LÄMPÖÄSSÄ
100% GEOTHERMAL HEAT

LÄMPÖÄSSÄ GROUND SOURCE HEAT PUMP
ESI 6-17 / EMI 22-43 / ELI 60-90

INSTRUCTIONS FOR USE, INSTALLATION AND MAINTENANCE

LÄMPÖÄSSÄ 5/2016

Foreword

We thank you for your confidence in our products and congratulate you on making an excellent choice! You have selected a long-lasting and environmentally friendly Lämpöässä geothermal heat system. We hope that you will enjoy the trouble-free heating provided by Lämpöässä for many decades to come. Please familiarize yourself with these instructions for use and maintenance. Keep the instructions for future use and reference should problems occur.

These instructions consist of three manuals drawn up with consideration of different user groups. The instructions for use include manuals intended for users, installers, and maintenance personnel. The instructions also separately contain warranty conditions, technical specifications, and connection diagrams.

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USER MANUAL

INSTALLER MANUAL

MAINTENANCE MANUAL

1. Safety

In order to ensure trouble-free operation of the Lämpöässä geothermal heating system and achieve the best efficiency, the system must be transported and installed in accordance with the manufacturer's instructions. After performance of installation works, the installation checklist must be reviewed in order to minimise the risk of potential errors. The manufacturer shall not accept any responsibility for equipment defects or related expenses caused through installation faults.

The pipe and electrical installations for the Lämpöässä geothermal heating systems can only be installed by qualified persons. If problems should occur during installation, we recommend that you contact your dealer or consult with Lämpöässä maintenance specialists by phone.

If the fault symbol is displayed on the touch screen, a system malfunction has occurred. Press this button to display information on the cause of the malfunction.

Press this button for additional information on the touch screen data.

2. Geothermal heating system operation

A geothermal (or ground source) heat pump can extract geothermal heat from soil, water bodies or a bore hole. For an overview of the heat pump and its operating environment, see the picture below. Of the total thermal energy required for heating, Lämpöässä collects more than 75% from natural sources. For thermal energy collection, approx. 25% of electrical energy is required for running the various system components.

The geothermal heating system consists of heat collection piping, water/ethanol (ethyl alcohol) mixture circulating within the piping, and a ground source heat pump unit. The ground source heat pump unit comprises an integrated hot water storage tank, compressor, heat exchangers, and closed refrigerant circuit, i.e., compressor unit. The heat collection fluid in the ground circuit, the refrigerant and the water in the heating network never mix at any stage of the process. Heat is transferred between fluids using plate heat exchangers.

2.1. Lämpöässä structure and operating principle

The Lämpöässä ESi/EMi/ELi series are especially suitable for use as the primary heating system of new and renovated residential buildings and secondary residences. In order to ensure trouble-free operation, all Lämpöässä geothermal heat pumps have been test-run, set up and tested by the manufacturer. If a geothermal heat pump is being used in the part-power configuration, for example, because high temperature is required in the radiator system, the heating system must be dimensioned and adjusted so that the return water temperature is always below +55 °C. By part-power we hereby mean that the electric heating element (immersion heater) is allowed to switch on if necessary.

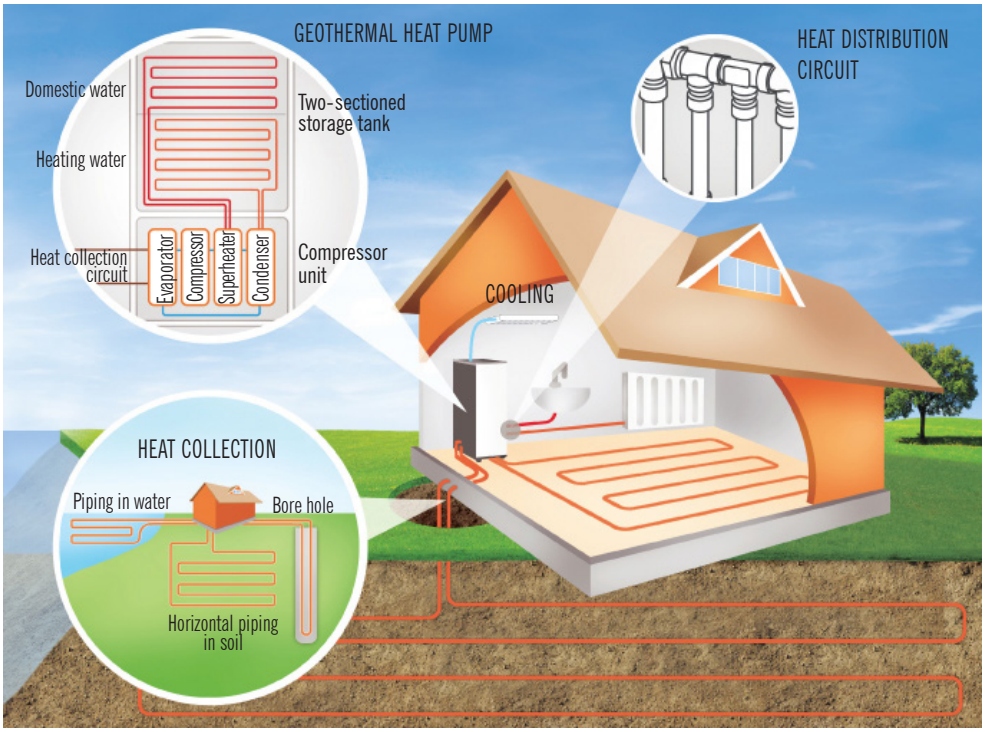
Because Lämpöässä ESi/EMi/ELi series doesn't include integrated storage tank, it needs a separate storage tank to function. The size and structure of the storage tank can be chosen due to the need for hot domestic water. For the operating principle and main components of Esi/Emi series, see the picture on page 6. The picture has also been discussed in Sections 2.1.1-2.1.3.

2.1.1. Heat collection circuit

The geothermal heat system circulates water/ethanol mixture protected against freezing in the heat collection circuit in order to collect thermal energy accumulated in soil through solar radiation. The heat collection piping used comprises a bore hole or plastic pipe (PEM 40/10) placed at least 1-1.2 metres deep in soil or at least 3 metres deep in water. The circulating mixture warms up by a few degrees and delivers this thermal energy to the geothermal heat pump's EVAPORATOR (1), i.e., the heat exchanger. The temperature of the heat collection fluid arriving from the soil to the evaporator is approx. 0 °C.* This temperature can be lower in winter and higher in summer. At the evaporator, the energy of the heat collection fluid is transferred to the low-pressure refrigerant circulating inside the heat pump. The refrigerant is evaporated using the thermal energy.

2.1.2. Compressor unit

From the evaporator, refrigerant vapour is transferred to COMPRESSOR (2) for ramping up the pressure. This is accompanied by steep temperature rise. In the course of the heat pump process, the refrigerant temperature is the highest after the compressor, in excess of 100 °C, and the refrigerant is referred to as 'hot gas'.



The hot refrigerant is transferred from the compressor to heat exchangers (condenser and superheater), through which it releases its thermal energy into the heating water storage tank (6). The heat in the storage tank is used for heating and hot domestic water production purposes. When heat is extracted from the refrigerant vapour, a point is reached where the vapour begins to revert into liquid – i.e., is condensed. This point is close to temperature required for heating (in general, approx. 35-55 °C). Since the refrigerant gas leaves the compressor at approx. 120 °C, it cools first and liquefies later. The energy released in the course of such cooling is referred to as superheating energy. The superheating energy can be efficiently utilised in final heating of domestic water, by using a superheat exchanger (3).

After the superheater, the refrigerant is transferred to CONDENSER (4), where it is transformed from vapour to liquid, releasing the heat to the heating water storage tank and from there to the heating network. Emi 22P- and Emi 43P -models with separate storage tank has no separate superheater heat exchanger. All thermal energy is conceded through condenser heat exchanger to the separate storage tank. Having conceded its thermal energy, the liquid refrigerant is transferred through dehydration filter to EXPANSION VALVE (5), where the pressure of the liquid refrigerant drops and a new cycle from the evaporator can commence.

2.1.3. Hot water storage tank

It is possible to connect multiple storage tanks to ESi/EMi/ELi -models to store the thermal energy created. These storage tanks can vary in size. Lämpöässä Esi and Emi utilises carefully designed superheating technology allowing advantageous generation of heating and domestic hot water. The objective is to maximise the share of geothermal heat in overall heating. A two-sectioned HEATING WATER STORAGE TANK (6) equipped with partition enhances utilisation of superheating energy. The coefficient of performance remains at a high level, since the energy-efficient superheating mixture involves heat transfer between two tank sections using two different heat exchangers (condenser and superheater). Water from the hot water storage tank is circulated in the heat distribution piping consisting of 1-3 loops.

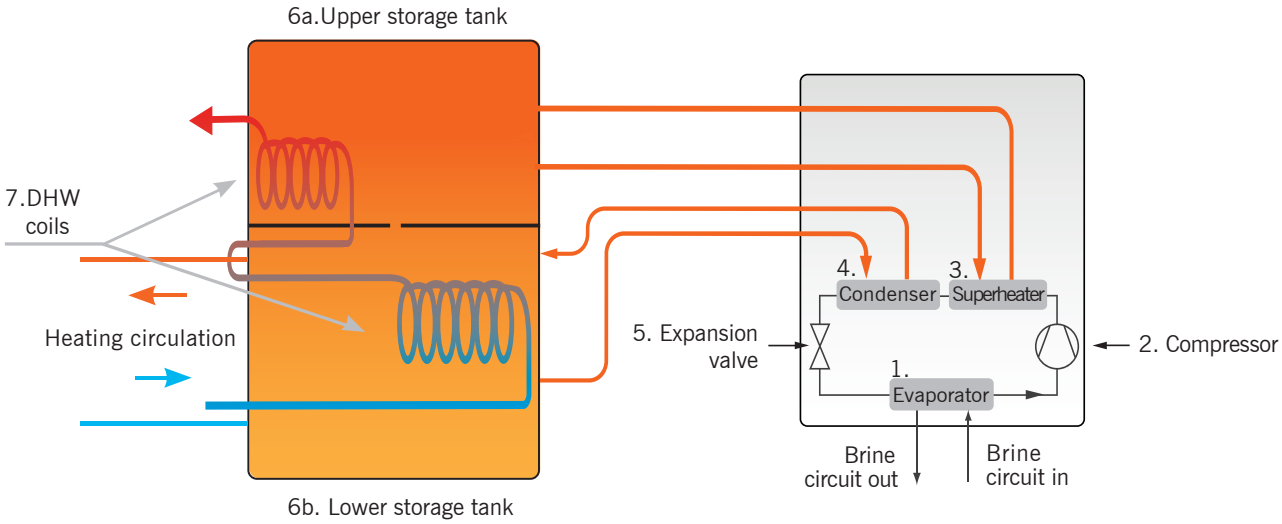
The top part of the storage tank, i.e. the UPPER STORAGE TANK (6a), is heated by using superheat removal heat exchanger (superheater 3) by the extremely high thermal energy acquired from the compressor. Hot superheating energy is stored for final heating of domestic hot water. If required, the high thermal energy can also be transferred to the heating system from the top storage tank.

The LOWER STORAGE TANK (6b) stores the thermal energy required for central heating from the condenser (4) at heating network-adjusted tem-

peratures lower than those of domestic hot water. The storage tank temperature levels are controlled by an adjustment curve – thus, at ordinary heating circumstances, the temperature varies depending on the heating need. In such cases, the system operates in so-called 'floating condensing' mode. Heat distribution can be arranged using water circulation-based floor heating, hot water radiators or air heating. The best coefficient of performance is achieved by floor heating, since the lower is the temperature of heat release, the better is the coefficient.

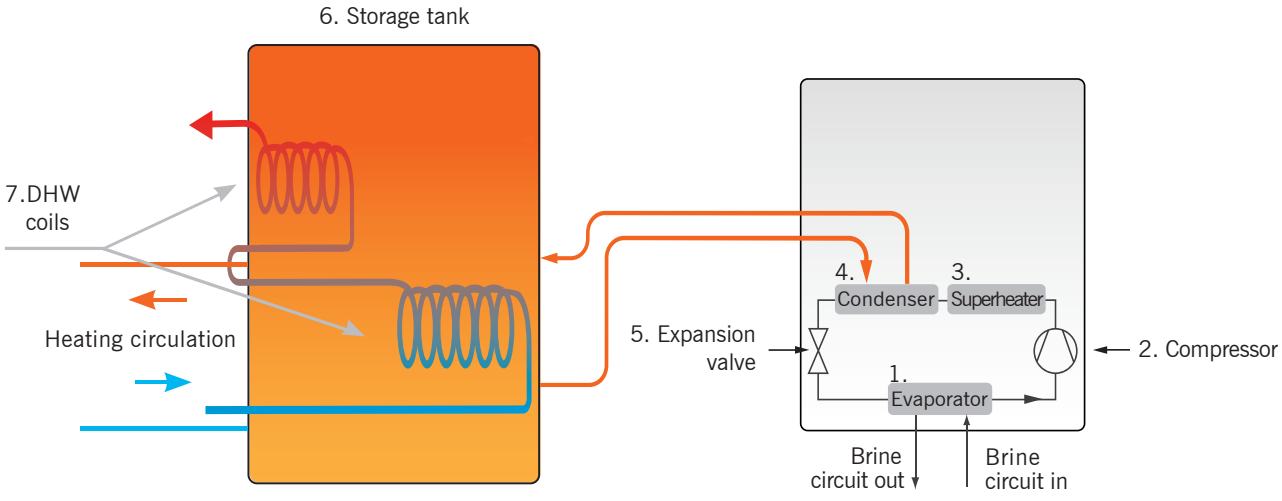
Domestic water is heated within a COIL (7) inside the storage tank, which is divided into two parts. The domestic water is pre-heated in the coil located at the storage tank's lower part, while final heating takes place inside the coil located at the tank's upper part. In general, domestic water temperature must exceed that of the heating water. Owing to the two-stage heat release of the superheating technology, the larger storage tank section heating the supply water can be kept at a lower temperature, since final heating of the domestic water takes place using the upper storage tank section of higher temperature. In such a case, the

Solution with separate storage tank with intermediate floor:



Separate storage tank Ground source heat pump

Solution with separate storage tank:



Separate storage tank Ground source heat pump

process operation temperatures remain as low as possible, which improves the system's annual efficiency. Division of the coil into two parts allows heating of the domestic water circulation only using the upper storage tank coil, so that blending of the storage tank temperature stratifications is avoided.

Lämpöässä ESi/EMi/ELi are well suitable for pieces of real estate with especially high hot domestic water consumption. In renovated residential buildings Lämpöässä Esi/Emi can be connected to existing separate storage tank as well if the storage tank is in good condition and is suitable for geothermal heating. In this case Lämpöässä ESi/EMi/ELi can be connected without the superheating feature and separate storage tank is used. In case the building includes previously installed water tank that is suitable for geothermal heating, it can be connected to Lämpöässä ESi/EMi/ELi.

2.2. ÄssäCooling cooling system

A passive cooling system can be installed into the heat collection circuit, in which case the fluid in the circuit is circulated through an additional heat exchanger. The heat exchanger releases cooling energy to indoor air. Such exchangers include radiant cooling units provided within the ventilation system or fan coils installed indoor. Lämpöässä offers multiple solutions for control of the cooling with ÄssäControl control system. These are available as accessories.

The Lämpöässä product family includes wall and ceiling-mounted fan units for cooling, complete with installation set. Passive cooling is a favourable approach to cooling, since the only running costs are associated with water circulation pump and cooling fan operation. In Esi/Emi series cooling is connected externally to the device through heat collection circulation.

3. How to use the equipment

3.1. Control system functioning

ÄssäControl by Lämpöässä is a logic-based control system. It considers the conditions prevailing in the premises and the surrounding environment with improved precision. ÄssäControl control system adjusts the heating network supply water temperature proceeding from the storage tank and outdoor temperature based on a seven-point adjustment curve, so that the room temperature remains pleasantly even regardless of outdoor temperature variations.

Depending on the connections, the control system controls 1-3 heat distribution circuits or 1-2 heat distribution circuits and domestic hot water temperature. With the help of the ÄssäControl control system, it is also possible to control a heat source external to the geothermal heat pump unit.

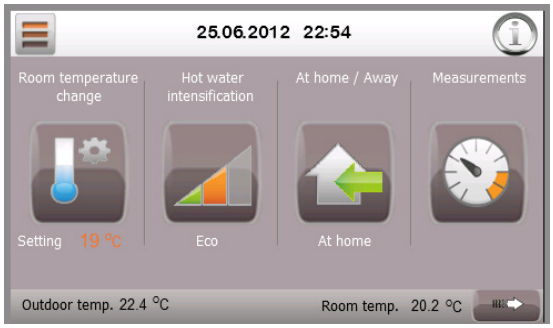
These instructions contain a user manual and a manual for equipment installer. Maintenance functions are password-protected.

