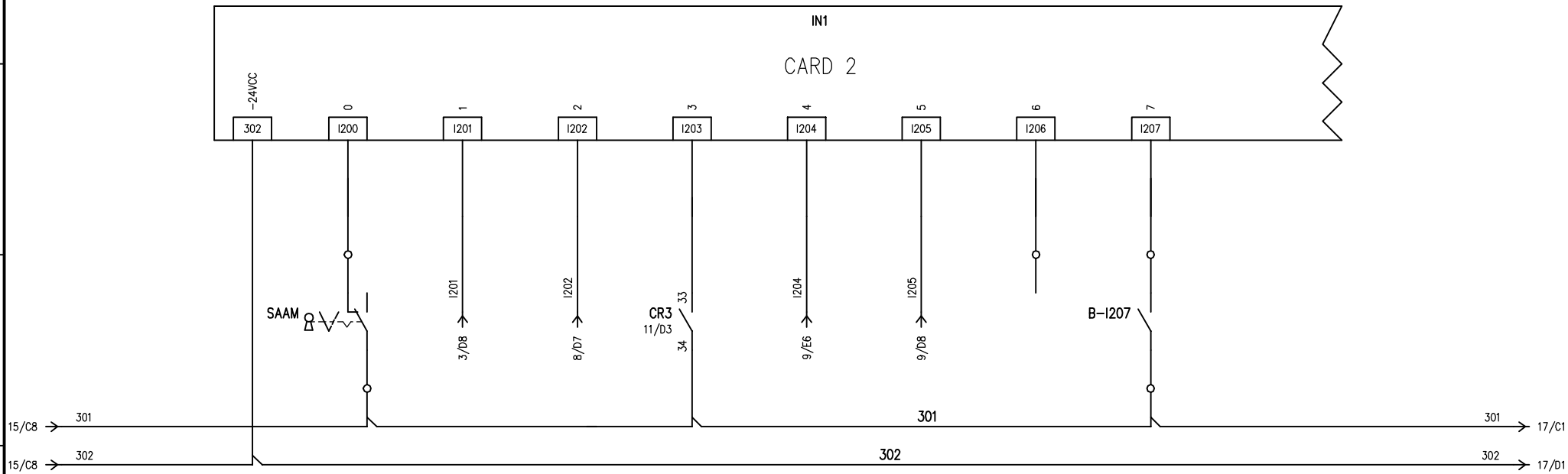
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	CPU OUTPUTS PLURITANK 60	71SE-06.DWG	14	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	ANALOG OUTPUTS PLURITANK 60	71SE-06.DWG	15	



PLC AUT/MAN

3 PHASE MONITOR HEALTHY

E-STOP HEALTHY

CONTROL ON RELAY

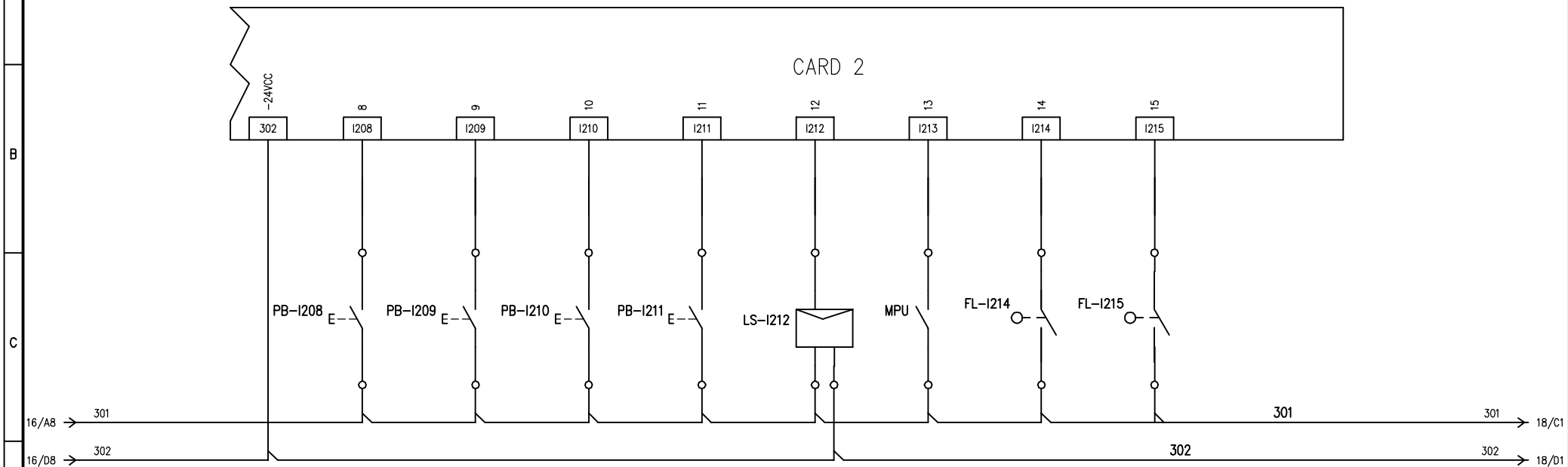
SAFETY DEVICE HEALTHY

SAFETY GUARDS BY PASS

FREE

COMPRESSED AIR LACKING

DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	INPUTS EXPANSION 1 PLURITANK 60	71SE–06.DWG	16	



RIGHT

LEFT

DOWN

UP

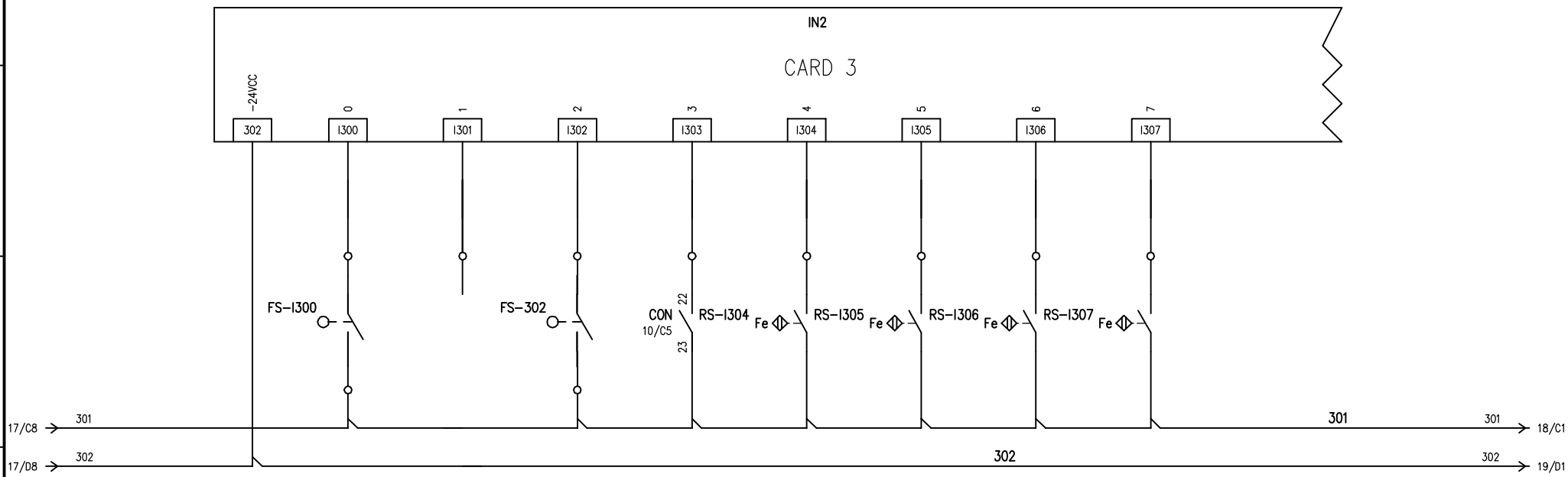
BASKET AT LOADING POS.

ULTRASONIC IN LIMITS

TANK 1 LEVEL HEALTHY

TANK 2 LEVEL HEALTHY

DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	INPUTS EXPANSION 1 PLURITANK 60	71SE-06.DWG	17	



TANK 3 LEVEL HEALTHY

FREE

TANKS 1-3 DRIP TRAY FLOAT SWITCH

CONDUCTIVITY CONTROLLER TANK 3

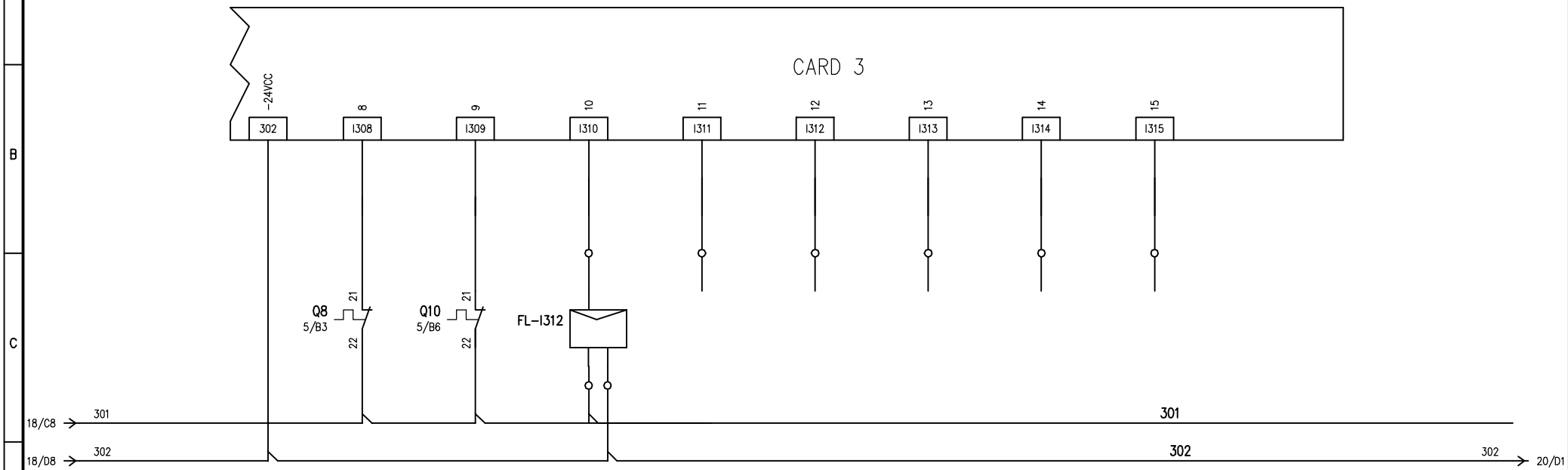
LID DRYER 4 OPEN

LID DRYER 4 CLOSE

LID DRYER 5 OPEN

LID DRYER 5 CLOSE

DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	INPUTS EXPANSION 2 PLURITANK 60	71SE-06.DWG	18	



MOTOR OVERLOAD FAN DRYER 4

MOTOR OVERLOAD FAN DRYER 5

BASKET AT UNLOADING POS.