3.2. Touch screen functioning

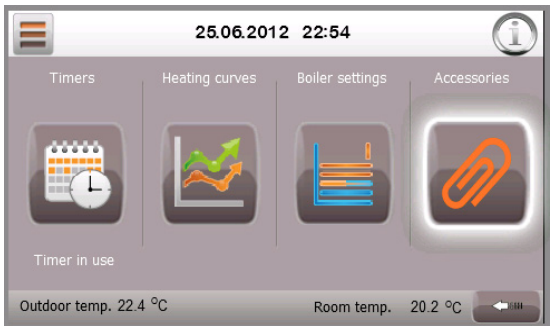
After unit start-up the display goes into basic mode, displaying on the two-part ÄssäControl home screen function shortcuts (8 pc.), time, date, and outdoor temperature. To switch between the two home screens, use the arrow buttons in the bottom right corner. To access the Functions screen, press the symbol in the top left corner.

Use the button in the bottom left corner to return to the home screen. Use the arrow button in the bottom right corner to return to previous screen. For instructions screen, press the 'i' button in the top right corner. In case of operation faults, an alarm button is displayed on the top bar.

The function shortcuts displayed on the first home screen include room temperature adjustment, domestic water boost, home/away function, and measurements.



The function shortcuts displayed on the second home screen include timer functions, adjustment curve set values, storage tank set values, and optional equipment.



Use the button in the bottom left corner to return to the home screen. Use the arrow button in the bottom right corner to return to previous screen. For instructions screen, press the 'i' button in the top right corner. In case of operation faults, an alarm button is displayed on the top bar. Alarms are described more in chapter 5.3.

3.3. Setting the time and date

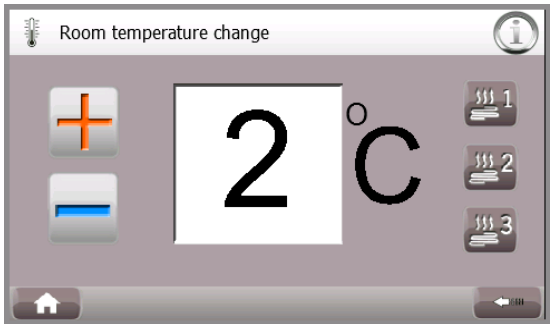
The time and date can be adjusted by pressing the date/time displayed on the home screen top part.

3.4. Function shortcuts

For user convenience, shortcuts have been provided to functions used most often. Use home screen shortcuts to access the respective functions.

3.4.1. Room temperature adjustment

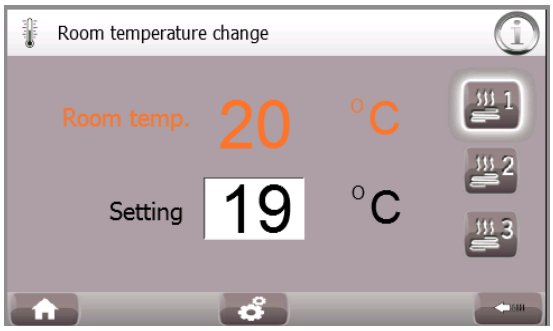
The heat distribution circuit/circuits' heat curve setting can be adjusted by using the home screen shortcut **Room temperature adjustment** to achieve room temperature increase or decrease. The setting can be adjusted between -3...+3 °C by using the 'plus' and 'minus' buttons. The function Room temperature adjustment is intended for quick temperature increase. Choose the heat distribution circuits to be influenced by



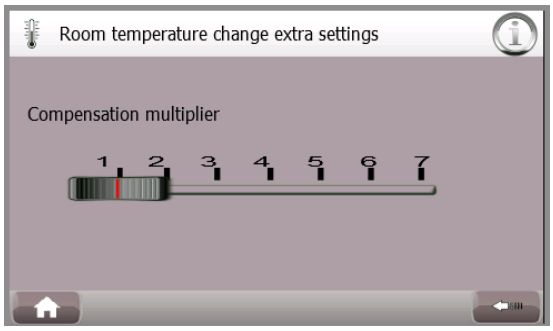
the adjustment by buttons HD1, HD2 (optional equipment) and HD3 (optional equipment). To restore the original setting, change the value to 0 °C. The original heating curve and heating curve adjusted by this function are visible on the Heat adjustment curve screens.

3.4.2. Room temperature adjustment by room temperature measurement (optional equipment)

As an option, the room temperature measurement function can be acquired for the system. In such a case, the room temperature is also displayed on the home screen and the screen Room temperature adjustment includes information on current/target room temperatures. Adjustment of room temperature now takes place by comparing the target and current room temperatures. By adjusting the target temperature higher or lower than the room temperature at the time, the unit adjusts the heat curve in the desired direction. Choose the heat distribution circuits to be influenced by the adjustment by buttons HD1, HD2 (optional equipment) and HD3 (optional equipment).



The rate of the function Room temperature adjustment can be increased 1...7 times by compensation. The compensation function is included under additional room temperature settings, which can be accessed by pressing the button at the bottom centre of the screen. In case of compensation value 7, the adjustment is seven times faster than in case of value 1. Large compensation values can cause room temperature fluctuations.



3.4.3. Domestic water boost

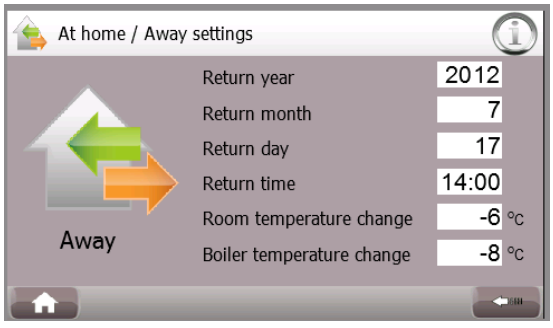
The storage tank can be set to function at maximum thermal output in order to meet transient needs, for example, if the need for domestic hot water increases temporarily. For domestic water boost, press the Max button. Return to the normal mode by pressing the Eco button. Choose the domestic water boost period (1...24 h) using the 'plus' and 'minus' buttons.

3.4.4. Home/Away function

The home/away function shortcut can be used to save energy when the residents are away for a long holiday trip, for example. The function **Away** changes the heat distribution circuit and storage tank temperature settings until the set date and time; after that, the original set values are automatically restored (i.e., the normal mode Home is reactivated).

The system's normal mode is **Home**. To activate the Away function, press the button Away and set the date and time of your return for restoring the mode Home (default value: 24 h). The changes in room and storage tank temperatures can also be programmed. In order to ensure restoring of the normal temperatures by the time of your return from the holiday trip, the day preceding the actual return date, for example, could be programmed as the return date.

Set the desired heat distribution circuit temperature adjustment under Room temperature adjustment; values between -10...+10 °C are possible. Set the desired storage tank temperature adjustment value under Storage tank temperature adjustment. This setting influences domestic water temperature. Values between -10...+10 °C are possible. If any of these temperatures is not to be changed, keep 0 °C as its value. When leaving for a holiday trip, for example, both of the values might be lowered by approx. 5 degrees by setting -5 °C as the room/storage temperature adjustment value.

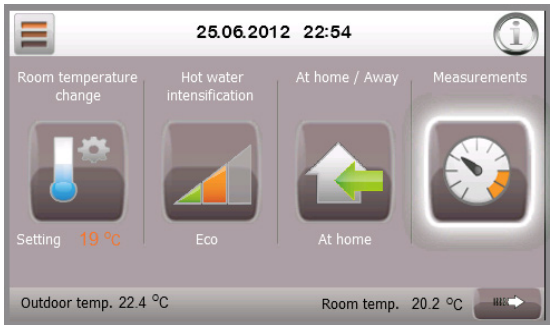


Use the button in the bottom left corner to return to the home screen. Use the arrow button in the bottom right corner to return to previous screen. For instructions screen, press the 'i' button in the top right corner. In case of operation faults, an alarm button is displayed on the top bar.

The function can be activated only if the end date or time is in the future. If the end date is set into the past, the mode Home is activated and the mode Away cannot be activated.

3.4.5. Measurements

This shortcut allows accessing the **Measurements** menu, which will be discussed in more detail in the Section on menu functions.

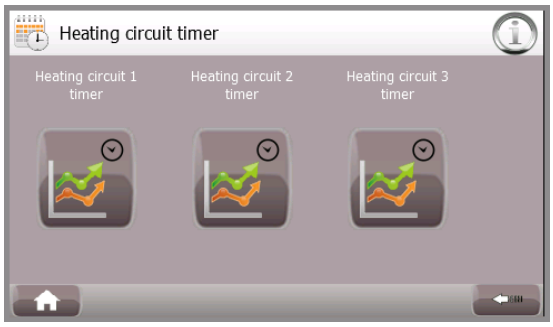


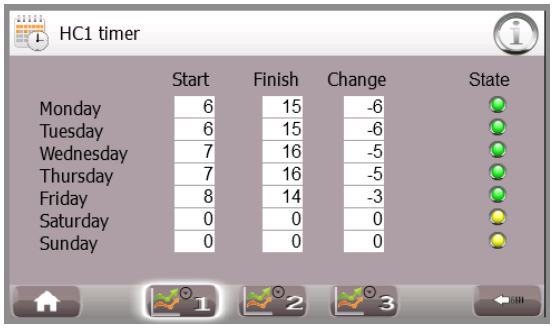
3.4.6. Timer functions

Timer functions can be utilised, for example, in secondary residences or to benefit from off-peak electricity rates, in which case weekday-specific modification of temperature levels is advantageous. The values once set are saved in the memory and can be modified as necessary. The timer function can be activated or removed from use through the **Timer functions** shortcut.

On the **Timer functions** screen, the timing target (storage tank or heat distribution circuit) is selected and the timer function activated/ deactivated.

On the following screens, the target weekdays for timed temperature changes are selected. On the screens, the temperature change beginning and end times (in full hours) can be set in weekday-specific manner, as well as the change in degrees. Temperature change values between -10...+10 °C are possible.

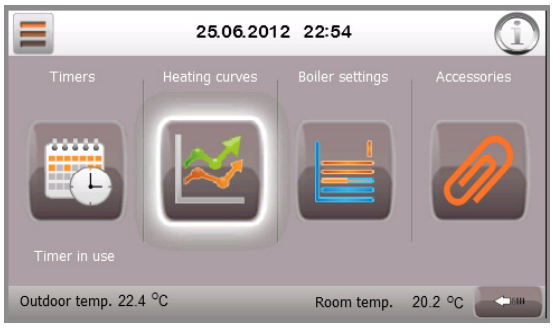




The last timing column consists of symbols describing the state of timing. A white symbol means that there is no active timer setting for the weekday. A yellow symbol means that time and temperature have been set, but the timer function has not been activated. A green symbol means that time and temperature have been set and the timer function has been activated.

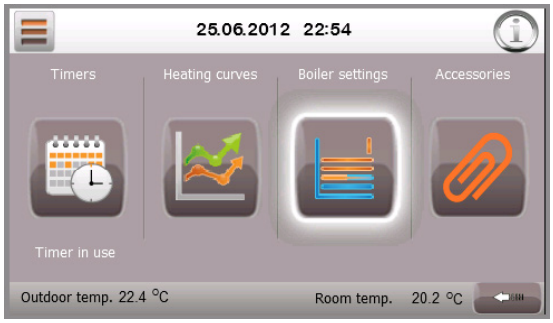
3.4.7. Heating curves

This shortcut allows accessing the **Heating curves** menu, which will be discussed in more detail in the Section on menu functions.



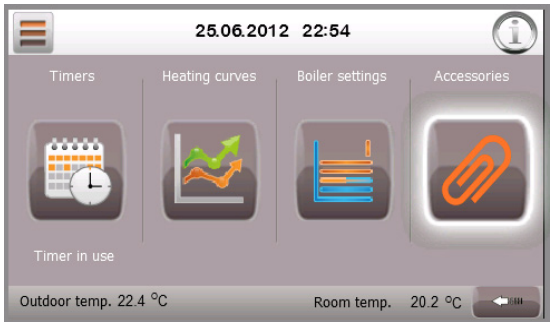
3.4.8. Storage tank settings

This shortcut allows accessing the **Boiler settings** menu, which will be discussed in more detail in the Section on menu functions.



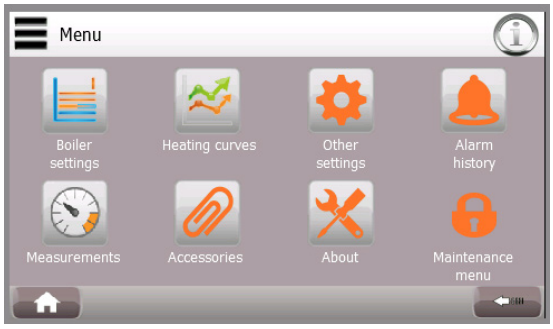
3.4.9. Optional equipment

This shortcut allows accessing the Optional equipment menu, which will be discussed in more detail in the section on menu functions.



3.5. Menu functions

Menu functions can be accessed by pressing the menu button on the home screen.

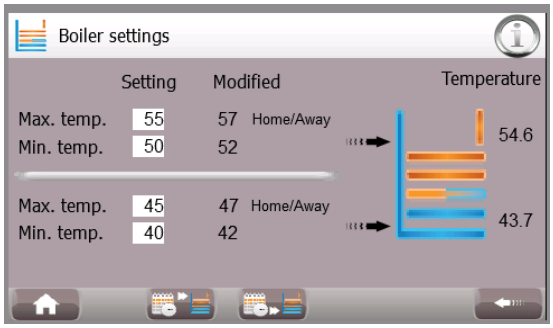


3.5.1. Storage tank settings

Storage tank set values are used to adjust the storage tank top and bottom section temperature limits to meet the site's domestic hot water consumption. The system includes a function that automatically elevates storage tank temperature if the heat distribution circuit adjustment curves are set higher than the storage tank temperature. Factory settings for the storage tank bottom section are 40 °C (min) and 45 °C (max). Factory settings for the storage tank top section are 50 °C (min) and 55 °C (max).

The difference between Min and Max values can be 2...10 °C. The maximum allowed storage tank top and bottom section temperature set value is 60 °C in case of full power geothermal heat pumps and 60 °C (bottom section) / 85 °C (top section) in case of part-power geothermal heat pumps. In Esi, Emi 22P-Emi 43P or ELi 60P-90P model with separate storage tank are the temperature sensors installed in the same water space on the top section of the storage tank. In such case same temperature settings are used for the top and lower sections of the storage tank.

The value Correction indicates the temperature as corrected by the Timer function, Home/Away function, Domestic water boost function, or automatic heat distribution circuit correction.



The storage tank temperature is a decisive factor in compressor starting and stopping. The minimum value programs compressor starting at the storage tank's target temperature. The maximum value programs compressor stopping at the storage tank's target temperature.

The storage tank is heated by the compressor. If the target temperature cannot be reached in a certain time (1...24 h), it is presumed that there is something wrong with the compressor and the compressor is turned off. In such cases, the storage tank is heated by the electric heating element. The default set value for this function is 12 h. If the electric heating element is switched on, the following warning is displayed on the

control panel display: Storage tank temperature not achieved in set time. Electric heating element has been switched on. For more information on programming the time, see menu Set values. NOTE! Electric heating is used only as back-up!

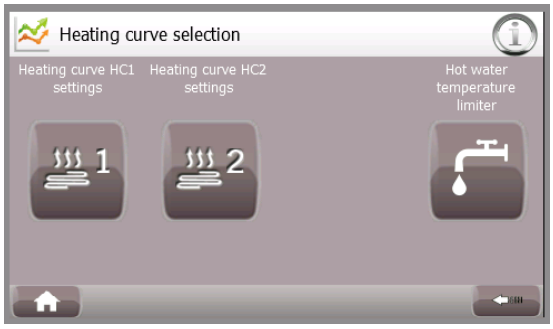
Maximum annual ground source heat pump efficiency can be achieved if the storage tank temperature is kept at an optimal level. The ground rule is that the storage tank set values must be kept at the lowest possible level, since it allows the best annual efficiency.

In winter, when the need for heating is larger, the set value for the storage tank bottom section should be programmed in relation to the supply water temperature. The temperature of the storage tank upper part increases after a long period of use and the threshold value for the compressor to run is 90 °C. This is due to the superheating properties of the storage tank structure. Because of this, the domestic hot water temperature limiting function (option) can be used in order to avoid potential hot water-related hazards. In general, the compressor is controlled according to the minimum setting of the storage tank lower part.

In summer, when there is no need for heating (with the exception of humid rooms), the compressor is seldom on and there is less superheating for domestic hot water production. In such a case the storage tank upper part and lower part temperatures are close to each other.

3.5.2. Heating curves

Heat distribution circuits (HD) are controlled by a seven-point adjustment curve. Depending on the connections, the control system controls 1-3 heat distribution circuits or 1-2 heat distribution circuits and domestic hot water temperature. In the **Heating curves** menu, the values of all heat distribution circuits can be changed separately to meet the heating water temperature (supply water) at a certain outdoor temperature.