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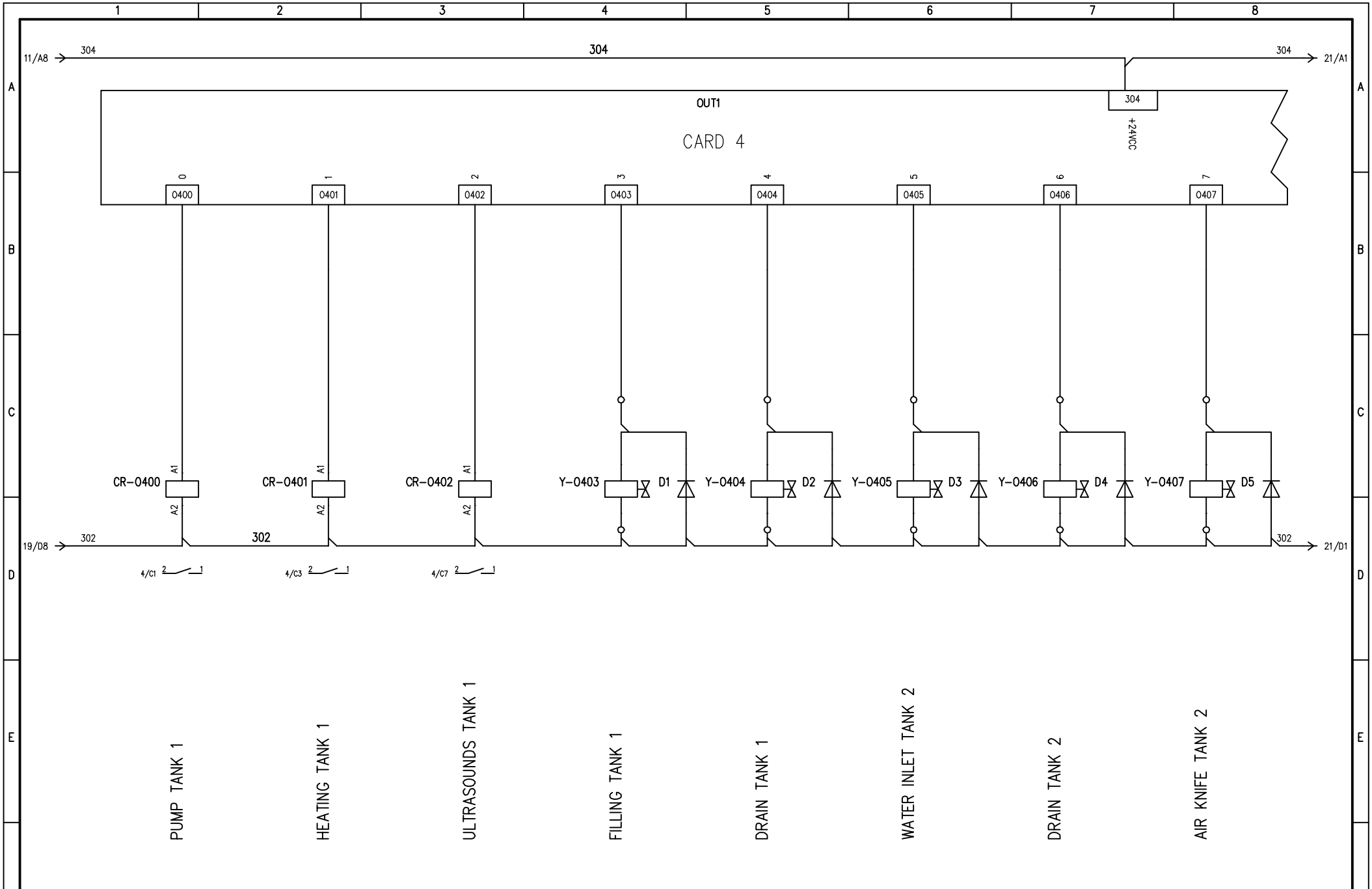
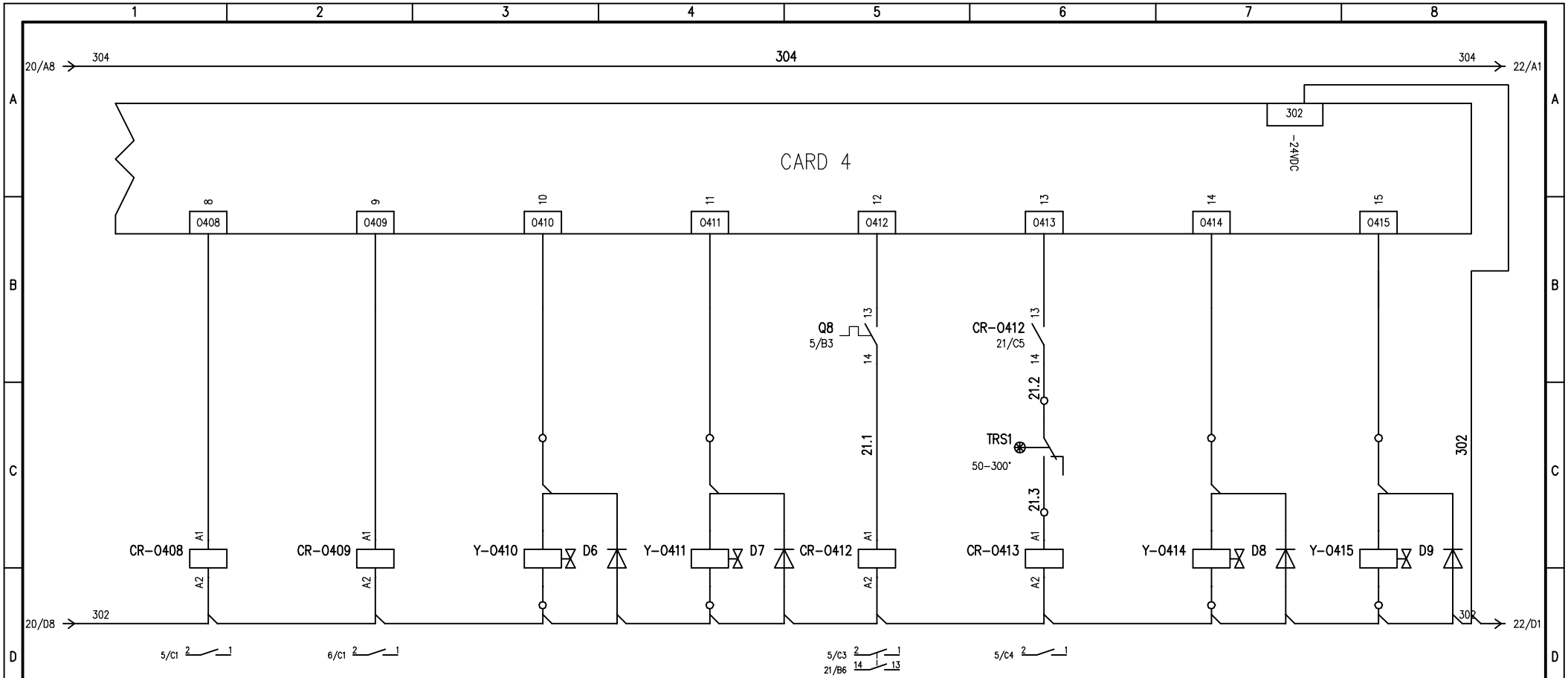
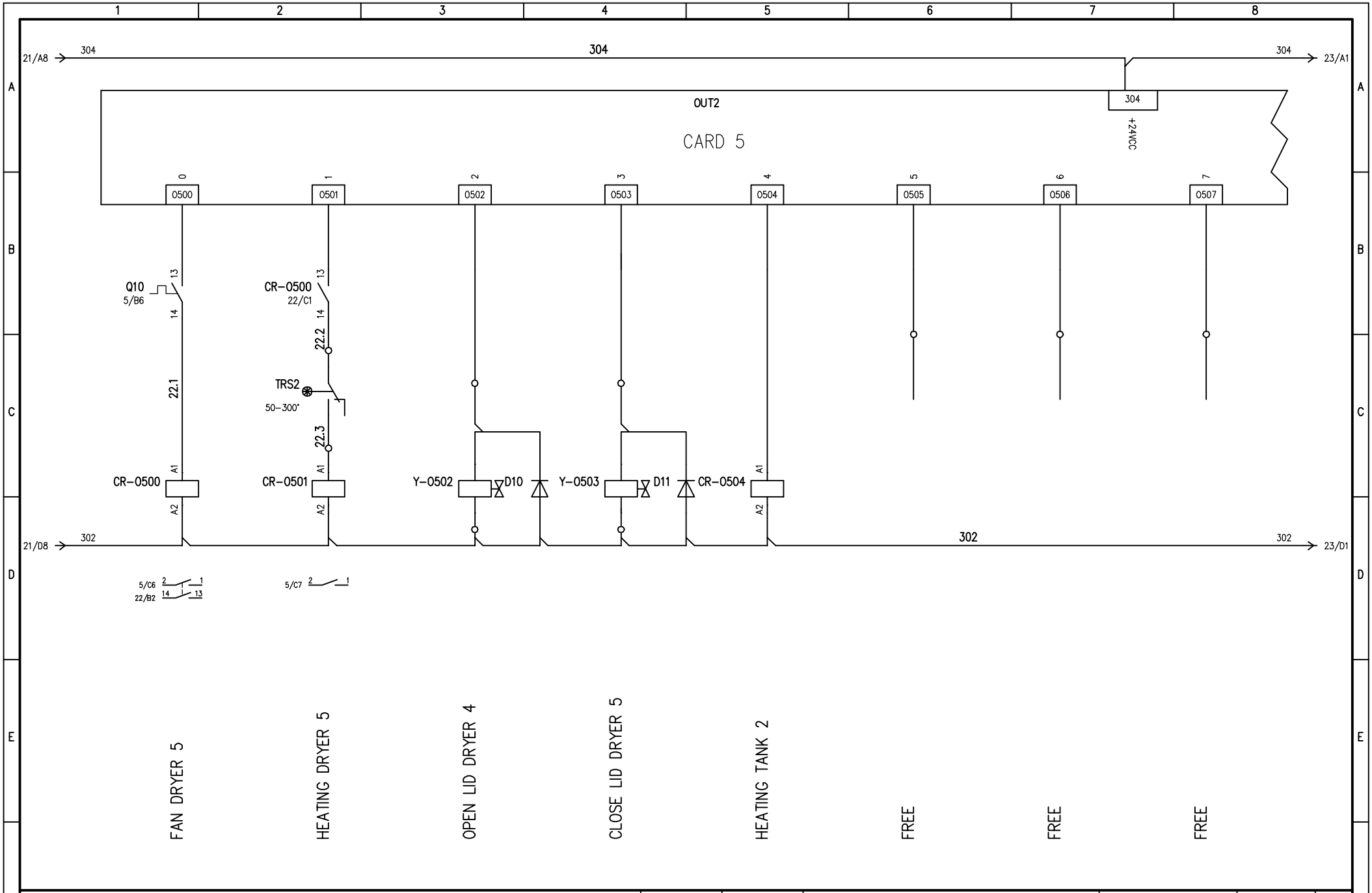
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	INPUTS EXPANSION 2 PLURITANK 60	71SE-06.DWG	19	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	OUTPUTS EXPANSION 1 PLURITANK 60	71SE–06.DWG	20	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	OUTPUTS EXPANSION 1 PLURITANK 60	71SE-06.DWG	21	