Exemplary floor heating adjustment curve (factory setting) °C*

Outdoor temperature	-20	-13	-7	0	+7	+13	+20
Heating water temperature	+32	+31	+29	+27	+25	+23	+21

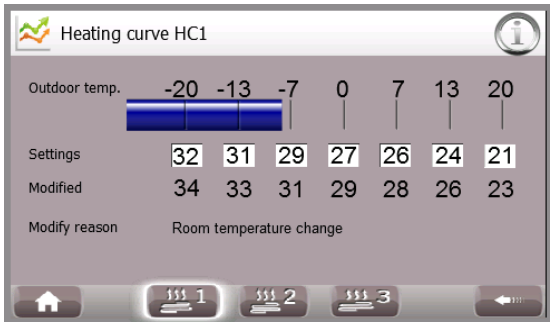
Exemplary radiator heating adjustment curve °C*

Outdoor temperature	-20	-13	-7	0	+7	+13	+20
Heating water temperature	+53	+48	+42	+36	+30	+25	+21

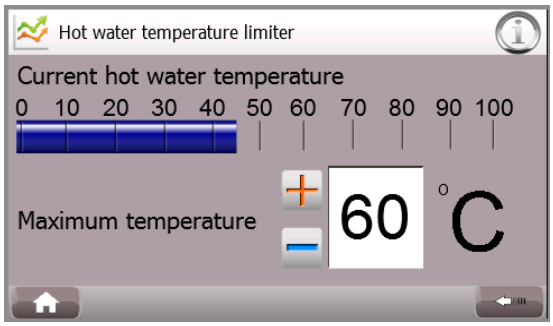
* Conditions in Finland.

The factory-set heating curve is suitable for floor heating. The adjustment curve values should be specified during the first year; they could be changed as follows, for example: If the indoor temperature feels too chilly while the outdoor temperature is -10 °C, the supply water set value can be increased a little at the outdoor temperature points -13 °C and -7 °C. Monitor the influence of the adjustment on room temperature for at least 24 hours before making any further modifications in adjustment curve set values. When using radiator heating temperature change is quicker.

For the temperature correction caused by Home/Away or Timer functions, see the bottommost line.

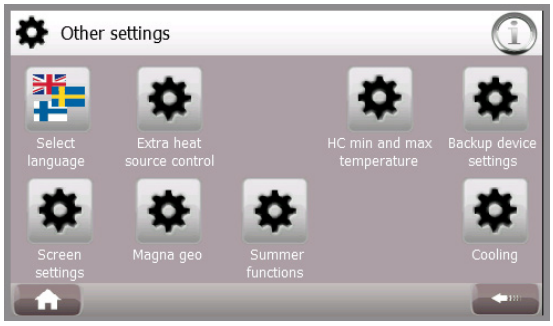


Maximum domestic water temperature can be limited by adjusting the Domestic water temperature limit value between 0...90 °C (factory setting: 55 °C).



3.5.3. Other set values

The menu **Other set values** allows circuit-specific programming of maximum and minimum heat distribution circuit supply water values, as well as programming of the safety device-heating element activation time.

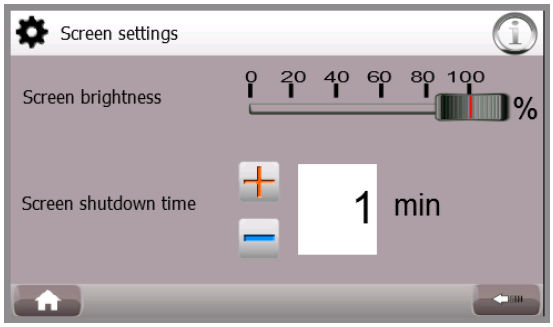


3.5.3.1. Language

The Language menu allows choosing between Finnish, Swedish and English for the user interface language.

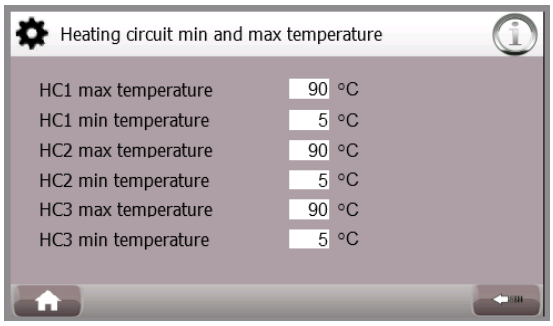
3.5.3.2. Screen settings

On screen settings -page it is possible to adjust the brightness of the screen and also the time after the screen goes off.



3.5.3.3. Min and max temperature of HD circuits

Set values are minimum possible values (min) and maximum possible values (max). Heat distribution circuits 2 and 3 are optional.

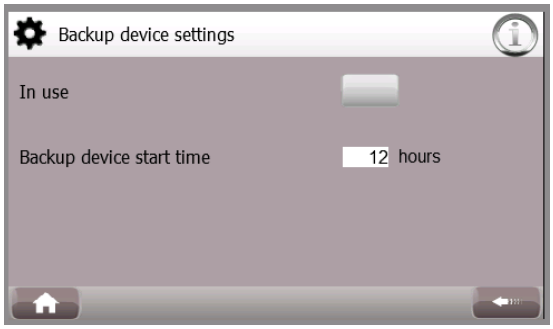


Factory settings for heat distribution circuits are as follows:

Set value and setting range	Meaning	Factory setting
Supply water1 max 0…90 °C	Maximum value of heat distribution circuit 1 heating supply water.	60°C
Supply water1 min 0…90 °C	Minimum value of heat distribution circuit 1 heating supply water.	5°C
Supply water2 max 0…90 °C	Maximum value of heat distribution circuit 2 heating supply water.	60°C
Supply water2 min 0…90 °C	Minimum value of heat distribution circuit 2 heating supply water.	5°C
Supply water3 max 0…90 °C	Maximum value of heat distribution circuit 3 heating supply water.	60°C
Supply water3 min 0…90 °C	Minimum value of heat distribution circuit 3 heating supply water.	5°C

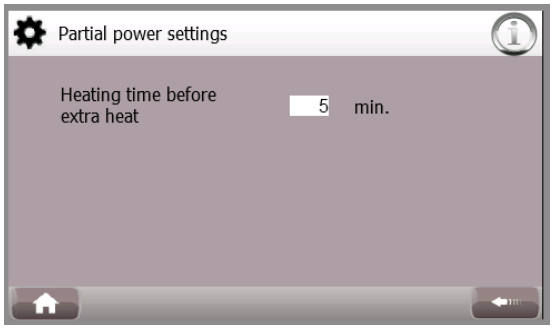
3.5.3.4. Safety device settings (in monovalent devices)

This screen allows programming activation of the safety device-heating element if the storage tank target temperature is not achieved by the compressor during the dedicated period (from 0 to 24 hours, factory setting: 12 hours). The setting is applicable in full-power systems only.



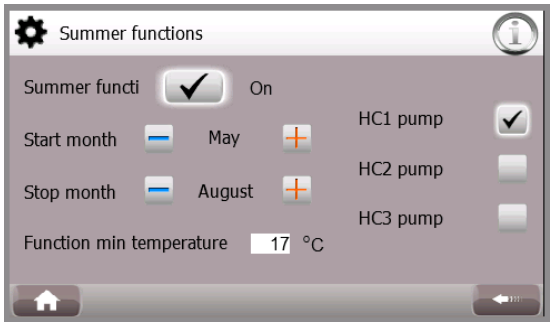
3.5.3.5. Bivalent settings (in bivalent devices)

In bivalent system the immersion heater and compressor can be on at the same time. In bivalent settings -page can be set the heating time before additional heating goes on.



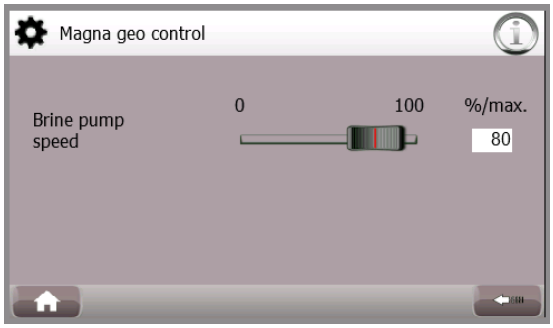
3.5.3.6. Summer functions

In this screen months when function is valid and circulation pumps active are selected. To avoid circulation pumps to be stucked they automatically start up every week for 30 seconds. Here you can also validate heating circuits where summer function is effecting. Circuit can be active during a whole summer when it is controlling bathroom area for example.



3.5.3.7. Brine circuit circulation pump control

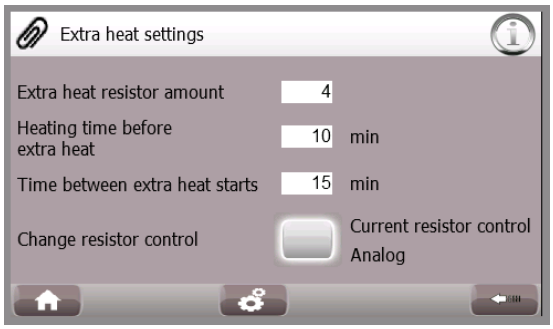
This screen allows adjustment of the ground circuit fluid flow rate. If the setting is 100%, the flow speed is maximal. If the setting is 0%, the flow speed is minimal. Factory setting: 80%.



3.5.3.8. External heating source controlling (accessory)

It is possible to connect a variety of additional external heat sources to the ground source heat pump, such as electricity or oil boiler. In the menu, Additional heat source control, the heating time is determined before the additional heat source is activated, as well as the time between the additional heat sources. This setting is only in bivalent mode. In monovalent mode the additional heat source can be used as a safety device. As standard the system comprises a control of one heating source. Control of (2 ... 4) additional heating sources, can be purchased as an accessory.

Settings	Options	Factory settings
Number of immersion heaters	1...4	1
Resistor control	Analog / digital	Digital
Analog Control (only if the control mode analog)	0 ... 10 V, The four-stage voltage amount by which the additional heat sources are triggered.	0, 0, 0, 0
Locations of the additional heat sources	Upper / lower tank	Upper

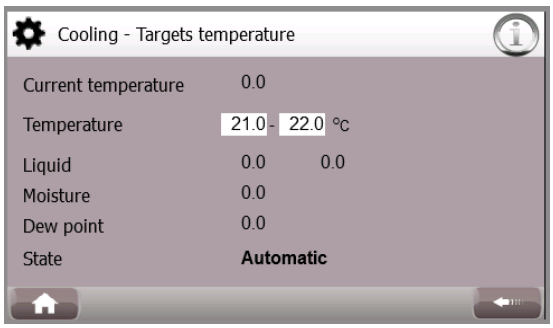


3.5.3.9. ÄssäControl-cooling, free (accessory)

To the heat pump collector can be installed a cooling system, where the heat transfer fluid is circulated in the building. If the system is fitted with a room temperature sensor, cooling circuit temperature is automatically adjusted to the desired room temperature. Without the room sensor, the system is cooling at maximum power. Free cooling is an energy-efficient way to cool the property, as the operating cost only consists of a circulating pump and energy consumption of the cooling fan motor. The cooling setting values can be modified under Other settings and Cooling (Note! The cooling-function is acquired).When taking the cooling system into use, the cooling control mode is set in the service menu. In the service there is following selectable control modes: Room temperature, External and Manual.

Room temperature

Room Temperature menu provides the cooling temperatures, which determines when the cooling system is running. In addition, the menu will display the current room temperature, coolant temperature, humidity, and dew point value, as well as system status heating / cooling / off).

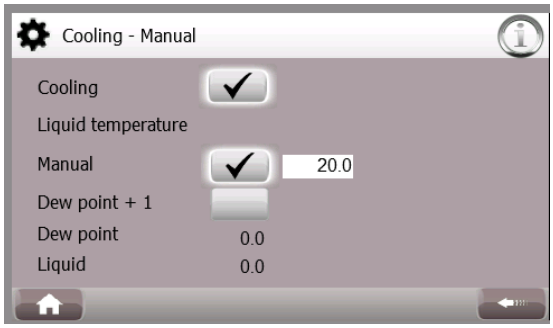


External

When the control mode is External, cooling is controlled by an external thermostat, which is connected according to the wiring diagram.

Manual control

When the control mode is set to Manual, this menu can be used to switch to active cooling. The system tries to keep the coolant temperature at a minimum of one degree above the dew point. From the menu coolant temperature can be set to be constant, where the dew point effect is not taken into account.



3.5.3.10. ÄssäControl-cooling, flexible (accessory)

Flexible cooling allows for a more versatile and more efficient cooling. In the flexible cooling, there are six different control modes:

1. **Heating**
   Ground source heat pump uses the ground loop by transferring energy to the storage tank for heating or hot water.

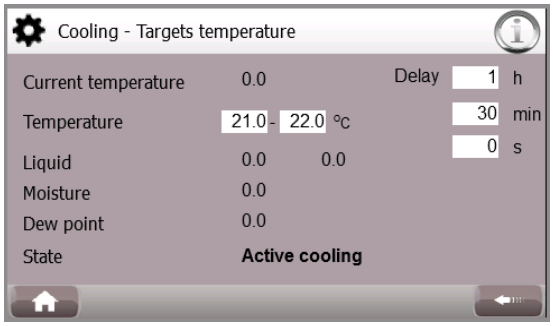
2. **Heating and cooling**
   Ground source heat pump heats the boiler by transferring heat from the refrigerant circuit and ground loop to the storage tank. This function is available when heating and cooling is needed simultaneously.

3. **Passive cooling**
   Ground source heat pump cools the cooling circuit by transferring heat to the ground loop. If the coolant circuit temperature has not reached the set value, in the time available (the display section Delay), becomes passive cooling automatically active cooling

4. **Active cooling**
   The ground source heat pump uses the compressor to cool the cooling circuit by transferring heat to the accumulator tank

5. **Unloading the extra heat**
   If the temperature in the accumulator rises to high, the extra heat is unloaded via an exchanger to the ground loop or air.

6. **Switched off**



The control of cooling is based on the machine's control modes, and control of magnetic valves and the circulating pumps. The position of the magnetic valves in different modes are determined in the service menu. In the service menu there is available control mode Control of the room temperature and External, which acts as free cooling.

3.5.3.11. Linkin several ground source heat pumps

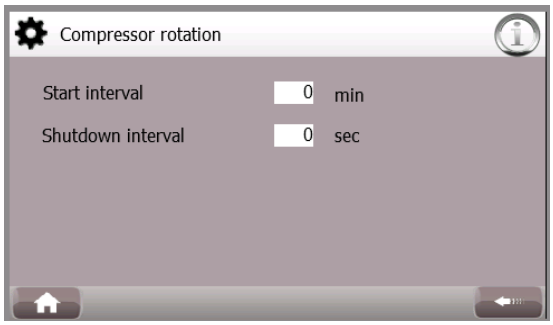
Determing the master device

If the system contains more than one geothermal heat pump, one has to be chosen as master device. All the sensors are connected to the master device. Program settings are defined in the factory and the master device is marked with the MASTER-marking and other devices with SLAVE-marking. All heat pumps can be monitored and controlled from each heat pumps control screen.

The compressors rotation extra accessory can be enabled when the system contains more than one geothermal heat pump. However, all the linked ground source heat pumps have to be equipped with ÄssäControl

Compressor rotation

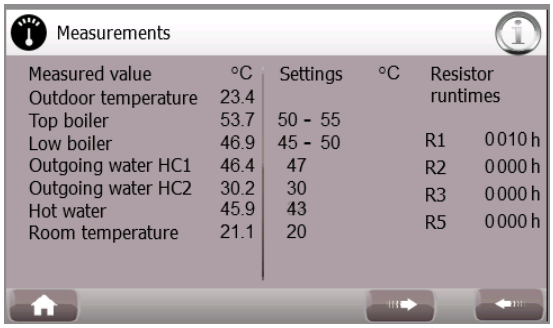
If multiple ground source heat pumps are used in the building, they can be connected to each other with compressor rotation (optional equipment). In such cases should be noted that all connected ground source heat pumps are equipped with ÄssäControl control system. Compressor rotation evens the operating hours of compressors. In the Compressor rotation menu can the start and shutdown intervals be modified. Possible values are for start interval values between 1...240 min (factory setting 1 min) and shutdown interval 1...240 s (factory setting 10 s).

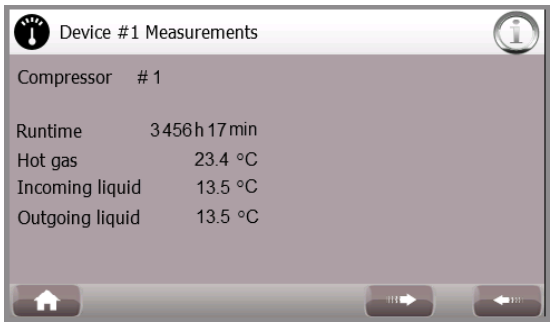


3.5.4. Measurements

Ground source heat pump operation can be monitored using various different measurement data. Use the screen numbering in the bottom bar for navigating between the **Measurements** screens.