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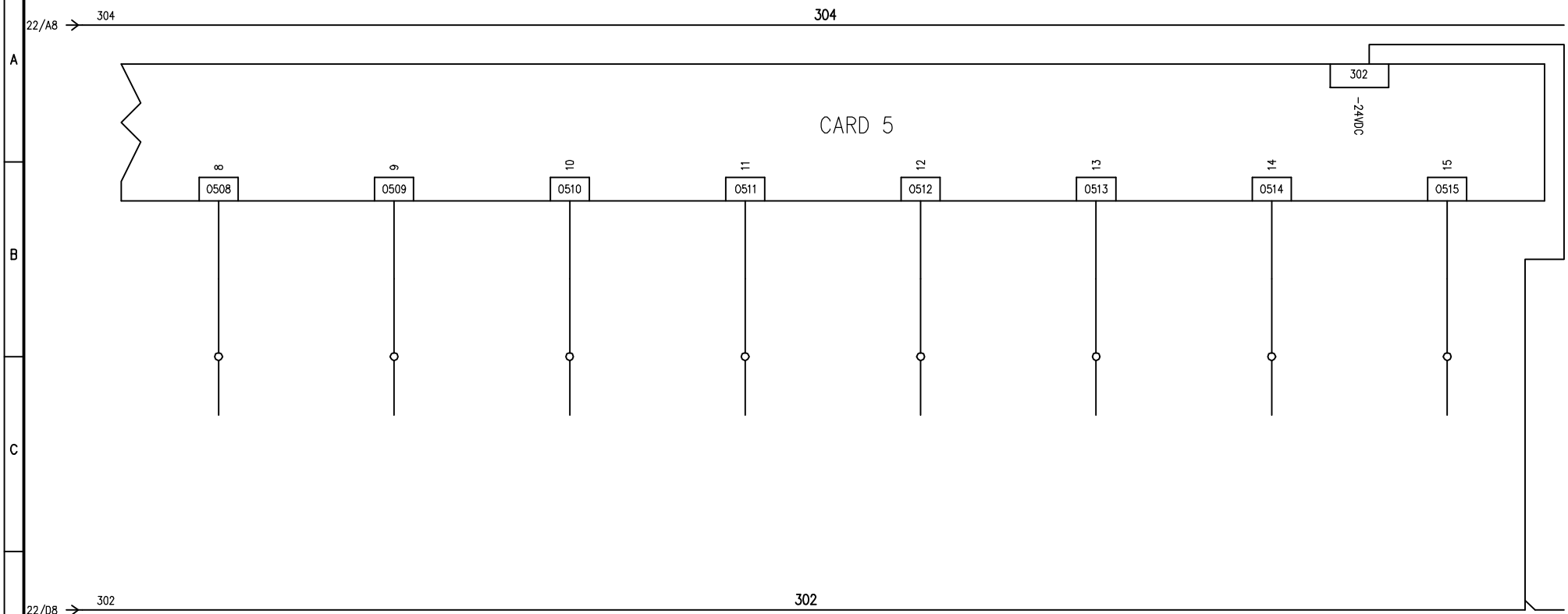
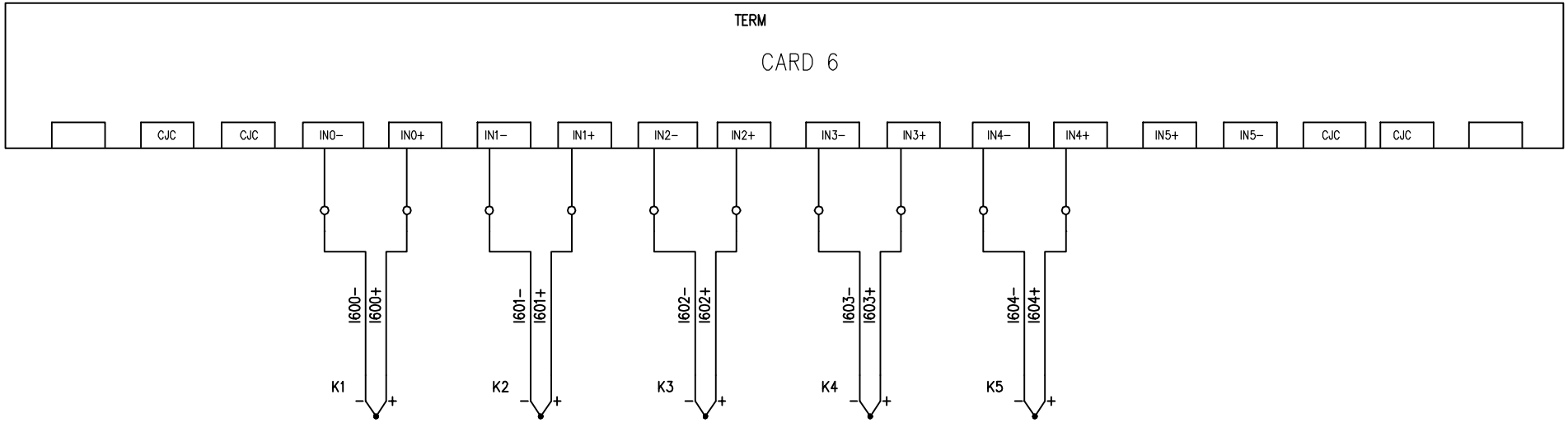
		26/01/2007	P.M.	OUTPUTS EXPANSION 2 PLURITANK 60	71SE-06.DWG	22	



novatec	NOVATEC S.r.l. reserves to itself – according to the rules– the property of this drawing with prohibition to reproduce or divulge it without its written authorization	DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
		26/01/2007	P.M.	OUTPUTS EXPANSION 2 PLURITANK 60	71SE–06.DWG	23	



DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	THERMOCOUPLE PLURITANK 60	71SE–06.DWG	24	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
	BASE PLC	1764-24BWA		1		ALLEN BRADLEY ITALIA		13/A1
	PROCESSOR WITH SERIAL	1769-LRP		1		ALLEN-BRADLEY ITALIA		12/B3
	NEUTRAL TEMINALS	194E-A32-NP		1		ALLEN-BRADLEY ITALIA		3/B1
	CONTROL BOARD LIGHTING	21416		1		SAREL		12/D8
	OPEN CONTACT ELEMENT	ZBE101	3389110089479	1	PCE	TELEMECANIQUE		9/C7
	CLOSE CONTACT ELEMENT	ZBE102	3389110089486	1	PCE	TELEMECANIQUE		9/C7
AL1	SUPPLIER	1606-XL240E		1		ALLEN-BRADLEY ITALIA		3/C3
ANA	PLC ANALOG OUTPUTS	1769-IF4OF2		1		ALLEN-BRADLEY ITALIA		15/B1
AZ1	INVERTER	VF-NC1S 2004 PL-W		1		TOSHIBA		6/C6
AZ2	INVERTER	VFS11S-2004 PL-WP		1		TOSHIBA		7/C2
AZ3	INVERTER	VFS11S-2004 PL-WP		1		TOSHIBA		7/C5
B-I207	AIR PRESSURE SWITCH	PM 10A		1		WIKA		16/C6
C1	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		11/D4
C2	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		11/D4
C3	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		11/D5
C4	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		11/D7
CR1	RELAY AUXILIARY 3NO+1NC	700DC-M310Z24		1		ALLEN-BRADLEY ITALIA	700-DC	8/D5
CR1.1	RELAY AUXILIARY 3NO+1NC	700DC-M310Z24		1		ALLEN-BRADLEY ITALIA	700-DC	8/D5

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DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	25	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
CR2	RELAY AUXILIARY 3NO+1NC	700DC-M310Z24		1		ALLEN-BRADLEY ITALIA	700-DC	9/D4
CR2.1	RELAY AUXILIARY 3NO+1NC	700DC-M310Z24		1		ALLEN-BRADLEY ITALIA	700-DC	9/D5
CR3	RELAY AUXILIARY 3NO+1NC	700DC-M310Z24		1		ALLEN-BRADLEY ITALIA	700-DC	11/D3
CR-004	RELAY AUXILIARY 3NO+1NC	700DC-M310Z24		1		ALLEN-BRADLEY ITALIA	700-DC	14/D4
CR-005	RELAY +SUPPORTS	700-HN103+700-HC24Z24		1		ALLEN-BRADLEY ITALIA	700-HC	14/D4
CR-006	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA	100-M9	14/D5
CR-0400	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		20/C1
CR-0401	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		20/C2
CR-0402	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		20/C3
CR-0408	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		21/C1
CR-0409	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		21/C2
CR-0412	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		21/C5
CR-0413	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		21/C6
CR-0500	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		22/C1
CR-0501	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		22/C2
CR-0504	9A CONTACTOR	100-M09NZD243		1		ALLEN-BRADLEY ITALIA		22/C5
D1	DIODE TERMINALS	39080		11		LEGRAND SPA		20/C5
E1A	800W HEATER	RP800		1		NOVATEC	3X800W	4/D3

DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	26	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
E1B	800W HEATER	RP800		1		NOVATEC		4/D3
E1C	800W HEATER	RP800		1		NOVATEC		4/D3
E2A	1000W HEATER	RP1000		1		NOVATEC	3X1000W	5/E1
E2B	1000W HEATER	RP1000		1		NOVATEC		5/E1
E2C	1000W HEATER	RP1000		1		NOVATEC		5/E2
E3A	1000W HEATER	ALMIK1.0-190		1		REDIC	3X1000W	5/E4
E3B	1000W HEATER	ALMIK1.0-190		1		REDIC		5/E4
E3C	1000W HEATER	ALMIK1.0-190		1		REDIC		5/E5
E4A	1000W HEATER	ALMIK1.0-190		1		REDIC	3X1000W	5/E7
E4B	1000W HEATER	ALMIK1.0-190		1		REDIC		5/E7
E4C	1000W HEATER	ALMIK1.0-190		1		REDIC		5/E8
E5A	800W HEATER	RP800		1		NOVATEC	3X800W	6/E4
E5B	800W HEATER	RP800		1		NOVATEC		6/E4
E5C	800W HEATER	RP800		1		NOVATEC		6/E5
ECO	ENCODER	27.27700.15/200		1		HONER		13/C2
ECV	ENCODER	27.27700.15/200		1		HOHNER		13/C4
EM2	RED MUSHROOM PUSHBUTTON HEAD	ZB4BS54		1		TELEMECANIQUE		8/B5
EMQ	RED MUSHROOM PUSHBUTTON HEAD	ZB4BS54		1		TELEMECANIQUE		8/B4

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DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	27	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
ESR1	EMERG. STOP MODULE	774130		1		PILZ		8/C2
ESR2	SAFETY DEVICE MODULE	774139		1		PILZ		9/C1
EVV1	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		11/D1
F1	2P 10,3X38 FUSE HOLDER	15651	3303430156512	1	PCE	MERLIN GERIN		3/B1
F18	TERMINAL FUSE-HOLDER	38086		1		LEGRAND SPA - RTA	2A	12/C1
FCON	TERMINAL FUSE-HOLDER	38086		1		LEGRAND SPA - RTA	2A	10/B5
FL-I214	LEVEL CONTROL	RSF44Y100RF		1		OPTIMAL		17/C6
FL-I215	LEVEL CONTROL	RSF44Y100RF		1		OPTIMAL		17/C6
FL-I312	MULTIFUNCTION PHOTOEYE	XUB0APSNM12		1		TELEMECANIQUE		19/C3
FP1	SAFETY LIMIT SWITCH	502210+533111		1		PILZ		9/B3
FP2	SAFETY LIMIT SWITCH	502210+533111		1		PILZ		9/B4
FP3	SAFETY LIMIT SWITCH	502210+533111		1		PILZ		9/B4
FP4	SAFETY LIMIT SWITCH	502210+533111		1		PILZ		9/B5
FS-302	LEVEL CONTROL	ILMM5		1		SAIET		18/C3
FS-I300	LEVEL CONTROL	RSF44Y100RF		1		OPTIMAL		18/C2
FVQ	TERMINAL FUSE-HOLDER	38086		1		LEGRAND SPA - RTA	2A	10/B2
GUS1	ULTRASONIC GENERATOR	RS 800 TG		1		NOVATEC	800W	4/D7
H1	RED WARNING LAMP	XB4BVB4		1		TELEMECANIQUE		9/D7

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DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	28	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
H-007	AUDIBLE ELEMENT	XVBC9B		1		TELEMECANIQUE		14/D5
H-008	RED LUMINOUS ELEMENT	XVBC34		1		TELEMECANIQUE		14/D6
H-009	YELLOW LUMINOUS ELEMENT	XVBC35		1		TELEMECANIQUE		14/D6
H-010	GREEN LUMINOUS ELEMENT	XVBC33		1		TELEMECANIQUE		14/D7
IN1	PLC INPUTS	1769-IQ16		1		ALLEN BRADLEY ITALIA		16/B2
IN2	PLC INPUTS	1769-IQ16		1		ALLEN BRADLEY ITALIA		18/B2
K1	THERMOCOUPLE	T/C FE/CO(GCI) Ø6X1		1		CAEL		24/C3
K2	THERMOCOUPLE	T/C FE/CO(GCI) Ø6X1		1		CAEL		24/C3
K3	THERMOCOUPLE	T/C FE/CO(GCI) Ø6X1		1		CAEL		24/C4
K4	THERMOCOUPLE	T/C FE/CO(GCI) Ø6X1		1		CAEL		24/C5
K5	THERMOCOUPLE	T/C FE/CO(GCI) Ø6X1		1		CAEL		24/C6
LS-I212	MULTIFUNCTION PHOTOEYE	XUB0APSNM12		1		TELEMECANIQUE		17/C5
M3	PUMP	P051		1		PLASTOMEC	120W	4/D1
M8	FAN	CB62		1		MVR	550W	5/E3
M10	FAN	CB62		1		MVR	550W	5/E6
M12	PUMP	CEAM70/3/AV		1		LOWARA	370W	6/D1
M15	CARRIER HORIZONTAL MOTOR	PC230M4T		1		MINIMOTOR	63W	7/E1
M16	CARRIER VERTICAL MOTOR	PC530M4T K		1		MINIMOTOR	270W	7/E5

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DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	29	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
OUT1	PLC OUTPUTS	1769-OB16		1		ALLEN-BRADLEY ITALIA		20/B1
OUT2	PLC OUTPUTS	1769-OB16		1		ALLEN-BRADLEY ITALIA		22/B1
P-I00	PRESSURE SWITCH	3296.072.001 0-1Bar		1		TECSIS		15/B2
PIN/H	24V LED GREEN LUMINOUS PUSHBUTTON	XB4BW33B5	3389110892048	1	PCE	TELEMECANIQUE		13/C7
PX-I02	CARRIER SENSOR	XS612B1PAL2		1		TELEMECANIQUE		13/C3
PY-I03	CARRIER SENSOR	XS612B1PAL2		1		TELEMECANIQUE		13/C3
Q1	AUTOMATIC SWITCH(low power)	1492-SP1C040		1		ALLEN-BRADLEY ITALIA	4A	3/B3
Q1.1	AUTOMATIC SWITCH(low power)	1492-SP1C100		1		ALLEN-BRADLEY ITALIA	10A	3/D3
Q2	AUTOMATIC SWITCH(low power)	1492-SP1C040		1		ALLEN-BRADLEY ITALIA	4A	3/B5
Q3	AUTOMATIC SWITCH(low power)	1492-SP1C020		1		ALLEN-BRADLEY ITALIA	2A	4/B1
Q4	AUTOMATIC SWITCH(low power)	1492-SP3C100		1		ALLEN-BRADLEY ITALIA	10A	4/B3
Q5	AUTOMATIC SWITCH(low power)	1492-SP1C010		1		ALLEN-BRADLEY ITALIA	1A	4/B5
Q6	AUTOMATIC SWITCH(low power)	1492-SP1C060		1		ALLEN-BRADLEY ITALIA	6A	4/B7
Q7	AUTOMATIC SWITCH(low power)	1492-SP3C100		1		ALLEN-BRADLEY ITALIA	10A	5/B1
Q8	MOTOR-PROTECTOR WITH AUX. CONTACTS	140M-C2E-B16		1		ALLEN-BRADLEY ITALIA	1-1.6A	5/B3
Q9	AUTOMATIC SWITCH(low power)	1492-SP3C100		1		ALLEN-BRADLEY ITALIA	10A	5/B4
Q10	MOTOR-PROTECTOR WITH AUX. CONTACTS	140M-C2E-B16		1		ALLEN-BRADLEY ITALIA	1-1.6A	5/B6
Q11	AUTOMATIC SWITCH(low power)	1492-SP3C100		1		ALLEN-BRADLEY ITALIA	10A	5/B7

DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	30	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
Q12	AUTOMATIC SWITCH(low power)	1492-SP1C040		1		ALLEN-BRADLEY ITALIA	4A	6/B1
Q13	AUTOMATIC SWITCH(low power)	1492-SP1C020		1		ALLEN-BRADLEY ITALIA	2A	6/B3
Q14	AUTOMATIC SWITCH(low power)	1492-SP3C100		1		ALLEN-BRADLEY ITALIA	10A	6/B4
Q15	AUTOMATIC SWITCH(low power)	1492-SP1C060		1		ALLEN-BRADLEY ITALIA	6A	6/B7
Q16	AUTOMATIC SWITCH(low power)	1492-SP1C060		1		ALLEN-BRADLEY ITALIA	6A	7/B2
Q17	AUTOMATIC SWITCH(low power)	1792-SP1C060		1		ALLEN-BRADLEY ITALIA	6A	7/B5
Q18	AUTOMATIC SWITCH(low power)	1492-SP1C010		1		ALLEN-BRADLEY ITALIA	1A	7/B8
QSG	MASTER SWITCH	194E-A32-1753		1		ALLEN-BRADLEY ITALIA	32A	3/C1
RS-106	LIMIT SWITCH	FA-4115		1		PIZZATO		13/C5
RS-1304	PISTON LIMIT SWITCH	CST-220		1		CAMOZZI		18/C5
RS-1305	PISTON LIMIT SWITCH	CST-220		1		CAMOZZI		18/C5
RS-1306	PISTON LIMIT SWITCH	CST-220		1		CAMOZZI		18/C6
RS-1307	PISTON LIMIT SWITCH	CST-220		1		CAMOZZI		18/C6
SAAM	2-SETTING KEY-OPERATED SELECTOR	XB2BG21		1	PZ	TELEMECANIQUE		16/C2
SAB	KEY-OPERATED SELECTOR	XB2BG210		1	Nr.	TELEMECANIQUE		9/C6
TERM	PLC THERMOCOUPLE	1769-IT6		1		ALLEN-BRADLEY ITALIA		24/B1
TRS1	STAINLESS STEEL THERMOSTAT	50-300		1		F.LLI PERUZZO	50-300°	21/C6
TRS2	STAINLESS STEEL THERMOSTAT	50-300°		1		F.LLI PERUZZO	50-300°	22/C2

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DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	31	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
U1	VOLTAGE METER	890210		1		PILZ		3/C7
VQ	COOLING FAN	99484006		1		CROUZET		10/D2
Y-0403	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		20/C4
Y-0404	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		20/C5
Y-0405	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		20/C6
Y-0406	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		20/C7
Y-0407	HYDRAULIC SOLENOID VALVE COIL	4978-01-17-20 Ø3/8		1		LEGRIS		20/C8
Y-0410	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		21/C3
Y-0411	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		21/C4
Y-0414	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		21/C7
Y-0415	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		21/C8
Y-0502	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		22/C3
Y-0503	PNEUMATIC SOLENOID VALVE COIL	G77		1		CAMOZZI		22/C4
T1	TRANSDUCER			1		NOVATEC		4/E7
M14	AGITATION MOTOR	BN 63B 6 GR63 B5		1		BONFIGLIOLI		6/F6
HL	ENCLOSURE LIGTHTING	2X18		2		PHILIPS		6/E3
CON	CONDUCTIVITY CONTROLLER	202540/10-888-22-00-000		1		JUMO		10/D5
	CONDUCTIVITY PROBE	2EL6-0, 01-PT100-G3/4A-A		1		JUMO		10/C4

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DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	32	

Ref-mark	Description	Article code	Alternative code	Quantity	U.M.	Manufacturer	Notes	Position
	PANEL VIEW	2711P-T6C5D		1		ALLEN-BRADLEY ITALIA		12/B2
	TERMINATORE DESTRO	1769-ECR		1		ALLEN-BRADLEY ITALIA		
	CONTROL BOARD	16137+16411		1		LUME		
	ROTATING KNOB WITH DOOR LOCKING+ACCESSORIES	194L-HE6N-175+194L-G3394		1		ALLEN-BRADLEY ITALIA		
	BASE+LID	XVBC21		1		TELEMECANIQUE		
	PIPE FIXING SUPPORT	XCBZ03		1		TELEMECANIQUE		
	CABLE HOLDER CHAIN	250.03.100.0		3	MT	IGUS		