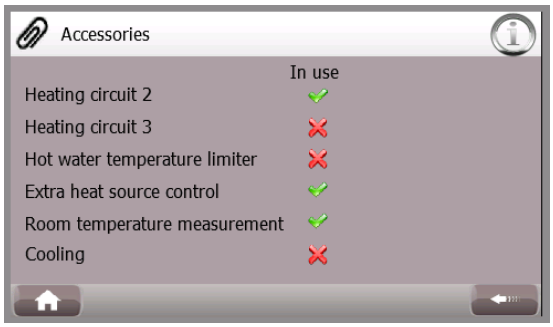
Measurements screen values describe heat pump operation under various conditions and the values shown cannot be modified. The left-hand column indicates current measurement values and the right-hand column the respective set values. Measurement results from all sensors, compressor running times, and electric heating element operation times can be browsed.





3.5.5. Optional equipment

In addition to the standard delivery, all of the additional features acquired are displayed on the Optional equipment screen.



Possible optional equipment includes:

Optional equipment	For more information, see
Heat distribution circuit 2	Adjustment curves, Timer functions
Heat distribution circuit 3 or Domestic water temperature limit	Adjustment curves, Timer functions Adjustment curves
Room temperature measurement	Shortcut functions, Adjustment curves
External heat source controlling	Other set values
ÄssäControl-Cooling free	Other set values
ÄssäControl-Cooling flexible	Other set values
Compressor rotation	Other set values

4. INSTALLATION WORKS

4.1. Before installation

Pipe assemblies for the installation of the Lämpöässä system may only be installed by qualified and trained persons. The equipment must be installed in compliance with instructions provided; after performance of installation works, the installation checklist must be reviewed in order to minimise potential errors. The manufacturer shall not be responsible for any equipment defects or related expenses caused through installation faults.

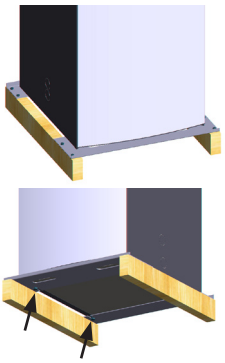
Check that:

- all the necessary hoses and sensors have been delivered
- the ground source heat pump has been correctly fitted
- the connections on top of the geothermal heat pump are intact
- the fuse size is correct for the master fuse and the ground source heat pump (see technical specifications)
- the ground circuit collection piping and supply piping have been installed properly

4.1.1. Transport

The Lämpöässä geothermal heat pump must always be transported in a vertical position. If tilting the equipment is unavoidable, for example, to pass through a doorway, the maximum tilting angle allowed is 45°. In other cases, the machine's compressor unit must be detached during tilting. The equipment may be moved from beneath using a fork lift, for example. Do not go underneath the equipment while it is being lifted!

A transportation platform has been fastened on both sides of the ground source heat pump using screws. The ground source heat pump's accessory package includes adjustable feet to be screwed into the unit bottom (see picture). After that, remove the wooden platform elements and their fixation screws (4 pc). To remove the platform, lift the equipment by a fork lift, for example.



4.1.2. Ground source heat pump installation area

We recommend that the Lämpöässä ground source heat pump be installed in a warm room with floor drain. During installation, when filling the ground circuit, some water/ethanol or water/glycol mixture may be splashed onto the floor. The chosen area does not have to be fireproof. Approx. 50 cm of installation space should be reserved above the equipment.

The floor must be able to withstand the weight of the ground source heat pump carrying a full storage tank. The floor must also be sufficiently even, because the ground source heat pump must be installed as level as possible. Final adjustments can be made using the adjustable feet underneath the equipment.

4.1.3. Removing the packaging

Remove the plastic wrapping and corner padding from around the product. Check that the pump has not suffered any transportation damage. If the heat pump is found to be damaged, the transport company must be immediately notified. We recommend photographing the damages.

Also check the contents of the delivery immediately. The Lämpöässä ESi/EMi/ELi-series accessory package includes the following components:

- valve motor
- 4-way valve (GSHP with separate storage tank with intermediate floor) OR 3-way valve (GSHP with separate storage tank)
- heat distribution pump
- outdoor sensor
- heating circuit temp. sensor
- storage tank temp. sensor (2 pc.)
- adjustable foot (4 pc.)
- filling group
- filling bottle (packaged inside the product)
- safety valve

If some of the accessories specified in the order are not included in the delivery, notify the equipment dealer within five days.

The plastic roof of the product is removed by lifting it from the edges.

INSTALLATION

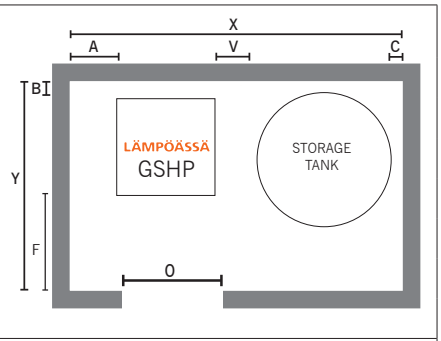
The front door is opened by sliding it upwards. Before this two screws in the front panel must be removed (as shown in the picture on right).

4.1.4. Space requirements

Lämpöässä ESi/EMi/ELi series ground source heat pump can conveniently be placed into a technical or utility room. The floor space to be reserved between the machine and storage tank must be adequate for pipe connections. Considering possible equipment maintenance, there must be approx. 70 cm of free space in front of the geothermal heat pump.

The height of a Lämpöässä ESi/EMi/ELi series ground source heat pump (including adjustable feet) is at least 145 cm. The transport platform adds some 8 cm. At the back section of the machine are the ground circuit connections that rise some 5 cm above the roof. Approx. 50 cm of free space must be reserved for connections on top of the machine. This should be kept in mind when installing the equipment into a low room, such as basement.

	ESi	EMi	ELi
A	400	400	400
B	50	50	50
C	50	50	50
O	700*	700*	700*
X	2300	3200	
F	700	700	700
Y	1500	1500	
V	200	200	200



* Min. width depends on the size of the selected storage tank

4.2. HVAC installation

4.2.1. Heat collection circuit and fill group installation

The connections for heat collection circuit are located on the top of the device. Install the heat collection circuit pipes to flexible hoses on the top of the device pursuant to the picture below. Install the fill and deairing group to the returning line from the heat collection circuit.

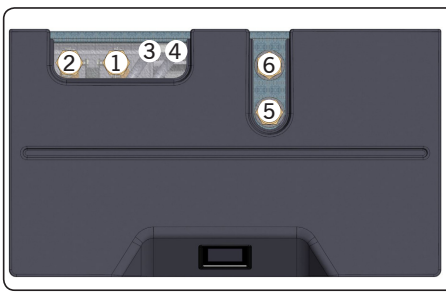
Esi

1. Lauhduttimelta meno	¾"
2. Lauhduttimelle paluu	¾"
3. Tulistimelta meno	½"
4. Tulistimelle paluu	½"
5. Maapiiriin meno	1"
6. Maapiiristä paluu	1"
1. Flow from the condenser	¾"
2. Return into the condenser	¾"
3. Flow from the superheater	½"
4. Return into the superheater	½"
5. Collector circuit, flow from the evaporator	1"
6. Collector circuit, return into the evaporator	1"

Emi

1. Lauhduttimelta meno	1½" sk
2. Lauhduttimelle paluu	1½" sk
3. Tulistimelta meno	¾" sk
4. Tulistimelle paluu	¾" sk
5. Höyrystimeltä maapiiriin	2" sk
6. Maapiiristä höyrystimelle	2" sk
1. Flow from the condenser	1½" IT
2. Return into the condenser	1½" IT
3. Flow from the superheater	¾" IT
4. Return into the superheater	¾" IT
5. Collector circuit, flow from the evaporator	2" IT
6. Collector circuit, return into the evaporator	2" IT

ELi



1. Lauhduttimelta meno	2" sk
2. Lauhduttimelle paluu	2" sk
3. Tulistimelta meno	¾" sk
4. Tulistimelle paluu	¾" sk
5. Höyrystimeltä maapiiriin	2" sk
6. Maapiiristä höyrystimelle	2" sk
1. Flow from the condenser	2" IT
2. Return into the condenser	2" IT
3. Flow from the superheater	¾" IT
4. Return into the superheater	¾" IT
5. Collector circuit, flow from the evaporator	2" IT
6. Collector circuit, return into the evaporator	2" IT

NOTE! Insert the electricity plug of the superheat pump into the connector box if superheat circuit connected.

If cooling equipment is located higher than the ground source heat pump is connected to the pump, a membrane expansion vessel must be included in the system. In such cases, a de-aeration connection must be installed to the highest point of the system and the fill container removed from use by closing the shut-off valve underneath it (see the annexed HVAC connections diagram).

4.2.2. Filling and de-aeration of the heat collection circuit

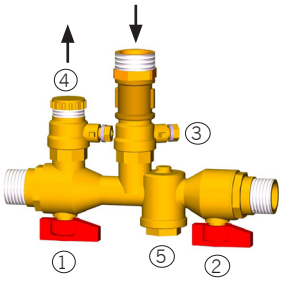
Accessories required for the filling and de-aeration of the ground circuit:

- mixing tank, 60 litres
- submersible pump fitted with a filter, lifting height approx. 30m
- water/ethanol or water/glycol mixture (1:1) with a frost resistance of -16 °C
- reinforced hose 1" (2 pc.), length approx. 3 m
- connector 1" (1 pc.) (female)
- connector 3/4" (1 pc.) (female)

WORK STAGES

Please check that the ground circuit has been correctly connected.

NOTE! The following instructions are for ESi series. The filling and de-airing is done similarly to EMi/ELi series but the valve gropup is built during installation.



1. Remove the styrox packaging protecting the group of fill valves.
2. Detach the expansion vessel from the foremost ball valve.
3. The foremost shut-off valve (2) of the group of fill valves must always be open.
4. Attach the submersible pump reinforced hose to the foremost ball valve (3) in the group of fill valves and open the ball valve.
5. Attach a reinforced hose from the ball valve (4) at the back of the group of fill valves to the fill container and open the valve.
   NOTE! The flow direction has to be correct since there is a one way valve installed between the cooling connections.
6. Fill the container with water/ethanol or water/glycol (frost r. -16 °C) mixture (ratio 1:1).
7. Bleed air from fill hoses by activating the submersible pump and keeping the valve (1) open. When air has escaped, close the valve (1) to start actual fluid circulation through the ground circuit.
8. Add fluid until the piping is full. Upon de-aeration, the unit's own brine circulation pump can be used to speed up fluid circulation.
   - Check that the motor protection switch (QM1) is not on.
   - Turn master switch (Q1) and control current switch (F10) on.
   - The forced control of gound circuit pump can be activated from the maintenance manual of ÄssäControl. Go to manual control and choose manual control on and ground circuit 1 on.
   - Turn the motor protection switch (QM1) on.

   NOTE! When using the system's own brine circulation pump for de-aeration purposes, check that the flow direction of the separate submersible pump is always the same as that of the unit's pump.
9. Keep the submersible pump running until the fluid is clear and no gurgling can be heard from the pipes. NOTE! De-aeration usually takes several hours and helps to ensure that all the air is remove from the system and will not cause any malfunctions once the system is started. Leave no pressure in the network! Remove any air from the evaporator through the de-aeration connection of the pipe located between the ground circuit and the evaporator.
10. When de-aeration has been completed turn the motor protection switch QM1 off and also manual control function off.
11. Open shut-off valve (1) at the back of the group of fill valves.
12. Close both ball valves (3) and (4).
13. Remove the fill hoses.
14. Fasten the expansion vessel back in its place in the foremost ball valve (3) in the group of fill valves.
15. Remove the safety valve on the expansion vessel.
16. Fill ¾ of the expansion vessel with water/ethanol or water/glycol mixture.
17. Fasten the safety valve to the expansion vessel.
18. Open the foremost shut-off valve (3) in the group of fill valves.
19. Remove and clean the net strainer (5) on the mud separator, repeat this several times, if necessary. The red-handled valves (1) and (2), as well as the valve under the fill container must be closed in order to prevent fluids from running out.

Filling and de-aeration have now been completed.

4.2.3. Connections between heat pump and storage tank

The storage tank is connected to the ground source heat pump pursuant to the connection diagram at the end of this manual. The connections for the ground source heat pump are shown in the picture found in chapter 4.2.1. The factory setting for super heat valve can be found in the technical specifications table. The setting can be adjusted in the maintenance menu.

4.2.4. Heating and domestic hot water connections

Connect the heating and domestic hot water connections pursuant to connection diagrams in the chapter 8. Connection diagrams.

Heating connection

Heat distribution circuit surface sensors located on top of the storage tank must be installed to the distance of approx. 0.5 m from the three-way or four-way valve. Circuit HD1 is always the main heating circuit (rooms, for example); it is used for higher temperature (radiator heating, for example). In case of compressor malfunction, the electric heating element heats the circuit HD1 more efficiently. Circuit HD2 is used in radiator-heated buildings for the possible floor heating share or for other purposes (e.g., humid rooms). In these cases the circuits can be controlled individually. The heat distribution circuits can be unconnected through Summer Fuctions for summer. In this case e.g. HD2 in humid rooms can only be used.

The pipes in the heating network are connected to the ground source heat pump using either textile hoses (network of radiators) or using a fixed piping network (floor heating). These connections prevent sound from passing into the network. All heating connections (for example, a heating radiator for an air conditioner or a heated towel rail) must be made to the heat distribution circuits, not domestic hot water. When the network piping is in place, filling may commence.

NOTE! Maximum storage tank pressure is 1.5 bar!

NOTE! If renovating, ensure that the heat distribution piping has been properly rinsed before connecting the geothermal heat pump. If renovating, installing a mud separator to the heat ditribution circuit is recommended.

Speed controlling of the heat circulation pumps of Esi series

Heat circulation pumps with EMi/ELi-series determined by demand of the heatable estate. Heat circulation pumps will be adjusted according to manufacturer's instructions.

Grundfos UPM3 AUTO heat circulation pump which is used in a HD circuit can be set in three different controlling modes: proportional pressure mode, constant pressure mode, constant curve mode. **Factory setting is proportional pressure mode 3.** In radiator network constant pressure mode 1 or 2 can be used if sound of the flow water is disturbingly high.

Proportional pressure mode	LED1 green	LED2 yellow	LED3 yellow	LED4 yellow	LED5 yellow
Proportional pressure mode 1	■	■			
Proportional pressure mode 2	■	■		■	
Proportional pressure mode 3	■	■		■	■
Auto *Adapt*	■	■			■

Constant pressure mode	LED1 green	LED2 yellow	LED3 yellow	LED4 yellow	LED5 yellow
Constant pressure mode 1	■		■		
Constant pressure mode 2	■		■	■	
Constant pressure mode 3	■		■	■	■
Auto *Adapt*	■		■		■

Constant curve mode	LED1 green	LED2 yellow	LED3 yellow	LED4 yellow	LED5 yellow
Constant curve mode 1	■	■	■		
Constant curve mode 2	■	■	■	■	
Constant curve mode 3	■	■	■	■	■
Constant curve mode 4	■	■	■		■

Storage tank and heating system filling and de-aeration

The storage tank is to be filled with special care through the group of fill valves included in the system so that the storage tank pressure never exceeds 1.5 bar. While filling the storage tank, the air inside it must be allowed to escape freely and not through air valve or safety valve, for example. Suomen Lämpöpumpputekniikka Oy cannot be held responsible for any expenses resulting from storage tank breakage in situations where the tank has not been filled with water pursuant to the above instructions.

There must be a de-aeration valve in the same branch with the group of fill valves. The expansion vessel may be in the same branch as well. The pipes in the network are filled with water.

Filling and de-aerating a heating system fitted with a pressure gauge:

- Open the fill valve on the heating network.
- Fill the network with water.
- De-aerate the storage tank and network until all the air has been removed and leave the pressure at 1-1.2 bar (max. 1.5 bar).
- Maximum pressures:
  - Heating network storage tank – 1.5 bar
  - Domestic hot water circuit – 9 bar

Domestic hot water connections and circulation of water

If there is no domestic hot water circulation at the site, make connections pursuant to HVAC diagrams annexed to these instructions. Domestic water is connected to the ground source heat pump pursuant to the picture in Section 4.2.1. The same picture is provided on top of the unit, under the roof. The mixing valve is fitted to the hot water pipe in order to prevent burns. The overflow pipe is joined to the floor drain as instructed or to an overflow funnel if the distance to the floor drain is more than two metres. The overflow funnel must be directed down towards the floor drain. The backpressure valve is fitted to the cold water joint on the input side (see the annexed HVAC connections diagram).

NOTE! External radiators or dryers may not be connected to domestic hot water circulation!

If the heatloss of the DHW circuit is considerd great it is recommended to install an ÄssäStream heater (see more in the ÄssäStream brochure).