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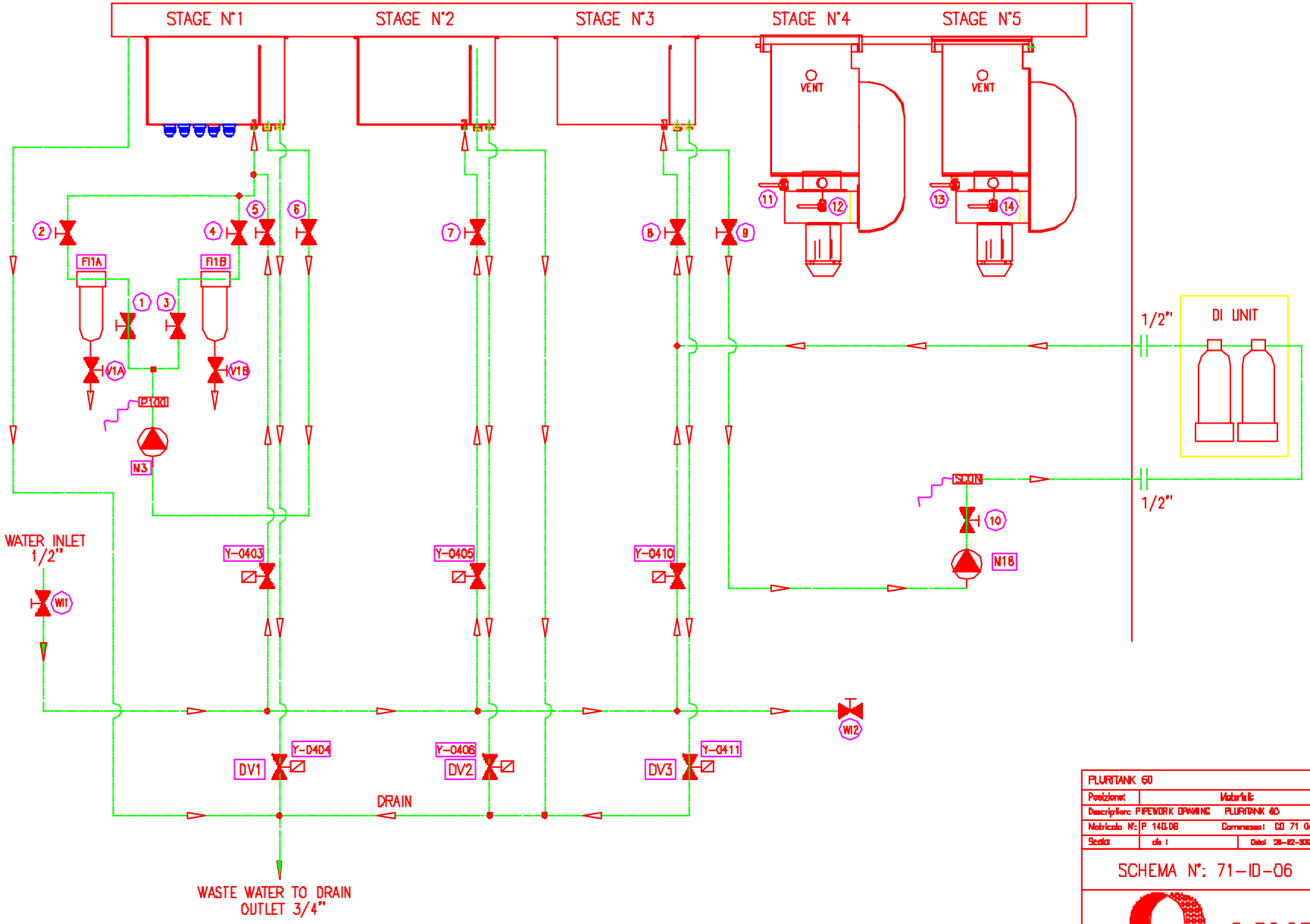
DATE	DRAWING	TITLE	DIAGRAM NR.	PAGE	REV
26/01/2007	P.M.	SPARE PARTS LIST PLURITANK 60	71SE-06.DWG	33	

Part 9
Plumbing Schematics



PLURITANK 60			
Posizione:	Materiale:		
Descrizione: PIPEWORK DRAWING	PLURITANK 60		
Matricola N°: P 140.06	Commessa: CO 71 06		
Scala: da 1	Data: 28-02-2007	Pag. N°: 1	

SCHEMA N°: 71-ID-06

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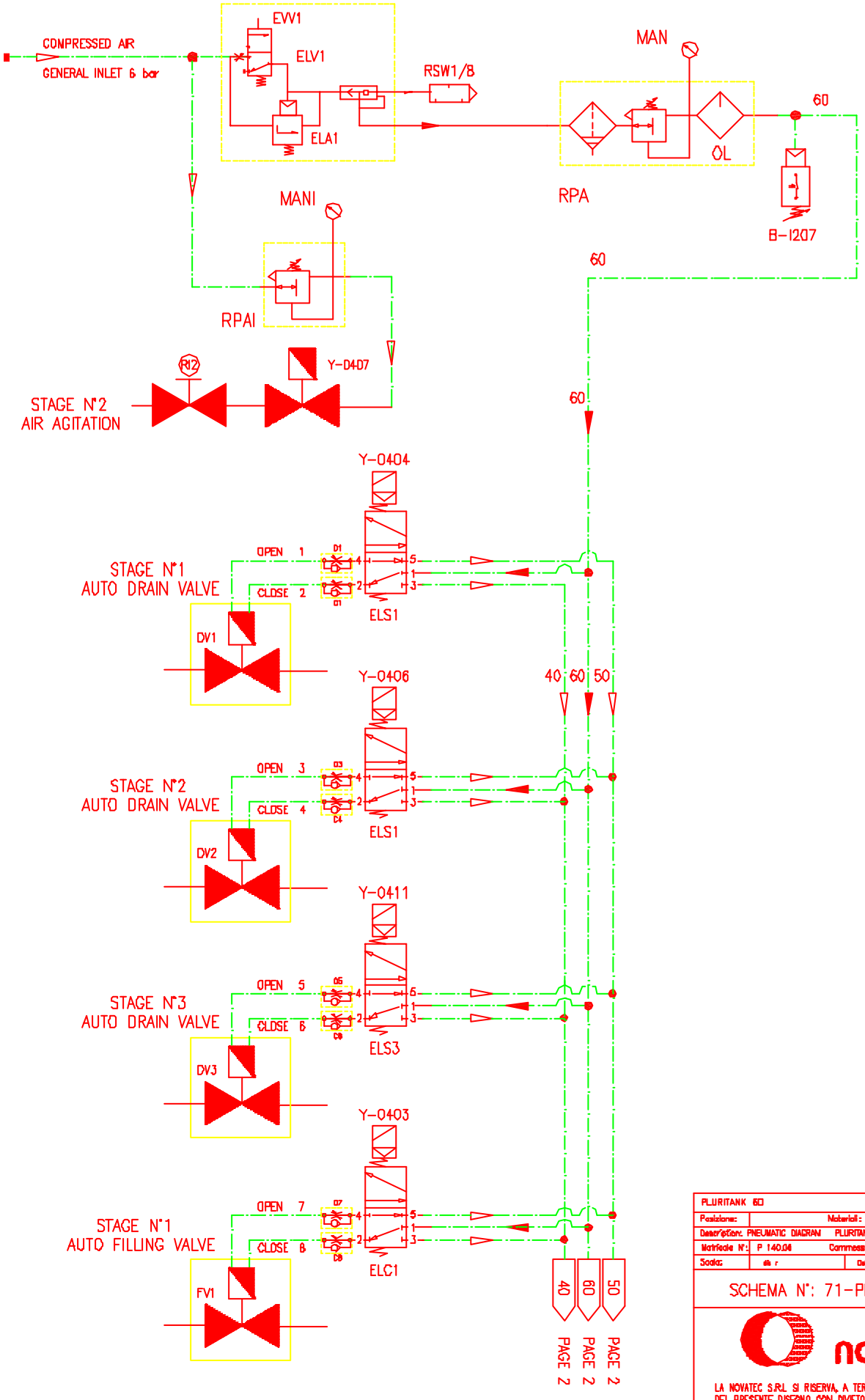
Part 10
Pneumatic Schematics


COMPRESSED AIR
GENERAL INLET 6 bar
EVV1
ELV1
ELA1
RSW1/B
MAN
OL
RPA
60
B-1207
MANI
RPAI
Y-0407
STAGE N°2
AIR AGITATION
60
Y-0404
OPEN 1
CLOSE 2
STAGE N°1
AUTO DRAIN VALVE
DV1
ELS1
Y-0406
40 60 50
OPEN 3
CLOSE 4
STAGE N°2
AUTO DRAIN VALVE
DV2
ELS1
Y-0411
OPEN 5
CLOSE 6
STAGE N°3
AUTO DRAIN VALVE
DV3
ELS3
Y-0403
OPEN 7
CLOSE 8
STAGE N°1
AUTO FILLING VALVE
FV1
ELC1
40
60
50
PAGE 2
PAGE 2
PAGE 2
PLURITANK 60
Posizione:
Materiali:
Descrizione: PNEUMATIC DIAGRAM PLURITANK 60
Matricola N°: P 140.06
Commessa: CO 71 06
Scala:
Data: 28-02-2007
Pag. N°: 1
SCHEMA N°: 71-PN-06
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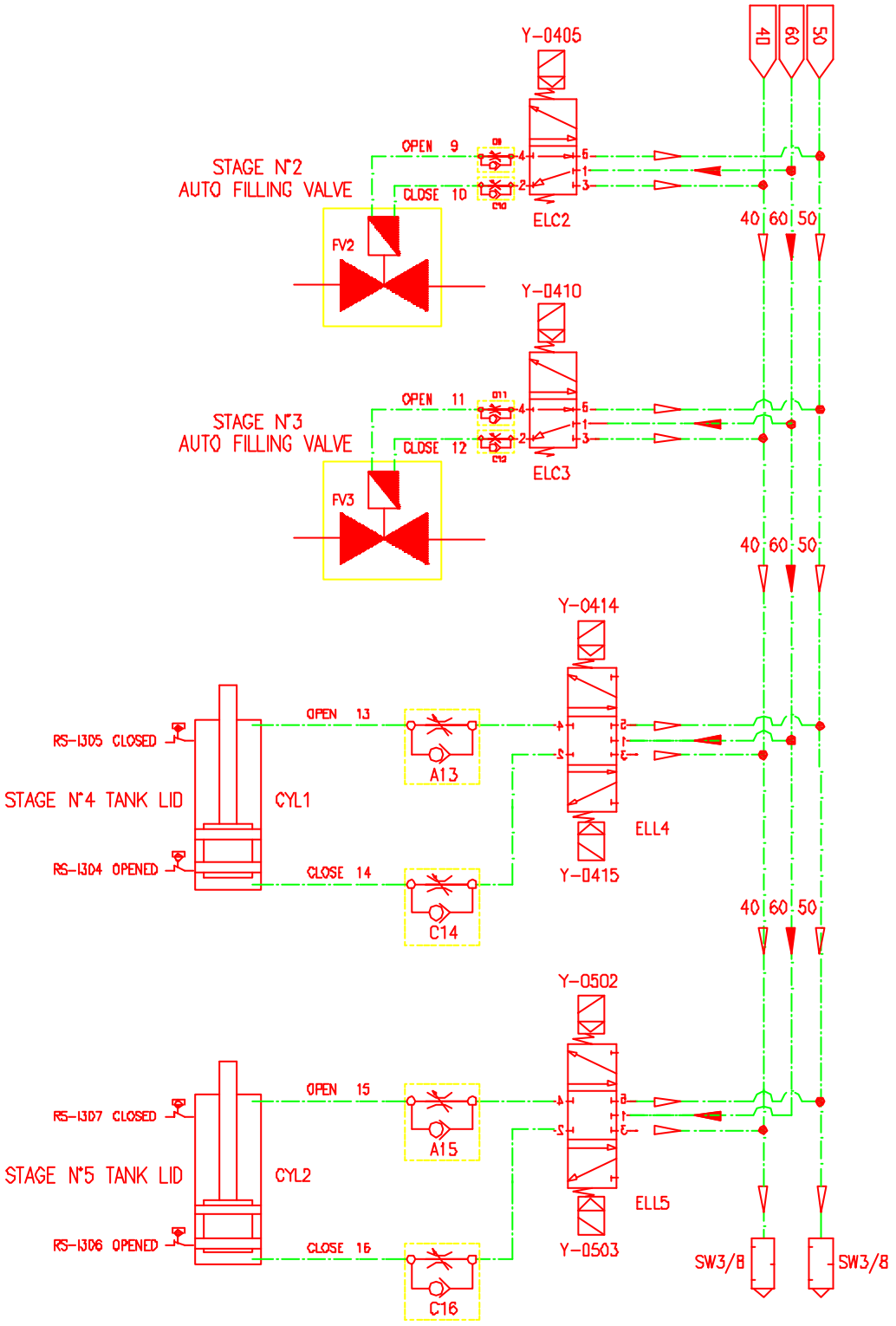
LA NOVATEC S.R.L. SI RISERVA, A TERMINE DI LEGGE LA PROPRIETA' DEL PRESENTE DISEGNO CON DIVIETO DI RIPRODURLO O DIVULGARLO SENZA LA SUA AUTORIZZAZIONE SCRITTA.