HVAC checklist

Check that

- the joints are tight and there are no leaking valves
- the expansion vessel on the heating system and fill side is properly installed
- the overflow pipe on the safety valve and the pressure gauge on the heating system have been properly installed
- the heating system has been filled and de-aerated appropriately
- the ground circuit has been installed, filled and de-aerated appropriately

4.3. Electrical installation and outdoor sensors

Only qualified electricians are permitted to carry out electrical work on the heat pump according to general regulations.

GSHP	El.network	Fuse size slow, A (*bivalent models)
Esi 6	400V 3N~	3x10 (*16)
Esi 9	400V 3N~	3x16 (*20)
Esi 11	400V 3N~	3x16 (*20)
Esi 14	400V 3N~	3x16 (*20)
Esi 17	400V 3N~	3x16 (*20)
Emi 22/22P	400V 3N~	3x25 (*always configure separately)
Emi 28/28P	400V 3N~	3x25 (*always configure separately)
Emi 43/43P	400V 3N~	3x50 (*always configure separately)
ELi 60/60P	400V 3N~	3x63 (*always configure separately)
ELi 90/90P	400V 3N~	3x100 (*always configure separately)

The Lämpöässä heat pump is connected to a 400 V (50 Hz) electrical network. The Lämpöässä heat pump has been fitted with an integrated electrical switchboard which is permanently powered. The location of the protection switch for the motor and other tripping devices are in the electrical switchboard that is inside the heat pump. The electrical switchboard is located at the top of the heat pump, under the plastic roof. The plastic roof of the product is removed by lifting it from the edges. A plastic-coated wire is used as a supply line, which wire travels to the master switch in a casing pipe. The electrical switchboard cover can be removed by undoing four screws on top of the switchboard.

While using the superheat function in Esi-model the connection plug (XP11) of superheat circuit pump (P11) needs to be mounted to the connection box. The connection box can be found from behind of the heat pump front plate. More details can be found from the annexed electrical connections diagram.

In the electrical connection of heat distribution pump (P12/P13) must be used plug-ins included in the package. See the annexed electrical connections diagram.

4.3.1. Outdoor sensor

In order for the outdoor sensor to recognise weather conditions as effectively as possible, it must be placed in the correct location. The outdoor sensor should be placed on the north-western or northern side of the building to avoid the effects of the morning sun. If the sensor cannot be placed as recommended, ensure that this is protected from direct sun light.

The sensor is placed approximately 2/3 of the way up to the wall of the building near the corner. A sensor should not be placed under a roof, in a place protected from the wind or over a vent, doors or windows where the temperature is not the normal outdoor temperature.

Device	Terminal Block No.	Conductor Type
Outdoor sensor NTC	X 1/10 and X 1/2	2 X 0,7 mm^2

4.3.2. Storage tank and heat distribution sensors

In Esi/Emi model with separate storage tank are the temperature sensors installed in the same water space on the top section of the storage tank. In such case same temperature settings are used for the top and lower sections of the storage tank. The connections diagrams for cases where the ground source heat pump is connected to a Lämpöässä storage tank are found at Lämpöässä website. Heat distribution circuit sensors must be installed to the distance of approx. 0.5 m from the three-way or four-way valve to the flowing line of the heat distribution circuit.

4.3.3. Room sensor (optional)

In order for the room sensor to detect average indoor temperatures as reliably as possible, it must be placed in a central and open location, for example a hallway between several rooms or the staircase. String a bipolar electrical line (at least 0.5 mm^2) from the heat pump to the room sensor. Position the room sensor approximately 2/3 of the way up the wall. Connect the room sensor lead to the heat pump.

Device	Terminal Block No.	Conductor type
Room sensor NTC	X 1/4 and X 1/2	2 X 0,7 mm^2

4.3.4. Current monitor

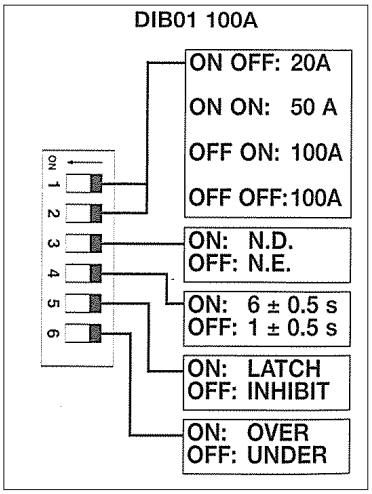
If the equipment has been installed in the part-power configuration, load limiting relays must be installed to the building's master electrical switchboard, if necessary. These relays are intended to reduce the power of the ground source heat pump's electric heating element by phases if the phase current passing through the building's master fuses approaches the master fuse nominal current.

Current monitoring relay installations and connection

Load limiting relays are connected downstream of the master electrical switchboard's master fuse so that the entire building's main current passes through the relays. Contact data of load limiting relays are wired by quadrupole cable from the master switchboard to the ground source heat pump electrical switchboard, where they are connected to the control circuit diagram.

These settings are initial and may require changing. Relays must always be adjusted in a case-specific manner.

- Choose correct current range
  - Turn switch 2 to position ON (if master fuse size is less than 50 A)
  - Other switches 1, 3-6 to position OFF.
- Adjust hysteresis, current % and delay using screws in the front part (master fuses 25 A)
  - Hysteresis 21
  - Current 25 - 28 %
  - Delay 1s
- The relay requires external voltage 24-240 V/AC.



- External supply is connected to terminals A1 and A2.
- Terminals 15 and 16 are connected to geothermal heat pump and interrupt the heating element's supply with respect to the phase the current value of which is exceeded.
- Each phase must be lead through the relay using the dedicated hole inside it.
  - L1 for relay 1
  - L2 for relay 2
  - L3 for relay 3

No other connections with relay are necessary.

Electrician's checklist

Check that

- all phases going to the switchboard are in the correct phase sequence
- the master fuse is of sufficient size
- the ground source heat pump's fuse size is correct, type: slow (C curve)
- if necessary, current monitor has been installed to the building's master electrical switchboard (part-power models)
- the main cable is of sufficient size

4.4. Commissioning

Before commissioning, check that:

- the heating system has been connected, filled and de-aerated appropriately
- the ground circuit has been installed, filled and de-aerated appropriately
- electrical connections have been made appropriately and the outdoor sensor (and optional room sensor) has been installed
- after preventing the compressor from starting, water in the storage tank has been heated by the electric heating element for at least 6 hours

If the ground source heat pump is started for the first time without pre-heating, compressor will be damaged. Fill the storage tank with water and prevent the compressor from starting by pressing down the red compressor motor circuit breaker. Switch on the ground source heat pump's power supply, the electric heating element begins to heat the water contained in storage tank. A regulator alarm goes on and the text "Compressor 1 circuit 1 some motor protection gone off. Check motor protection F1, F2 or F3" appears on the display. Later another regulator alarm goes on and the text "Resistor functioned in full power system" appears. These alarms do not require taking any measures. Starting of the compressor is allowed after six hours of pre-heating.

NOTE!
A compressor started without pre-heating is not covered by warranty!

Possible problems during startup

Problem	Cause	Solution
Fuses always blow when the compressor is started.	You are using the wrong type of fuse.	Check that the fuse is automatic: C or D / ceramic fuse: SLOW or with a snail icon.
	Temporary connections at the site are causing an overload of the fuses	Reduce load.
The heat collection circuit pump does not start.	The regulator may not be getting any power.	Check the regulator fuse.
	The regulator is not authorised to start the pump.	Check the measured/set values.
	The shut-off valves are in the fill position.	Check that the de-aeration and fill valves are in the closed position and that the intermediate valve is open.
	The plug-ins of heat collection pump are unconnected from the swithboard.	Connect the plug-ins.
	Control system is on manual control.	Remove manual control from the maintenance menu or switch off the ground source heat pump's power supply for a moment.
The compressor runs for a little while and the evaporator pressure switch goes off.	There may still be air in the heat collection circuit.	De-aerate the heat collection circuit.
	There may be a leak in the refrigerant circuit.	Contact the equipment installer or dealer.
	There may be dirt in the mud separator.	Check the mud separator and clean as required.
	The level of fluid in the heat collection circuit. may be too low.	Check the level of the fill container and fill as required (de-aeration of groun circuit may be necessary as well).
	Some valve in the heat collection circuit may be closed.	Check all valves and open if closed.
The compressor runs for a little while and the condenser pressure switch goes off.	There may be air in the condenser circuit or charge pump.	De-aerate charge circuit netween the device and storage tank. Open the charge pump and chech that the pump is operating.
The fluid level in the heat collection circuit fill container drops suddenly after startup.	There is a leak in the system (the smell of ethyl alcohol or glycol is strong), there is a leak in the heat collection circuit or there is still air in the circuit.	Check the condition of valves in the de-aeration group, air valve and the shaft seal on the ground circuit pump, check the condition of heat collection circuit extension joints, or de-aerate.
Motor protection switches go off when starting.	The compressor or the ground circuit pump is short-circuited or one of the phases is not activated.	Check electrical connections.
	The fuses in the master switchboard of the building have blown or are faulty.	Check and replace fuses as required.

The maintenance menu section Manual control allows manual control of compressors, pumps and valves. This facilitates troubleshooting process and may be of help in case of starting problems.

5. MAINTENANCE

5.1. Maintenance and care

The Lämpöässä ground source heat pump is an easy-care and reliable heating system that does not require regular maintenance. If the installation is carried out with care and in accordance with the instructions provided, there is usually no need for maintenance. The fill container and mixture circuit filter should be checked every couple of weeks during the first few months and afterwards approximately once a month for the first year of use thereafter. Also in pressurized systems it should be checked regularly that the pressure stays at approx. 1 bar.

Lämpöässä heat pumps which includes 3-6 kg refrigerant are hermatically sealed and therefore annual inspection is not required. You are offered the possibility of concluding an agreement on periodic inspections, in connection with which the operation of the Lämpöässä heat pump is covered stage by stage. The observations are registered in the inspection record and necessary measures taken (such as adjustments, for example). For additional information on the periodic inspection agreement, visit huolto@lampoassa.fi.

5.2. Possible problems occurring during use

Problem	Possible cause	Solution
The compressor does not start.	The water tank temperature is adequate and in accordance with the regulator.	No action required.
	The compressor has been stopped for less than 1 minutes.	No action required.
	Fuse problem.	Check the condition of the fuses in the master switchboard.
	Incorrect power supply phase sequence.	Contact an electrician.
The compressor does not start and the display reads “Incorrect phase sequence” or “Motor protection switch gone off”.	Incorrect power supply phase sequence.	Contact an electrician.
	The motor protection switch has gone off.	Check the motor protection switch adjustment values, set the motor protection switch to Start position and acknowledge the alarm text displayed. If the fault is not cleared, contact an electrician.
The compressor does not start and the display reads “Low pressure switch gone off” or “High pressure switch gone off”.	The low pressure switch has gone off.	Check functionality of the brine circuit pump by running it through the maintenance menu and acknowledge the alarm text displayed.
	The high pressure switch has gone off.	Check functionality of the condenser pump by running it through the maintenance menu and acknowledge the alarm text displayed.
The compressor does not start and the display reads “Compressor 1 circuit 1 some motor protection gone off. Check motor protection F1, F2 or F3.”	The motor protection switch has gone off.	Press down the motor protection switch.
	The suction pressure switch on the pressure switch has gone off.	Set off the switch.
No text is visible on the display.	The device is not getting any power.	Check that that the control current and master switches are on.
	A fuse has blown.	Check the building’s master fuse and heat pump supply fuse.
	The display is damaged or the display cable loose or damaged.	Contact maintenance.
The system does not produce enough heat.	A sudden drop in outdoor temperature may temporarily cause inadequate heating power in new buildings, because moisture contained in the structure takes up a lot of heat when it dries.	No action required.
	During the first year, the ground circuit may not produce heat at full power because the earth around the ground circuit pipes has not yet become more solid.	No action required.
In the **Measurements** screen, the set value and measured value do not match.	Some active correction function (for example, timer or home/away) is adjusting the original set value.	The active correction function can be deactivated, if required.
	A spiking over-voltage caused by a lightning strike has caused a fault in the regulator (not under warranty), causing the temperature to drop from the actual values.	Replace the regulator (not under warranty).
	The regulator motor has been set on manual and the regulation does not take place.	Return the heat distribution circuit adjustment motor to automatic mode.
	In summer, when the building indoor temperature exceeds the value adjusted, the supply water temperature sensor indicates higher readings as compared to the adjustment curve, due to rise in the heat distribution circuit temperature.	No action required.

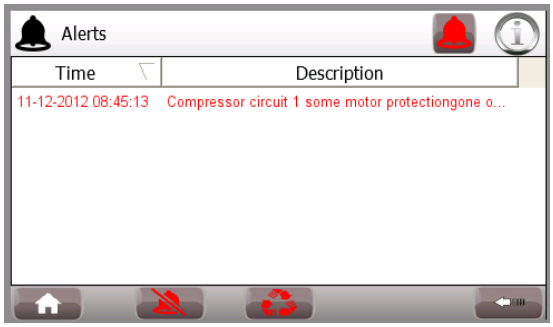
The compressor is on all the time or for long periods of time.	A lot of heat is needed, for example the outdoor temperature is very low or the structure is drying during the first year's use of the building.	No action required.
	Lack of refrigerant. Can be detected from bubbles in the liquid container even after some minutes of use.	Contact a refrigeration supplier or maintenance.

If these instructions do not help, please contact the equipment installer or your local dealer. If necessary, contact the Lämpöässä maintenance call centre at +358 40 841 8340.

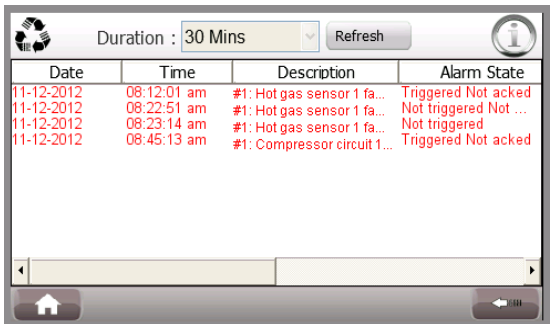
5.3. Alarms

There are two ways to examine the alarms with ÄssäControl.

- You can see the active alarms if you press the alarm bell on front page. You can check out the alarms by pressing the **check out alarms** -button. You can go to **alarm history** from active alarms page by pressing the button at the bottom of the page.



- You can see earlier alarms by pressing the **alarm history** -button at the **menu functions**.

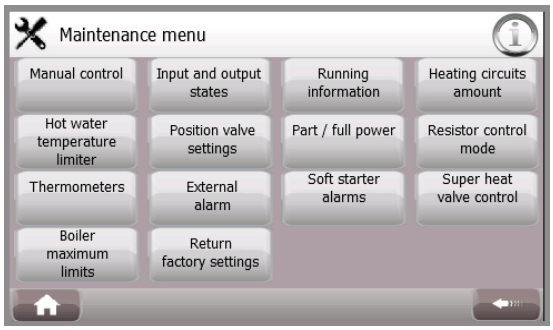


The software automatically stores the newest 100 fault messages. This menu allows resetting the fault log data stored. Possible alarms in Esi ground source heat pump:

- Compressor 1 circuit 1 some motor protection gone off. Check motor protection F1, F2 or F3.
- Compressor 1 internal heat protection gone off. Wait 45 min.
- Low pressure pressostat of circuit 1 functioned. Accept presostat.
- High pressure pressostat of circuit 1 functioned. Accept presostat
- Incorrect phase order. Change feed phase order.
- Temperature did not rise in pre set time. Resistance enabled.
- Outside temperatur sensor fault.
- Hot gas sensor 1 fault.
- Low boiler sensor fault.
- Top boiler sensor fault.
- Heating circuit 1 sensor fault.
- Heating circuit 2 sensor fault.
- Heating circuit 3 sensor fault.
- Hot water temperature sensor fault
- Room temperature sensor fault.
- Alarm of liquid circuit (optional)
- External alarm
- Resistor functioned in full power system

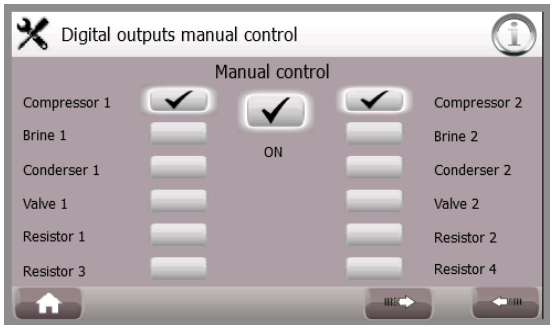
5.4. Maintenance procedures

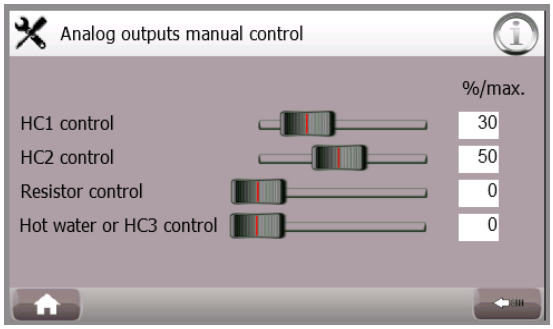
NOTE! Access to the maintenance menu is password-protected. Access to the maintenance menu is restricted to Lämpöässä installer training graduates and certified installers. Status data can be monitored through the maintenance menu. The monitoring options include digital inputs and outputs, analog inputs and outputs, and variables.



5.4.1. Manual control

This screen allows bypassing automatics and controlling compressors, pumps, and valves manually. Control has been divided between **digital outputs** and **analog outputs**.



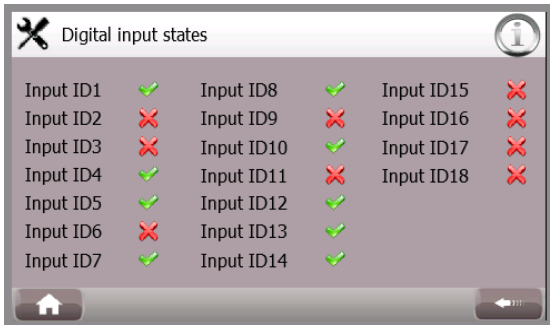


5.4.2. Input and output statuses

For the purpose and function of digital inputs and outputs, see the annexed equipment electrical diagrams.

Digital inputs

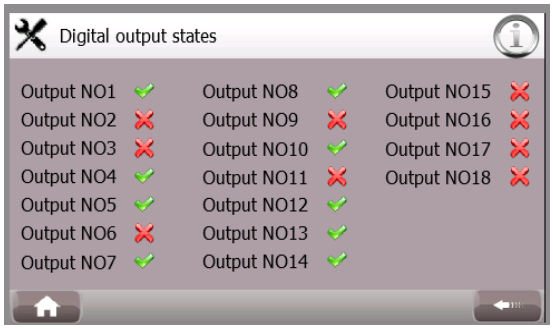
This screen allows checking digital input statuses.



Digital Input (ID)	
1 Compressor 1 Motor protection	10 Low pressure alarm circuit 1
2 Not in use	11 High pressure alarm circuit 1
3 Brine pump 1 Run indicator	12 Compressor 1 Run indicator
4 Not in use	13 Not in use
5 Not in use	14 Soft Starter
6 Not in use	15 External Alarm
7 Compressor 1 internal alarm	16 Not in use
8 Not in use	17 Flow Sensor
9 Phase failure detector	18 Not in use

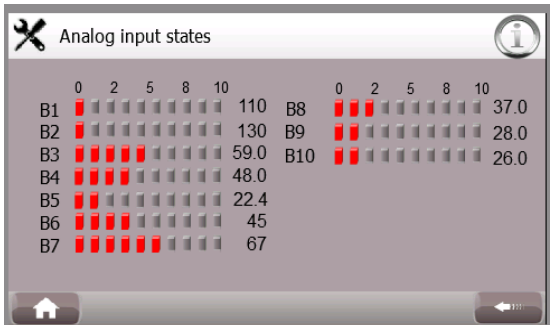
Digital outputs

This screen allows checking digital output statuses.



Digital Output (NO)	
1 Brine circuit 1	10 Not in use
2 Not in use	11 Not in use
3 Alarm signal	12 Immersion heater 4
4 Compressor 1	13 Immersion heater 1
5 Condenser pump 1	14 Heating circuit pump 1
6 Magnetic valve 1	15 Heating circuit pump 2
7 Immersion heater 2	16 Heating circuit pump 3
8 Immersion heater 3	17 Not in use
9 Not in use	18 Pressure equalizing valve (Only 1-phase devices)

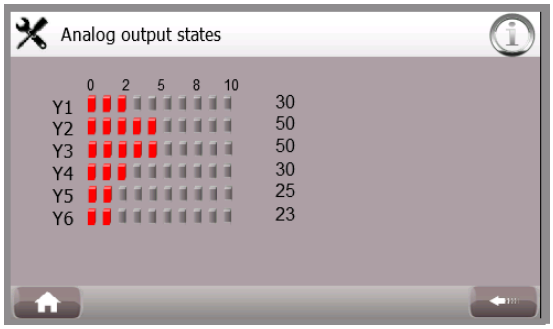
Analog inputs



This screen allows checking analog input statuses.

Analog Input (B)	
1 Hot gas sensor 1	6 Circuit 1 outgoing temperature sensor
2 Not in use	7 Circuit 2 outgoing temperature sensor
3 Boiler top part temperature sensor	8 Circuit 3 outgoing temperature / Measurement of domestic hot water sensor
4 Boiler foot part temperature sensor	9 Not in use
5 Outside temperatur sensor	10 Brine circuit heat

Analog outputs

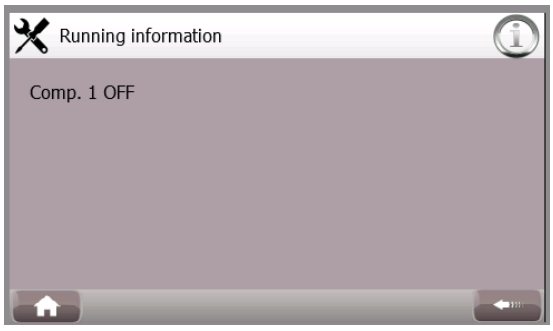


This screen allows checking analog output statuses.

Analog Output (Y)
1 Heating circuit 1 regulation motor
2 Heating circuit 2 regulation motor
3 Analog immersion heater control 0-10V
4 Heating circuit 3 regulation motor/ Adjusment of domestic hot water
5 Speed regulation of brine pump
6 Superheat valve regulation

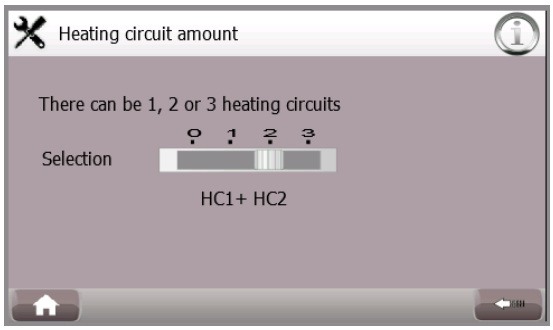
5.4.3. Running information

This screen shows compressor's current state.



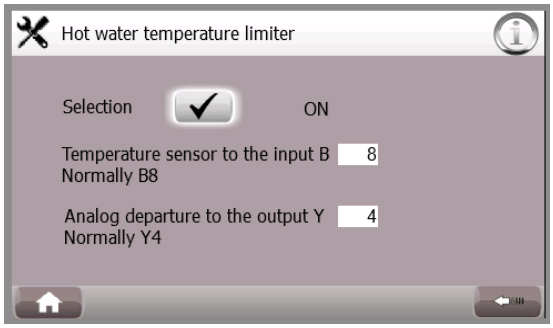
5.4.4. Heat distribution circuit quantity

There may be from 1 to 3 heat distribution circuits, of which circuits 2 and 3 are optional. If three heat distribution circuits are in use, the domestic water temperature limit function cannot be used at the same time



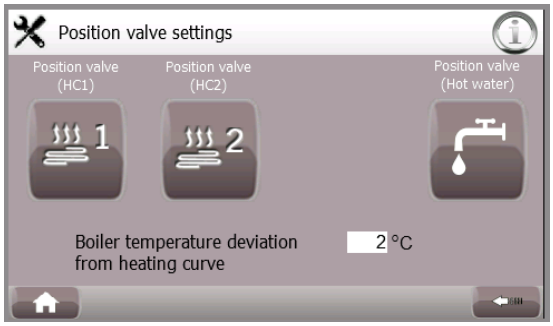
5.4.5. Domestic hot water temperature limit

This screen allows activation of the **domestic hot water temperature limit** and changing of the domestic hot water temperature sensor and the related position valve connection location. The default setting is that the temperature sensor is connected to analog input B8 and position valve to analog output Y4 .

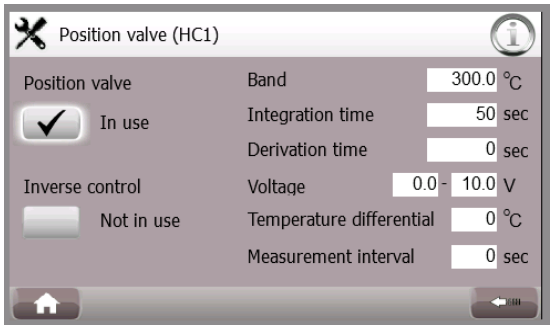


5.4.6. Positioning valve control

This screen allows determining the settings of position valves associated with heat distribution circuits and domestic hot water temperature limit. Each adjustable circuit has two setting screens.



If the temperature at storage tank bottom part is lower than that of the heat distribution circuit, the storage tank temperature is automatically increased so as to meet the heat distribution circuit temperature with additional divergence value. Adjustment range 0...10 °C, factory setting 2 °C.



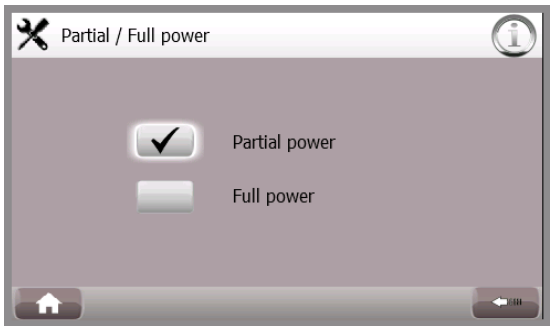
The following settings are possible for all circuits:

Setting	Description	Example
Reverse control (ON/OFF)	Reversing of position valve adjustment direction	In the OFF position, if voltage is 0 V, the regulator is in its extreme right position. In the ON position, if voltage is 0 V, the regulator is in its extreme left position.
Adjustment range (10...600°C)	The divergence from target temperature in which case the position valve is adjusted from one extreme position to another. Factory setting: 300 °C.*	If the adjustment range is 140 °C and the target temperature differs from the current temperature by 14 °C, the valve is adjusted to 10% of the maximum. If the temperature changes too quickly, the adjustment range is increased. If the temperature changes too slowly, the adjustment range is decreased.
Integration time (5...300 s)	Temperature divergence correction interval(s). Factory setting: 50 s.**	If integration time is 10 s, the valve position is changed once in every 10 s, if required.
Derivative time (0...10 s)	Temperature divergence reaction time. Factory setting: 0.	The longer the derivative time, the more the regulator position changes upon each adjustment. Consider that increase in derivative time may result in increased regulator fluctuation.
Voltage (0...10 V)	Position valve control voltage min and max values. Factory setting: 0.0-10.0 VAC.	This setting depends on the regulator used.
Temperature divergence (0...10 °C)	Allowed divergence from target temperature. Factory setting: 0 °C.	At value 5 °C, the regulator position is changed only after the difference between the actual temperature and target temperature exceeds 5 °C.
Frequency of measurements (0...30 s)	How often is the current temperature checked. Factory setting: 0.	At value 15 s, the current temperature is checked once in every 15 s. At value 0 the checking is continuous.

* Domestic water limit 30 °C ** Domestic water limit 40 s.

5.4.7. Part-power / Full power

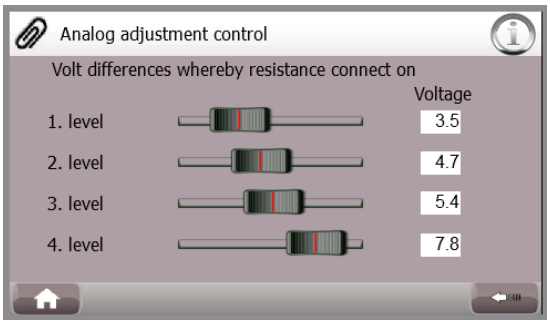
The maintenance menu allows switching between full power (default setting) and part-power, in which case the equipment allows activation of the electric heating element or some other source of additional heat simultaneously with the compressor.



The heating time before heating element activation can be set under Additional heat settings in the Other set values screen.

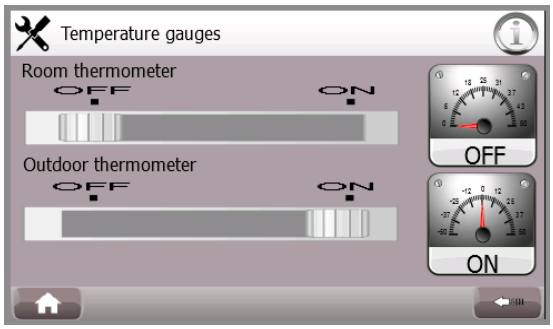
5.4.8. Immersion control

Electrical immersions can be controlled with both digital and analogic signal. Selection is made in this screen. Analogic controller adjusment is in the screen Other setting points / External heating control / Settings / Analogic adjusment setting.



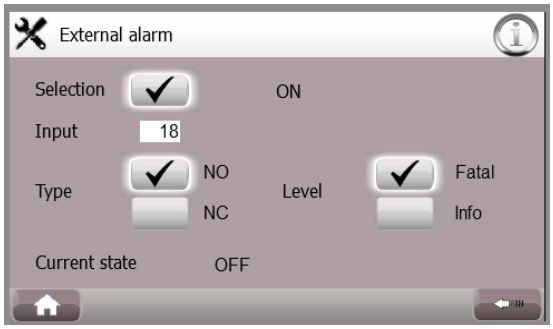
5.4.9. Temperature gauges

This screen allows choosing the temperature gauges used. By default, the outdoor temperature gauge is present. Indoor temperature gauge is optional.



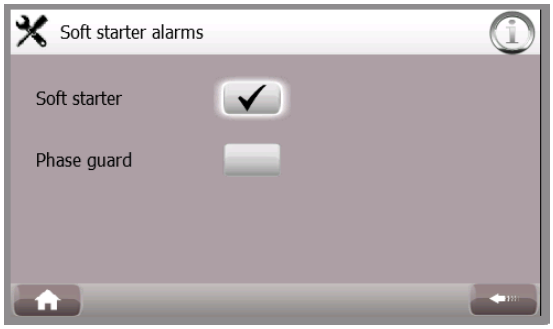
5.4.10. External alarm

On this page, if in use, external alarm settings are defined. Status is either info or serious. Is the status is info external alarms doesn´t affect to the heat pump operation. Is the status is serious compressors are not starting. External alarm can be connected to digital inputs 17 or 18.



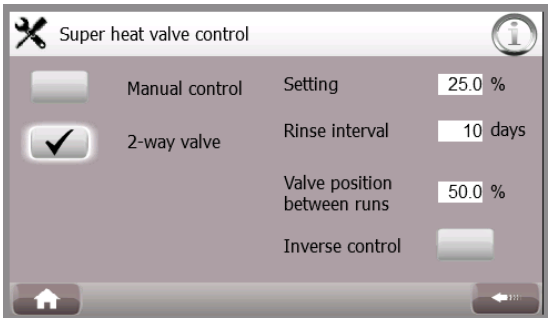
5.4.11. Soft starter alarms

The soft starter alarms can be activated at this page.



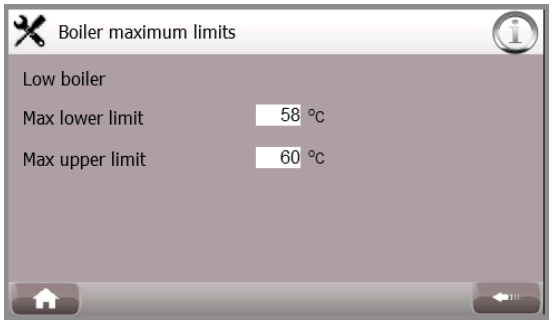
5.4.12. Super heat valve control

This menu is for adjusting superheat trim valve settings. Value in the menu indicates the setting point when compressor is running. Valve position between the compressor runs indicates valve settings point when compressor is not running. Frequency between the flushes is settled with rinse interval. Rinse is implemented on the first running period of the day when time indicated in the rinse interval is full. Valve type (NP/NC) is defined with the diversed controlling. Manual controlling settles the valve to the percentage indicated in the valve setting point. The factory setting for super heat valve control can be found from the Technical specifations table.



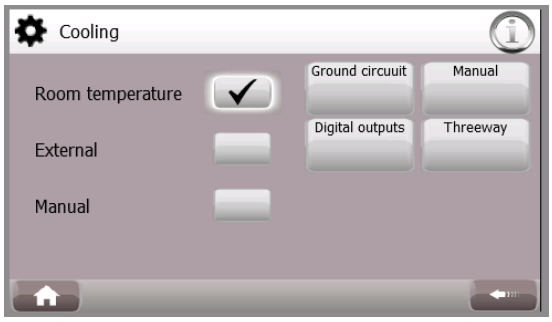
5.4.13. Boiler maximum limits

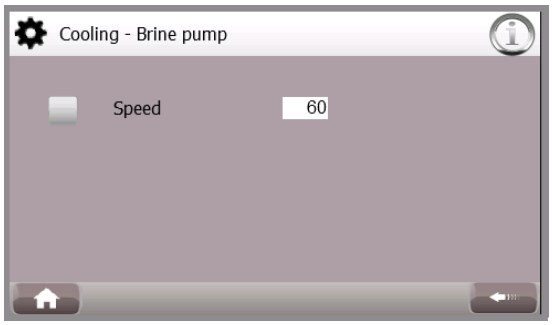
Maximum boiler limits are set on this page.