FLURITANK 60			
Posizione:	Materiali:		
Descrizione: PNEUMATIC DIAGRAM	FLURITANK 60		
Matricola N°: P 140.06	Commessa: CO 71 06		
Scala	ala :	Data: 28-02-2007	Pag. N°: 2

SCHEMA N°: 71-PN-06

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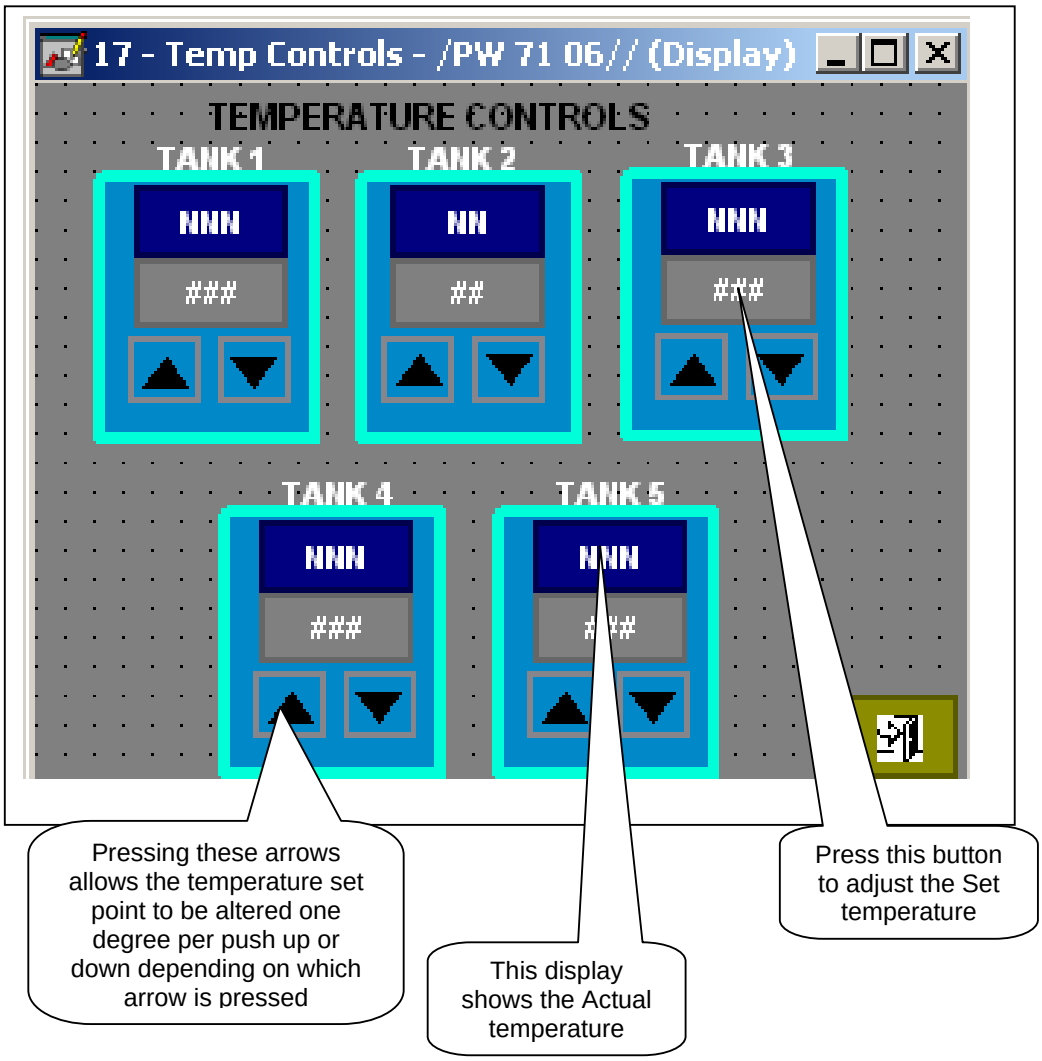
Part 11 Temperature Control



Part 12
Conductivity Meter

Part 13
Pumps and Motors

Part
14
Hepa Filtration Unit

NOT FITTED

Part 15 Inverters

Instruction Manual (Supplementary)
Totally-Enclosed Box Type Inverter
TOSVERT **VF-S11**

Thank you for purchasing a Toshiba "Totally-enclosed box type TOSVERT VF-S11 series inverter."
This Manual gives a supplementary explanation of some items referred to in the instruction manual E6581158 included with the product. Please read this manual carefully along with the instruction manual E6581158.

1-phase 240V class	0.2 to 2.2kW
3-phase 240V class	0.4 to 4.0kW
3-phase 500V class	0.75 to 4.0kW

- To set makers -

Please see to it that this manual is supplied to the inverter's end user, along with the instruction manual E6581158.

■Safety precautions

Before reading this manual, please read the following instructions in addition to “I. Safety Precautions,” of the instruction manual E6581158.

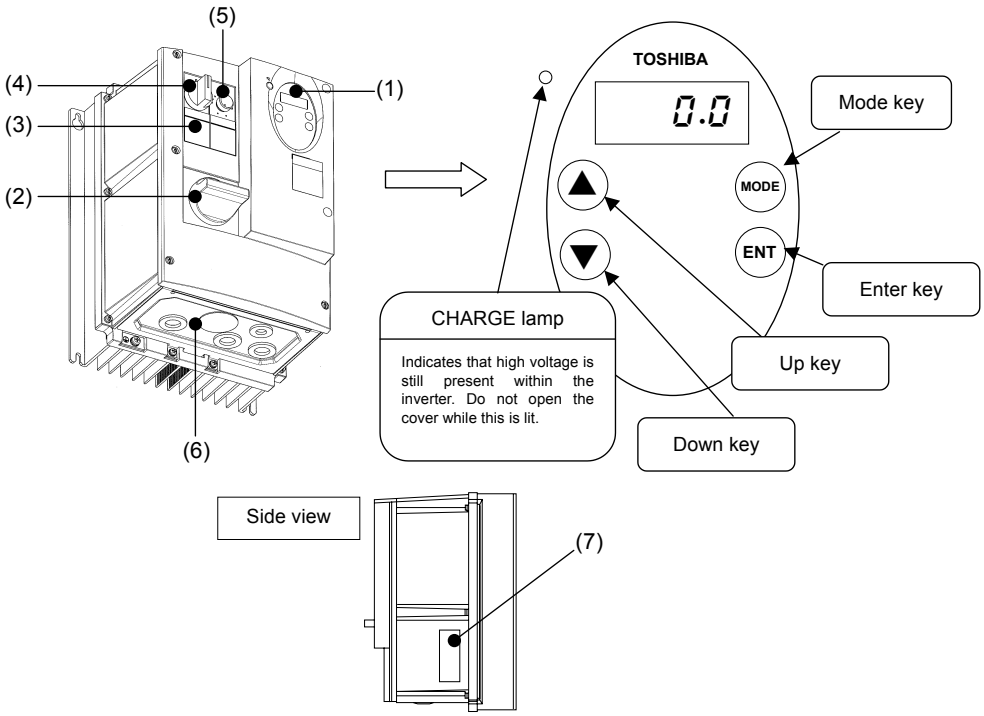
■General Operation

Danger	
Mandatory	• Circuit boards are exposed when the front cover is removed. So do not detach the front cover when the inverter is energized or within 10 minutes after power is turned off. Doing so could result in electric shock.

■Transportation

Warning	
Mandatory	• When handling the inverter unit, hold it by both the sides firmly. If you hold it by the fins at the upper and lower parts, you could get injured.