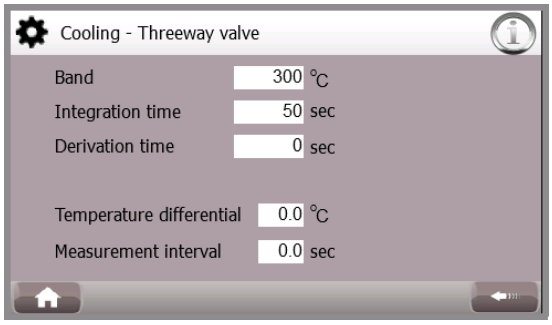
5.4.14. Cooling

Controlling methods available: Roomtemp, External and Manual. Selection of the brine speed while cooling is operating..

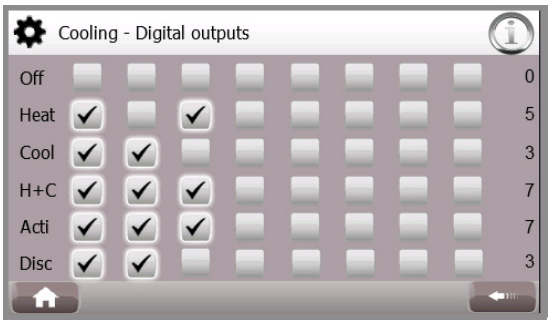




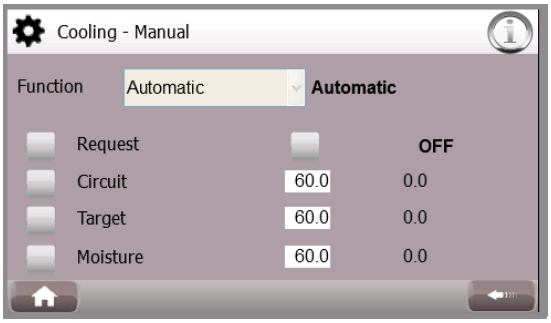
Three way valve control settings in a free cooling.



Digital output selection in flexible cooling.

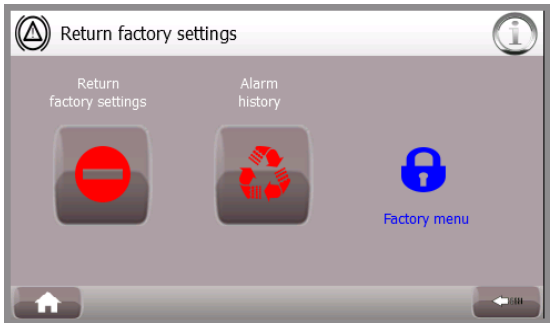


Manual mode for cooling is intended for testing the function. Manual settings can be controlled from the functions menu. From there it's possible to adjust the cooling systems mode, temperature limits and humidity values manually.



5.4.15. Return factory settings

Returning the factory settings and browsing the alarm history in this view.



6. WARRANTY CONDITIONS

The manufacturer grants its products a two (2) year warranty from the commissioning date specified in the product's warranty certificate. During the warranty period, the manufacturer is responsible for that the product complies with its agreed characteristics and is free of manufacturing or design defects. The manufacturer's responsibility for the faults of its products involves only repair of a faulty product or replacement thereof with a faultless products, within a reasonable time and at the manufacturer's discretion. The manufacturer shall take care of product repairs through its own maintenance service or authorized maintenance centre. Faulty product components must be returned to the manufacturer.

The warranty does not cover any faults discovered in the products that have been caused through negligence of the purchaser or other user of the product, failure to comply with the product's instructions for use, maintenance or care, extreme voltage fluctuations (over ±10 % of the nominal voltage), lightning, fire or other respective event. Transport damages are not covered by the warranty. Also, the warranty does not cover situations caused by product installation to the place of use in contradiction with instructions for installation or use or otherwise incorrectly, or by product repair, modification or installation by some other party than the manufacturer or a maintenance company authorised by the manufacturer.

The warranty does not cover the adjustments or ground circuit and heat distribution circuit de-aeration procedures specified in the instructions for use. Furthermore, the warranty does not cover any faults caused by use of unauthorised and corrosive fluids in the ground circuit piping. The manufacturer only grants the aforementioned warranty and this warranty is the only warranty granted by the manufacturer to its products. The aforementioned warranty does not concern any additional equipment or accessories installed afterwards and subject to their own warranty.

An additional warranty condition associated with Lämpöässä geothermal heat pump is compressor preheating prior to starting thereof for the first time (see 4.4. Commissioning).

7. TECHNICAL SPECIFICATIONS

LÄMPÖÄSSÄ		Esi 6	Esi 9	Esi 11	Esi 11 1x230V	Esi 14	Esi 14 1x230V	Esi 17	Emi 22(22P)	Emi 28 (28P)	Emi 43 (43P)	ELi 60 (60P)	ELi 90 (90P)
Width	mm	595	595	595	595	595	595	595	920	920	920	1200	1200
Depth	mm	680	680	680	680	680	680	680	680	680	680	680	680
Height	mm	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
Weight	kg	174	178	192	192	202	202	210	395 (387)	395 (387)	412 (420)	515 (505)	605 (595)
Heat pump type		Brine-to-water											
Compressor type		Scroll											
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C	R410A	R410A
Refrigerant volume	g	1400	1900	2000	2000	2500	2500	2600	4900 (4700)	5000 (4800)	5700 (5900)	8700 (8500)	10000(9800)
Compressor oil		POE	POE	POE	POE	POE	POE	POE	POE	POE	POE	POE	POE
Storage tank volume	l	-	-	-	-	-	-	-	-	-	-	-	-
Maximum pressure of heat tank	bar	-	-	-	-	-	-	-	-	-	-	-	-
Heating regulator		ÄssäControl											
Evaporator material		Stainless Steel											
Brine volume in evaporator	l	2,6	2,6	3,2	3,2	4,2	4,2	4,7	7,5	7,5	8,4	10,0	15,0
Condenser material		Stainless Steel											
Water volume in condenser	l	1,8	1,8	2,7	2,7	3,6	3,6	4	7,5	7,5	8,4	7,0	10,0
Factory setting of condenser pump		Constant curve 2		Constant curve 3					Constant curve 3			Constant curve 3	
Factory setting of superheat circuit	%	35	35	40	40	40	40	40	55 (-)	55 (-)	55 (-)	75 (-)	85 (-)
Sound power level(1	dB	37	37	40	41	41	42	41	45	46	49	-	65
OPERATION LIMITS:													
Temperature limits (brine/water)	°C	-10/60, 15/30										-10/60, 20/30	
Pressure limit (refrigerant)	bar	1,5/29										4/45	
PERFORMANCE DATA:													
Heating power at temperature 35°C(2	kW	8,44	10,44	12,38	12,14	15,64	14,98	17,75	22,42	29,52	46,19	60,69	91,03
Heating power at temperature 55°C(2	kW	7,75	9,82	11,45	11,2	14,47	13,65	16,71	20,71	26,75	42,83	58,13	86,24
Cooling power at temperature 35°C(2	kW	6,91	8,49	10,09	10,24	12,75	12,91	14,37	17,57	23,19	33,15	46,67	67,03
Cooling power at temperature 55°C(2	kW	5,62	6,88	8,16	8,19	10,28	10,32	11,69	14,25	18,24	27,64	37,22	53,96
Input power at temperature 35°C(2	kW	1,70	2,15	2,49	2,53	3,20	3,28	3,67	4,99	6,47	10,25	13,06	20,18
Input power at temperature 55°C(2	kW	2,34	3,10	3,44	3,60	4,33	4,62	5,13	6,55	8,62	13,32	18,83	28,26
COP at temperature 35°C(2		4,96	4,84	4,97	4,79	4,88	4,56	4,84	4,49	4,56	4,50	4,64	4,51
COP at temperature 55°C(2		3,30	3,17	3,33	3,11	3,33	2,95	3,25	3,16	3,10	3,22	3,08	3,05
SCOP 35°C / Energy efficiency class 35°C(3		5,24 / A⁺⁺*	5,13 / A⁺⁺*	5,29 / A⁺⁺*	5,10 / A⁺⁺*	5,31 / A⁺⁺*	4,97 / A⁺⁺*	5,22 / A⁺⁺*	4,98 / A⁺⁺*	5,09 / A⁺⁺*	5,06 / A⁺⁺*	4,95 / A⁺⁺*	-
SCOP 55°C / Energy efficiency class 55°C(3		3,88 / A⁺⁺*	3,83 / A⁺⁺*	3,99 / A⁺⁺*	3,80 / A⁺⁺*	4,02 / A⁺⁺*	3,73 / A⁺⁺*	3,96 / A⁺⁺*	3,83 / A⁺⁺*	3,66 / A⁺⁺*	3,88 / A⁺⁺*	3,82 / A⁺⁺*	-
Energy efficiency class at 35°C (space heating / domestic hot water), package(4		A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺
Energy efficiency class at 55°C (space heating / domestic hot water), package(4		A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺	A⁺⁺⁺	A⁺⁺⁺	A⁺⁺
ELECTRICS:													
Power supply		400V 3N~ 50Hz			230V 1N~ 50Hz	400V 3N~ 50Hz	230V 1N~ 50Hz	400V 3N~ 50Hz	400V 3N~ 50Hz			400V 3N~ 50Hz	
Starting current	A	17	23	32	48	35	32	43	50	60	100	85	125
Running current (35°C / 55°C)(2	A	3,28 / 4,18	4,33 / 5,52	5,04 / 6,29	12,96/17,82	6,84 / 8,17	22,47/29,97	7,45 / 9,24	11,98/13,53	13,70/16,54	19,35/23,74	24,11/32,07	38,60/49,33
Fuse size (bivalent model)	A	3 x 10 (16)	3 x 16 (20)	3 x 16 (20)	32	3 x 16 (20)	40	3 x 16 (20)	3 x 25	3 x 25***	3 x 50	3x63	3x100
Immersion heater as a backup heating	kW	-	-	-	-	-	-	-	-	-	-	-	-
Supply cable size (bivalent model)(5	mm2	5x2,5 (5x6)			3 x 6	5x2,5 (5x6)	3 x 10	5x2,5 (5x6)	5 x 10	5 x 10	5 x 16	5 x 25	5 x 50
Soft starter		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Current control		Accessory			No	Accessory	No	Accessory	Accessory			Accessory	
Compressor motor circuit breaker setting	A	6	7	9	22	10	-	12	17	21	32	50	79

TECHNICAL SPECIFICATIONS

HEAT COLLECTION CIRCUIT(S):			Esi 6	Esi 9	Esi 11	Esi 11 1x230V	Esi 14	Esi 14 1x230V	Esi 17	Emi 22(22P)	Emi 28 (28P)	Emi 43 (43P)	ELi 60 (60P)	ELi 90 (90P)
Energy class of brine pump			A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)
Input power of brine pump		W	5-89	5-89	10-170	10-170	10-170	10-170	10-170	160-1330	160-1330	160-1330	30-2100	
Factory setting of brine pump		%	90	90	90	90	90	90	90	90	90	90	90	100
Ground loop maximum length, 1 ground loop[6]	Borehole, PEH, PN6	m	500	350	450	500	-	-	-	-	-	-	-	-
	Horizontal pipe, PEM, PN10	m	450	300	-	380	-	-	-	-	-	-	-	-
Ground loop maximum length, 2 ground loops[6]	Borehole, PEH, PN6	m	-	900	1200	1600	900	1000	600	1050	-	-	-	-
	Horizontal pipe, PEM, PN10	m	-	750	1050	1250	650	800	500	900	-	-	-	-
Ground loop maximum length, 3 ground loop[6]	Borehole, PEH, PN6	m	-	-	-	-	-	-	-	-	700	-	500	-
	Horizontal pipe, PEM, PN10	m	-	-	-	-	-	-	-	-	550	-	400	-
Ground loop maximum length, 4 ground loop[6]	Borehole, PEH, PN6	m	-	-	-	-	-	-	-	-	-	750	900	-
	Horizontal pipe, PEM, PN10	m	-	-	-	-	-	-	-	-	-	600	700	-
Nominal flow	ΔT=3K (ISO 14511)	l/s	0,64	0,79	0,94	0,91	1,18	1,11	1,34	1,65	2,19	3,41	-	700
Maximum external pressure drop		kPa	53	48	81	82	65	71	54	203	89***	127	-	550
Nominal flow	ΔT=4K	l/s	0,48	0,59	0,70	0,68	0,89	0,83	1,00	1,24	1,64	2,56	-	900
Maximum external pressure drop		kPa	66	65	96	100	84	91	77	208	100***	152	-	750
HEAT DISTRIBUTION CIRCUIT:														
Energy class of HC pump			A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	A (inverter)	Accessory				
Input power of HC pump		W	5-53	5-53	5-53	5-53	5-53	5-53	5-53					
Nominal flow	ΔT=5K Floor heating	l/s	0,40	0,50	0,59	0,58	0,74	0,71	0,70**					
Maximum external pressure drop		kPa	51	42	29	30	15	18	19**					
Nominal flow	ΔT=10K Radiator heating	l/s	0,18	0,23	0,27	0,27	0,34	0,33	0,40					
Maximum external pressure drop		kPa	71	69	66	66	57	60	51					

*Meets the energy efficiency class A+++ requirements. Meets the domestic hot water energy efficiency class A+ requirements.
**Calculated according to nominal flow at ΔT=7K.
***Maximum external pressure drop is possible to raise 191 kPa ΔT3, (204 ΔT4) when using 35 A fuses. Contact to your local dealer.

1) Tested according to ISO 3744/2010 at standard point B0/W55.

2) Tested according to ISO 14511/2013.

3) Tested according to EU 811/2013 at colder climate conditions.

4) Package means the combination of heat pump and heating regulator (EU 811/2013).

5) If conditions are requiring long cable work it is recommended to use 5x6 mm2 cable.

6) Calculated length according to nominal flow at ΔT=4K. Actual pressure drop is determined case by case.

8. ENERGY LABEL

9. HVAC SCHEMES

10. ELECTRICITY SCHEMES

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LÄMPÖÄSSÄ Esi 6

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

37 dB

00 dB

8	8	8
8	**8**	**8**
8	8	8
kW	kW	kW

2015 811/2013

ENERG
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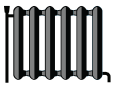
Y IJA IE IA

LÄMPÖÄSSÄ

Esi 6



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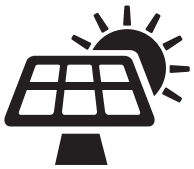
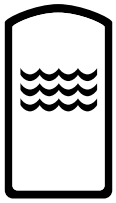
+  ☐

+  ☐

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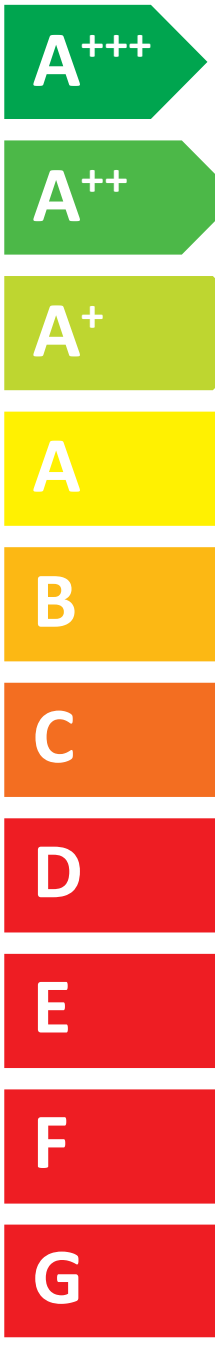

A+++

2015

811/2013

Product description

Name or trademark	Lämpöässä	
Model	Esi 6	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	8	kW
Seasonal space heating energy efficiency under average climate conditions	156	%
Annual electricity consumption for space heating	4116	kWh/a
Sound power level indoors	37	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	8	kW
	Warmer	8	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	160	%
	Warmer	154	%
Annual energy consumption under colder and warmer climate conditions	Colder	4786	kWh/a
	Warmer	2695	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	157	%
Seasonal space heating energy efficieny of package in colder climate conditions	161	%
Seasonal space heating energy efficieny of package in warmer climate conditions	155	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	7,8	kW
		Warmer	Pdesignh	7,8	kW
		Colder	Pdesignh	7,8	kW