■Exterior Features

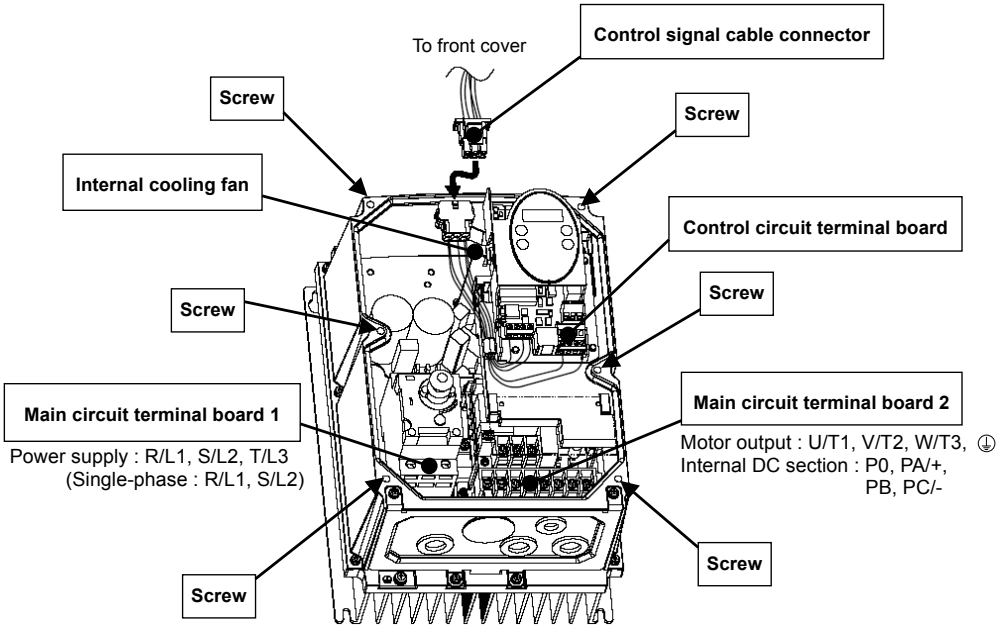


No.	Devices	Remarks
(1)	Operation panel	Equipped with ▲, ▼, MODE and ENT keys used to set parameters, a 7-segment LED and a CHARGE lamp.(The inverter does not have a RUN key, a STOP key and a potentiometer control, which are provided for VF-S11 standard series inverters.)
(2)	Manual power ON-OFF switch	Used to turn on and off power manually. Note 1:
(3)	Slots (x 2) reserved for optional devices	Slots for optional contact input switches. Note 2:
(4)	Operation ON-OFF rotary switch	Used to start and stop the inverter.
(5)	Potentiometer for frequency setting	Used to set the operation frequency of the inverter.
(6)	Wiring port plate	Steel plate with wiring portsThe effects of noise can be reduced to some degree by fixing shielded parts of cables with cable grounds or similar devices. See page 7.
(7)	Name plate	Label on which the ratings of the inverter unit is printed.

Note 1: The switch has the function of tripping (overcurrent tripping). If the switch is in the Trip position, inspect the inverter before turning back on the power switch, because the inverter itself may be faulty.

Note 2: Recommended contact input switches: Harmony series (XB5 series)

■**Main circuit and control circuit terminal boards**



How to remove the front cover
1. Shut off the supply of electricity from the main power supply, and turn the manual power ON-OFF switch to the OFF position.
2. Ten minutes or more after turning off power, check to be sure that the CHARGE lamp is not lit.
3. Remove the 6 screws* (indicated by the arrows in the figure) around the front cover.
   (* 4 screws for single/three-phase 240V-0.75kW models and smaller)
4. Pull the front cover slowly toward you to remove it and detach the control signal cable connector.

How to attach the front cover
1. Attach the control signal cable connector.
2. Attach the front cover.
3. Set and tighten the 6 screws* (indicated by the arrows in the figure) around the front cover.
   (* 4 screws for single/three-phase 240V-0.75kW models and smaller)

Caution: Attach the front cover securely.
Or else it does not serve as a protector compliant with IP54.
On top of that, it may become impossible to operate the keys on the operation panel.

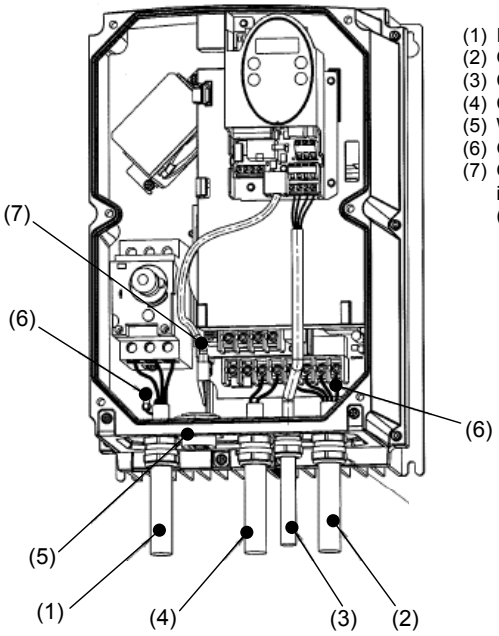
About the built-in cooling fan

The inverter has a built-in cooling fan. The cooling fan has a useful life of approximately 30,000 hours (2 to 3 years when operated continuously), so it needs to be replaced periodically.
(Single/three-phase 240V-0.75kW models and smaller are not equipped with cooling fans.)
If the cooling fan does not operate normally, the temperatures of the internal electrical components will rise high, and as a result their lives will be shortened. So inspect it periodically.

About the useful life of the manual power ON-OFF switch

The manual power ON-OFF switch has a useful life of approximately 5 years (if operated 12 hours per day at an average yearly ambient temperature of 30°C), so it needs to be replaced periodically.

■Wiring diagram

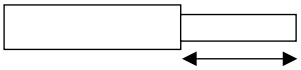


(1) Input power cable
(2) Output cable
(3) Control cable
(4) Control resistor (optional) cable
(5) Wiring port plate
(6) Grounding terminal
(7) Optional communications device interconnect cable (Option)

Cautions

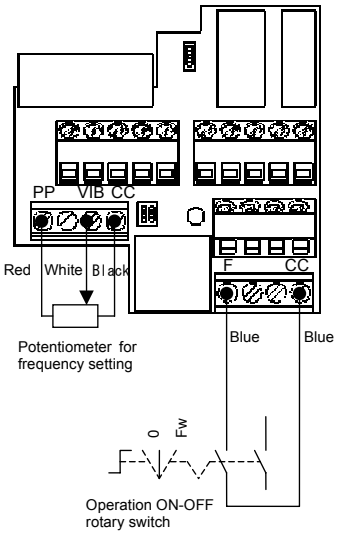
- Circuit boards are exposed when the front cover is removed. Since high voltages are applied to some parts of the circuit board, read Section 2.1, “Cautions on wiring,” of the instruction manual E6581158 carefully before wiring.
  When connecting cables, take care not to damage the circuit board with a screwdriver or a similar tool.
- To connect the power cable (to the manual power ON-OFF switch), torque the terminal screw to 1.7N·m (recommended). (M4 screw)
- Never turn on the power ON-OFF switch before attaching the front cover.
  Or you could get a shock.

The main circuit terminal board (input power cable) has terminals of a cable pinch type.
Before connecting a cable, strip off its sheath to a length of 10mm or so. Torque: 1.7N·m



■Diagram of cables connected at the factory

< WN type : Sink logic >



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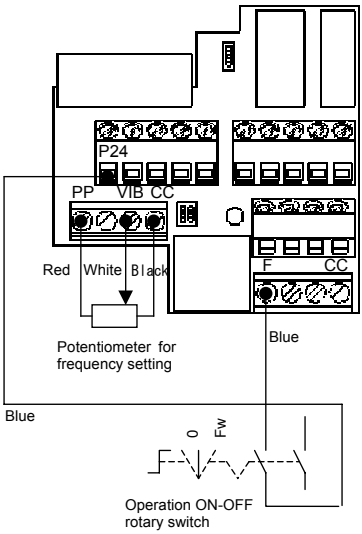
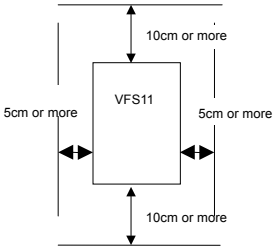


Note: The colors indicated in the above figure refer to the colors of cables.

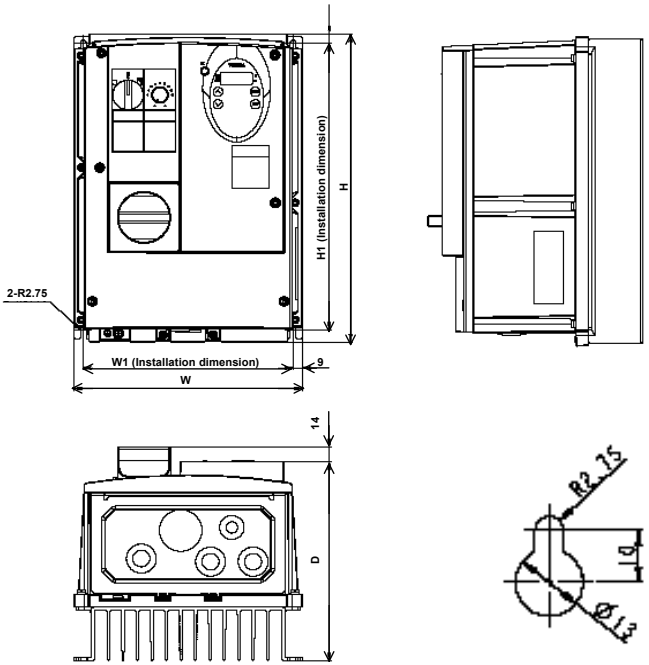
■Installation environment



- Operate in areas where ambient temperature ranges from -10°C to +40°C.
- Install the inverter in a well-ventilated place and mount it on a flat metal plate in portrait orientation. Install the inverter so that it is not inclined more than ±10° from the vertical.
- Leave a space of 10cm or more on the upper and lower sides of the inverter, and a space of 5cm or more on each side.
- The inverter has a built-in cooling fan. The cooling fan has a useful life of approximately 30,000 hours (2 to 3 years when operated continuously), so it needs to be replaced periodically. The inverter has a built-in cooling fan. (Single/three-phase 240V-0.75kW models and smaller are not equipped with cooling fans.)
  If the cooling fan does not operate normally, the temperatures of the internal electrical components will rise high, and as a result their lives will be shortened.
  So inspect it periodically.

■Outside dimensions

Voltage class	Applicable Motor (kW)	Inverter type	Outside dimensions (mm)						Cable port
			W	H	D	W1	H1	D1	
1-phase 240V	0.2	VFS11S-2002PLE	210	240	177	192	218	14	ϕ19×3 ϕ21×1
	0.4	VFS11S-2004PLE							
	0.75	VFS11S-2007PLE							
	1.5	VFS11S-2015PLE	215	297	206	197	277	14	ϕ19×1
	2.2	VFS11S-2022PLE	230	340	222	212	320	14	ϕ23×3
3-phase 240V	0.4	VFS11-2004PME	210	240	177	192	218	14	ϕ19×3 ϕ21×1
	0.75	VFS11-2007PME							
	1.5	VFS11-2015PME	215	297	206	197	277	14	ϕ19×1 ϕ23×3
	2.2	VFS11-2022PME							
	4.0	VFS11-2037PME	230	340	222	212	320	14	
3-phase 500V	0.75	VFS11-4007PLE	215	297	206	197	277	14	ϕ19×1 ϕ23×3
	1.5	VFS11-4015PLE							
	2.2	VFS11-4022PLE	230	340	222	212	320	14	
	4.0	VFS11-4037PLE							



■Specifications

Item			Specification					
Voltage class			1-phase 240V class/3-phase 240V class/3-phase 500V class					
Applicable motor (kW)			0.2	0.4	0.75	1.5	2.2	4.0
Model	Voltage class	Model number	VFS11S-/VFS11-					
	1-phase 240V class	VFS11S-	2002PLE	2004PLE	2007PLE	2015PLE	2022PLE	-
	3-phase 240V class	VFS11-	-	2004PME	2007PME	2015PME	2022PME	2037PME
	3-phase 500V class	VFS11-	-	-	4007PLE	4015PLE	4022PLE	4037PLE
Rating	Capacity (kVA)	Note 1:	0.6	1.3	1.8	3.0 /3.0 /3.1	4.2	6.7 /7.2
	Output current (A) Note 2:	1-phase 240V	1.5 (1.5)	3.3 (3.3)	4.8 (4.4)	8.0 (7.9)	11.0 (10.0)	-
		3-phase 240V	-	3.3 (3.3)	4.8 (4.4)	8.0 (7.9)	11.0 (10.0)	17.5 (16.4)
		3-phase 500V	-	-	2.3 (2.1)	4.1 (3.7)	5.5 (5.0)	9.5 (8.6)
	Output voltage Note 3:		240V class: 3-phase 200 to 240V, 500V class: 3-phase 380 to 500V					
	Overload current rating		150%-1min., 200%-0.5 sec. (50%-reduction value)					
Power supply	Voltage-frequency		240V class: 1-phase/3-phase 200 to 240V-50/60Hz, 500V class: 3-phase 380 to 500V-50/60Hz					
	Allowable fluctuation		Voltage+10%, -15% Note 4:, Frequency±5%					
Protective method			Totally enclosed type (JEM1030) compliant with IP54/possible to bring into compliance with IP55 Note 5:					
Cooling method			Self-cooled (with a built-in cooling fan. 1-phase/3-phase 240V-0.75kW or smaller: Cooling fan not provided)					
Color			Munsel 5Y-8/0.5					
Built-in filter			1-phase & 500V class: High-attenuation EMI filter, 3-phase 240V class: Standard filter					
Environments	Use environments		Indoor type. Altitude: Not more than 1000m. Place free from corrosive and explosive gases					
	Ambient temperature		-10 to +40℃					
	Storage temperature		-25 to +70℃					
	Relative humidity		20 to 93%					
	Vibration		5.9m/s^2 or less (10 to 55Hz)					

Note 1: Capacity is calculated at 220V for the 240V models and at 440V for the 500V models.

Note 2: Indicates rated output current setting when the PWM carrier frequency (parameter F300) is 4kHz or less. The values between parentheses refer to output currents at PWM carrier frequencies of over 4kHz. They need to be reduced further at frequencies over 12kHz (If a motor cable over 30m in length is used, it is necessary to reduce them more. This means that the lives of the internal components will be shortened). When the input power voltage of the 500V class model exceeds 480V, it is necessary to further reduce the setting. The default setting of the PWM carrier frequency is 12kHz.

Note 3: The maximum output voltage is equal to the input supply voltage.

Note 4: ±10% when the inverter is operated continuously (under a load of 100%).

Note 5: IP54-compliant structures refer to structures that protect the contents from dust and harmful effects of water that drops from every direction.
The inverter can be brought into compliance with IP55 specifications by making the wiring port watertight. (IP55-compliant structures refer to structures that protect the contents from dust and harmful effects of water that comes in a jet from every direction.)
To bring the inverter into compliance with IP-55, use PG screw type cable grounds. Among cable grounds available are skin-top grounds manufactured by LAPP (Germany).
When using this type of grounds, use them in combination with lock nuts specified below.

Cable port	Cable ground	Cable ground(EMC-compliant)	Lock nut
ϕ19 hole	MS11	MS-SC11	SM-11
ϕ21 hole	MS13.5	MS-SC13.5	SM-13.5
ϕ23 hole	MS16	MS-SC16	SM16

Note 6: For control specifications, parameters and functions, refer to the instruction manual E6581158.

Note 7: The factory default settings of the following parameters are different from those of the VFS-11 standard type.

Title	Function	Standard VF-S11	Totally enclosed type VF-S11
CMOd	Command mode selection	1	0
FMOd	Frequency setting mode selection	0	2

Note 8: The inverter has a built-in cooling fan. The cooling fan has a useful life of approximately 30,000 hours (2 to 3 years when operated continuously), so it needs to be replaced periodically.
(Single/three-phase 240V-0.75kW models and smaller are not equipped with cooling fans.)
If the cooling fan does not operate normally, the temperatures of the internal electrical components will rise high, and as a result their lives will be shortened. So inspect it periodically.

Note 9: The manual power ON-OFF switch has a useful life of approximately 5 years (if operated 12 hours per day at an average yearly ambient temperature of 30°C), so it needs to be replaced periodically.

Part 16
Sensors & Switches

Part 17
Ultrasonic Meters

Part 18 Maintenance

17.1 Daily Maintenance

- Drain stages 1, 2 and 3 by opening the valves located below the tanks. The valves are closed when the text is horizontal.
- Close the drain valves below the cleaning tanks and fill the tanks to about 25mm (1") below their rims. Ensure that the liquid level sensors on the front of the tanks are closed.
- Refill with fresh chemicals. (refer to the recommended process manual)
- Check for any obvious defects and rectify.
- Wipe down surfaces to prevent spilt chemicals crystallising on the surfaces.
- Check the quality of the water in the final stage. The water quality should always be higher than 1 MΩ/cm or less than 1 μS/cm depending on the type of meter used. If you do not have a suitable meter please contact us for further information.

17.2 Monthly Maintenance

Bearings
Lubricate the oscillation Rose bearings using light machine oil.

Deionised Water System

Refer to the Elga service manual

- Isolate the main water supply.
- Drain the reservoirs and wipe it out.
- Should there be any signs of bacterial growth i.e. a slimy film on the side walls of the tank sterilise as follows:
- Wipe all residues from side walls
- Fill the tank by opening the water isolator valve.
- Add 4 sterilising tablets to the reservoir tank (the type of tablets used to sterilise a baby's bottle e.g. Milton)
- Leave for one hour and then turn the system on and allow the tanks to fill.
- Add an additional tablet to each of the rinse tanks and leave for a further 10 minutes with the pump running.

- Drain and refill the system as normal
- Check flow as described in 2,5 and 2.6 above

17.4 Every six Months

Every six months the machine should be serviced. We recommend that a qualified maintenance technician carry out this work.

Part 19 Technical Specification

Electrical Supply:	400 / 415V, 50/60Hz. 3φ & Neutral (32A).
Total Power Rating:	15kW.
Normal Running:	5kW.
Water Supply:	25mm or 1”BSP female connection.
Drain:	Foul Sewer. One 1¼ ” BSP Connections: Water & Chemical.
Fume Extraction:	ϕ150mm. Duct. 300cfm total

Part 20 Trouble Shooting

System Alarm (red) Message Display

Display Message	Description & Action to be Taken	Type
E-STOP BUTTON OPERATED	The **Emergency stop** button has been pressed. Twist the **Emergency stop** button clockwise to release.	Alarm
SYSTEM 3 PHASE SUPPLY FAULT	A fault has been detected on Main 3 Phase electrical supply to the Cleaning Machine. Check that there is 400-415V Ac between each of the 3 phases and that the phase rotation is correct.	Alarm
SAFETY DOORS OPEN	The safety doors have been opened. Check all Safety doors are closed.	Alarm
ROBOT HORIZONTAL INVERTER FAULT	The Robot horizontal inverter has tripped. Check the Inverter INV1 a fault message will be displayed Make a note of this fault message and report this fault to Optimal.	Alarm
ROBOT HORIZONTAL TRAVEL FAULT	This fault occurs when the Robot travels horizontally and no count is seen from the horizontal encoder system for 2 seconds, i.e. the Robot has failed to move. Check for any possible blockage or obstruction that may have caused the Robot to stop, also check the top rail which the Robot drives along for any liquid that may result in slippage of the Robot's drive wheel. When all checks have been made press the Horizontal Reset button to reset the fault and the Robot will continue to operate.	Alarm
ROBOT VERTICAL INVERTER FAULT	The Robot vertical inverter has tripped. Check the Inverter INV2 a fault message will be displayed Make a note of this fault message and report this fault to Optimal.	Alarm
ROBOT VERTICAL OVER TRAVEL FAULT	The Robot vertical travel has raised or lowered to its limit in travel. Reset the Robot Control (see section 6.6), if this problem persists report this fault to Optimal.	Alarm
ROBOT VERTICAL LOSS MOTION FAULT	The Robot vertical travel has attempted to lower on to an obstruction. Check for any obstructions below Robot arm and remove.	Alarm
24V POWER SUPPLY FAILED	The 24VDC power supply has failed. Check circuit breaker and reset if necessary. Replace power supply if input voltage is ok, but no output.	Alarm
STAGE FILTER DRIP TRAY FULL	Section No.1-6 filter drip tray has become full of water. Valve will be de-energised until drip tray is empted. Check filter bowls, pumps, pipe work and tanks for leaks before draining drip tray.	Alarm
AUTO RECOVERY FAILED CHECK DI CYLINDERS	Section No.4 DI water quality has been out of set limits for 15 minutes. DI cylinders need recharging.	Alarm

System Warning (yellow) Message Display

Display Message	Description & Action to be Taken	Type
STAGE No.1 LOW WATER LEVEL	Stage No.1 water level float switch has detected a low water level, preventing Stage No.1 heaters and pump from operating, or water level pressure switch has detected a low water level, preventing the ultra-sonics from operating. Check for any water leaks, if there are no leaks top-up the water to the correct level.	Warning
STAGE No.2 LOW WATER LEVEL	Stage No.2 water level float switch has detected a low water level, preventing Stage No.2 heaters and pump from operating, or water level pressure switch has detected a low water level, preventing the ultra-sonics from operating. Check for any water leaks, if there are no leaks top-up the water to the correct level.	Warning
STAGE No.3 LOW WATER LEVEL	Stage No.3 water level float switch has detected a low water level, preventing Stage No.3 heaters and pump from operating, or water level pressure switch has detected a low water level, preventing the ultra-sonics from operating. Check for any water leaks, if there are no leaks top-up the water to the correct level.	Warning
REMOVE CARRIER FROM UNLOAD STATION	A carrier is occupying Coating System Unload station. Remove Carrier from the Coating system Unload Station.	Warning
ROBOT HOME CYCLE	The Robot system is currently operating the automatic Home cycle. The Robot home cycle is a sequence to reset the Robot's positional counters.	Warning
TEMPERATURES OUT OF RANGE	One or more of the Cleaning System process temperature controllers are +/- 10°C or more from the operating set point. Check Cleaning System temperature controllers to find the temperature controller +/- 10°C or more from the operating set point, and then the circuit breaker of that Cleaning stage (see Electrical schematics section 12).	Warning
SAFETY DOOR OVERIDE SELECTED	The interlocks on the sliding windows are disabled so that the robot can move with the widows in the open position	Warning
ULTRASONIC FAULT	The sonic generator has become faulty. Remove the rear panel covering the generator, and observe the fault LEDs on the generator to locate the fault.	Warning