Seasonal efficiency	Heating	Average	SCOP/A	156	%
		Warmer	SCOP/W	154	%
		Colder	SCOP/C	160	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	7,8	kW	3,42	COPd
			Tj = 2 °C	8,0	kW	3,97	COPd
			Tj = 7 °C	8,1	kW	4,33	COPd
			Tj = 12 °C	8,3	kW	4,61	COPd
			Tj = bivalent temperature	7,8	kW	3,30	COPd
			Tj = operation limit	7,8	kW	3,30	COPd
		Warmer	Tj = 2 °C	7,8	kW	3,30	COPd
			Tj = 7 °C	8,0	kW	3,74	COPd
			Tj = 12 °C	8,2	kW	4,43	COPd
			Tj = bivalent temperature	7,8	kW	3,30	COPd
			Tj = operation limit	7,8	kW	3,30	COPd
		Colder	Tj = -7 °C	8,0	kW	3,83	COPd
			Tj = 2 °C	8,2	kW	4,27	COPd
			Tj = 7 °C	8,3	kW	4,60	COPd
			Tj = 12 °C	8,5	kW	4,66	COPd
			Tj = bivalent temperature	7,8	kW	3,30	COPd
			Tj = operation limit	7,8	kW	3,30	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,0	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		4116	kWh/a
		Warmer	QHE/W		4786	kWh/a
		Colder	QHE/C		2695	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

ENERG Y IJA
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LÄMPÖÄSSÄ Esi 9

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

37 dB

00 dB

10	10
10	**10**
10	10
kW	kW

2015 811/2013

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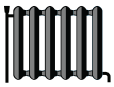
Y IJA IE IA

LÄMPÖÄSSÄ

Esi 9



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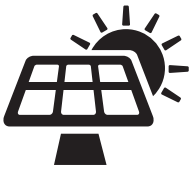

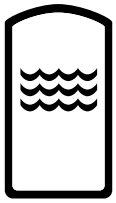

X

A+++

A+++

A++

A+

A

B

C

D

E

F

G

2015

811/2013

Product description

Name or trademark	Lämpöässä	
Model	Esi 9	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	10	kW
Seasonal space heating energy efficiency under average climate conditions	153	%
Annual electricity consumption for space heating	5296	kWh/a
Sound power level indoors	37	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	10	kW
	Warmer	10	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	157	%
	Warmer	154	%
Annual energy consumption under colder and warmer climate conditions	Colder	6181	kWh/a
	Warmer	3418	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	155	%
Seasonal space heating energy efficieny of package in colder climate conditions	158	%
Seasonal space heating energy efficieny of package in warmer climate conditions	155	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	9,8	kW
		Warmer	Pdesignh	9,8	kW
		Colder	Pdesignh	9,8	kW

Seasonal efficiency	Heating	Average	SCOP/A	153	%
		Warmer	SCOP/W	154	%
		Colder	SCOP/C	157	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	9,9	kW	3,32	COPd
			Tj = 2 °C	10,0	kW	3,88	COPd
			Tj = 7 °C	10,2	kW	4,28	COPd
			Tj = 12 °C	10,4	kW	4,64	COPd
			Tj = bivalent temperature	9,8	kW	3,10	COPd
			Tj = operation limit	9,8	kW	3,10	COPd
		Warmer	Tj = 2 °C	9,8	kW	3,10	COPd
			Tj = 7 °C	10,0	kW	3,68	COPd
			Tj = 12 °C	10,3	kW	4,42	COPd
			Tj = bivalent temperature	9,8	kW	3,10	COPd
			Tj = operation limit	9,8	kW	3,10	COPd
		Colder	Tj = -7 °C	10,1	kW	3,72	COPd
			Tj = 2 °C	10,2	kW	4,18	COPd
			Tj = 7 °C	10,4	kW	4,57	COPd
			Tj = 12 °C	10,7	kW	4,72	COPd
			Tj = bivalent temperature	9,8	kW	3,10	COPd
			Tj = operation limit	9,8	kW	3,10	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	0,99	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		5296	kWh/a
		Warmer	QHE/W		9181	kWh/a
		Colder	QHE/C		3418	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Esi 11

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

39 dB

00 dB

11	12
11	**12**
11	12
kW	kW

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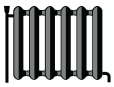
LÄMPÖÄSSÄ

Esi 11



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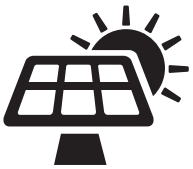
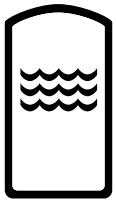
+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
C
D
E
F
G

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Product description

Name or trademark	Lämpöässä	
Model	Esi 11	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	11	kW
Seasonal space heating energy efficiency under average climate conditions	160	%
Annual electricity consumption for space heating	5926	kWh/a
Sound power level indoors	39	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	11	kW
	Warmer	11	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	164	%
	Warmer	159	%
Annual energy consumption under colder and warmer climate conditions	Colder	6899	kWh/a
	Warmer	3837	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	161	%
Seasonal space heating energy efficieny of package in colder climate conditions	165	%
Seasonal space heating energy efficieny of package in warmer climate conditions	161	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	11,5	kW
		Warmer	Pdesignh	11,5	kW
		Colder	Pdesignh	11,5	kW

Seasonal efficiency	Heating	Average	SCOP/A	160	%
		Warmer	SCOP/W	159	%
		Colder	SCOP/C	164	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	11,6	kW	3,45	COPd
			Tj = 2 °C	11,8	kW	4,02	COPd
			Tj = 7 °C	12,0	kW	4,41	COPd
			Tj = 12 °C	12,3	kW	4,80	COPd
			Tj = bivalent temperature	11,5	kW	3,33	COPd
			Tj = operation limit	11,5	kW	3,33	COPd
		Warmer	Tj = 2 °C	11,5	kW	3,33	COPd
			Tj = 7 °C	11,8	kW	3,80	COPd
			Tj = 12 °C	12,2	kW	4,56	COPd
			Tj = bivalent temperature	11,5	kW	3,33	COPd
			Tj = operation limit	11,5	kW	3,33	COPd
		Colder	Tj = -7 °C	11,8	kW	3,87	COPd
			Tj = 2 °C	12,1	kW	4,34	COPd
			Tj = 7 °C	12,3	kW	4,72	COPd
			Tj = 12 °C	12,6	kW	4,90	COPd
			Tj = bivalent temperature	11,5	kW	3,33	COPd
			Tj = operation limit	11,5	kW	3,33	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		5926	kWh/a
		Warmer	QHE/W		6899	kWh/a
		Colder	QHE/C		3837	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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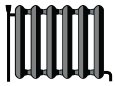
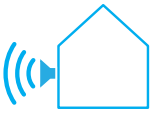
LÄMPÖÄSSÄ Esi 11 1x230V



	55 °C	35 °C
	A+	A++

A++
A+
A
B
C
D
E
F
G

41 dB



00 dB

55 °C	35 °C
11	12
11	**12**
11	12
kW	kW

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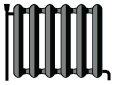
Esi 11 1x230V



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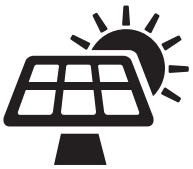
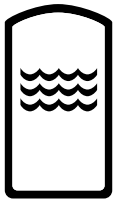
+		☐
+		☐
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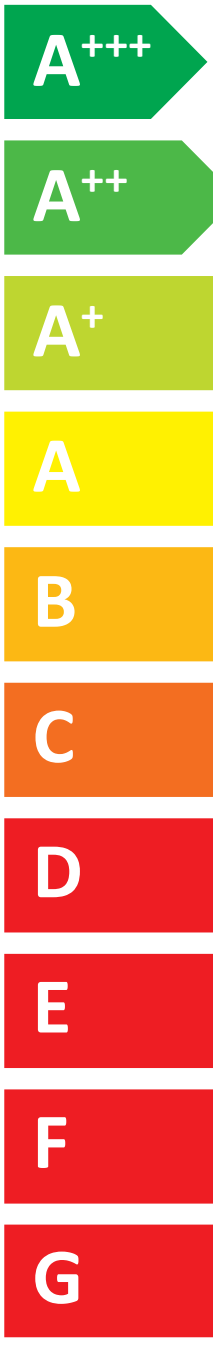

A+++

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Product description

Name or trademark	Lämpöässä	
Model	Esi 11 1x230V	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	11	kW
Seasonal space heating energy efficiency under average climate conditions	152	%
Annual electricity consumption for space heating	6082	kWh/a
Sound power level indoors	41	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	11	kW
	Warmer	11	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	155	%
	Warmer	153	%
Annual energy consumption under colder and warmer climate conditions	Colder	7106	kWh/a
	Warmer	3908	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	154	%
Seasonal space heating energy efficieny of package in colder climate conditions	157	%
Seasonal space heating energy efficieny of package in warmer climate conditions	155	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	11,2	kW
		Warmer	Pdesignh	11,2	kW
		Colder	Pdesignh	11,2	kW

Seasonal efficiency	Heating	Average	SCOP/A	152	%
		Warmer	SCOP/W	153	%
		Colder	SCOP/C	155	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	11,3	kW	3,26	COPd
			Tj = 2 °C	11,6	kW	3,82	COPd
			Tj = 7 °C	11,8	kW	4,25	COPd
			Tj = 12 °C	12,2	kW	4,62	COPd
			Tj = bivalent temperature	11,2	kW	3,11	COPd
			Tj = operation limit	11,2	kW	3,11	COPd
		Warmer	Tj = 2 °C	11,2	kW	3,11	COPd
			Tj = 7 °C	11,6	kW	3,65	COPd
			Tj = 12 °C	12,1	kW	4,39	COPd
			Tj = bivalent temperature	11,2	kW	3,11	COPd
			Tj = operation limit	11,2	kW	3,11	COPd
		Colder	Tj = -7 °C	11,5	kW	3,65	COPd
			Tj = 2 °C	11,9	kW	4,12	COPd
			Tj = 7 °C	12,1	kW	4,54	COPd
			Tj = 12 °C	12,5	kW	4,72	COPd
			Tj = bivalent temperature	11,2	kW	3,11	COPd
			Tj = operation limit	11,2	kW	3,11	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		6082	kWh/a
		Warmer	QHE/W		7106	kWh/a
		Colder	QHE/C		3908	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Esi 14

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

41 dB

00 dB

14	16
14	**16**
14	16
kW	kW

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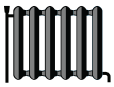
LÄMPÖÄSSÄ

Esi 14



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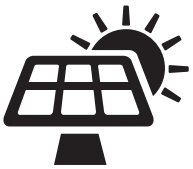
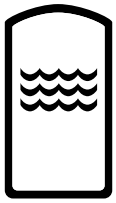
+  ☐

+  ☐

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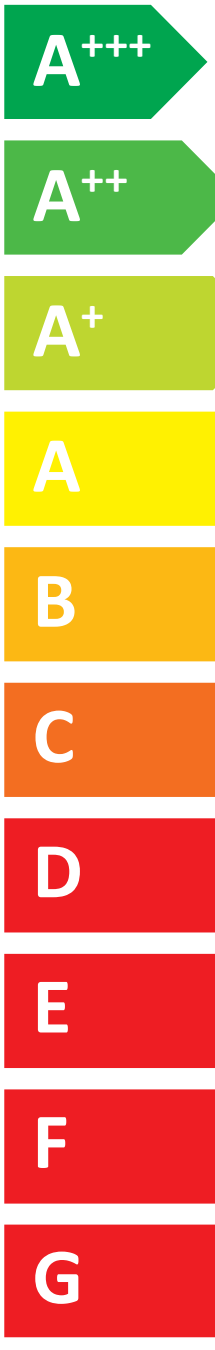

A+++

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Product description

Name or trademark	Lämpöässä	
Model	Esi 14	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	14	kW
Seasonal space heating energy efficiency under average climate conditions	161	%
Annual electricity consumption for space heating	7443	kWh/a
Sound power level indoors	41	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	14	kW
	Warmer	14	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	165	%
	Warmer	160	%
Annual energy consumption under colder and warmer climate conditions	Colder	8645	kWh/a
	Warmer	4819	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	162	%
Seasonal space heating energy efficieny of package in colder climate conditions	167	%
Seasonal space heating energy efficieny of package in warmer climate conditions	162	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	14,5	kW
		Warmer	Pdesignh	14,5	kW
		Colder	Pdesignh	14,5	kW

Seasonal efficiency	Heating	Average	SCOP/A	161	%
		Warmer	SCOP/W	160	%
		Colder	SCOP/C	165	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	14,6	kW	3,50	COPd
			Tj = 2 °C	14,8	kW	4,02	COPd
			Tj = 7 °C	15,0	kW	4,42	COPd
			Tj = 12 °C	15,4	kW	4,82	COPd
			Tj = bivalent temperature	14,5	kW	3,33	COPd
			Tj = operation limit	14,5	kW	3,33	COPd
		Warmer	Tj = 2 °C	14,5	kW	3,33	COPd
			Tj = 7 °C	14,8	kW	3,79	COPd
			Tj = 12 °C	15,3	kW	4,56	COPd
			Tj = bivalent temperature	14,5	kW	3,33	COPd
			Tj = operation limit	14,5	kW	3,33	COPd
		Colder	Tj = -7 °C	14,8	kW	3,93	COPd
			Tj = 2 °C	15,1	kW	4,35	COPd
			Tj = 7 °C	15,4	kW	4,73	COPd
			Tj = 12 °C	15,8	kW	4,94	COPd
			Tj = bivalent temperature	14,5	kW	3,33	COPd
			Tj = operation limit	14,5	kW	3,33	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		7443	kWh/a
		Warmer	QHE/W		8645	kWh/a
		Colder	QHE/C		4819	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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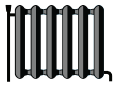
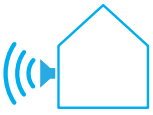
LÄMPÖÄSSÄ Esi 14 1x230V



	55 °C	35 °C
	A+	A++

A++
A+
A
B
C
D
E
F
G

42 dB



00 dB

55 °C	35 °C
14	15
14	**15**
14	15
kW	kW

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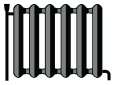
Esi 14 1x230V



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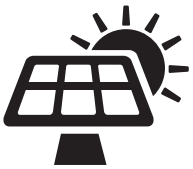
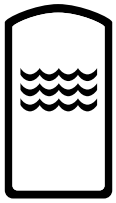
+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
C
D
E
F
G

2015

811/2013

Product description

Name or trademark	Lämpöässä	
Model	Esi 14 1x230V	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	14	kW
Seasonal space heating energy efficiency under average climate conditions	148	%
Annual electricity consumption for space heating	7627	kWh/a
Sound power level indoors	42	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	14	kW
	Warmer	14	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	149	%
	Warmer	145	%
Annual energy consumption under colder and warmer climate conditions	Colder	9032	kWh/a
	Warmer	5014	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	149	%
Seasonal space heating energy efficieny of package in colder climate conditions	151	%
Seasonal space heating energy efficieny of package in warmer climate conditions	147	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	13,7	kW
		Warmer	Pdesignh	13,7	kW
		Colder	Pdesignh	13,7	kW

Seasonal efficiency	Heating	Average	SCOP/A	148	%
		Warmer	SCOP/W	145	%
		Colder	SCOP/C	149	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	13,7	kW	3,11	COPd
			Tj = 2 °C	14,0	kW	3,77	COPd
			Tj = 7 °C	14,2	kW	4,01	COPd
			Tj = 12 °C	14,5	kW	4,36	COPd
			Tj = bivalent temperature	13,7	kW	2,95	COPd
			Tj = operation limit	13,7	kW	2,95	COPd
		Warmer	Tj = 2 °C	13,7	kW	2,95	COPd
			Tj = 7 °C	13,9	kW	3,41	COPd
			Tj = 12 °C	14,3	kW	4,16	COPd
			Tj = bivalent temperature	13,7	kW	2,95	COPd
			Tj = operation limit	13,7	kW	2,95	COPd
		Colder	Tj = -7 °C	13,9	kW	3,53	COPd
			Tj = 2 °C	14,2	kW	3,95	COPd
			Tj = 7 °C	14,4	kW	4,27	COPd
			Tj = 12 °C	14,6	kW	4,47	COPd
			Tj = bivalent temperature	13,7	kW	2,95	COPd
			Tj = operation limit	13,7	kW	2,95	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		7627	kWh/a
		Warmer	QHE/W		9032	kWh/a
		Colder	QHE/C		5014	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Esi 17

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

41 dB

00 dB

17	18
17	**18**
17	18
kW	kW

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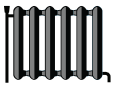
LÄMPÖÄSSÄ

Esi 17



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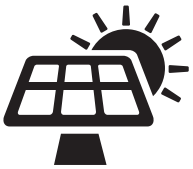
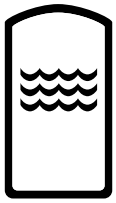
+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
C
D
E
F
G

Product description

Name or trademark	Lämpöässä	
Model	Esi 17	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	17	kW
Seasonal space heating energy efficiency under average climate conditions	158	%
Annual electricity consumption for space heating	8716	kWh/a
Sound power level indoors	41	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	17	kW
	Warmer	17	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	162	%
	Warmer	158	%
Annual energy consumption under colder and warmer climate conditions	Colder	10145	kWh/a
	Warmer	5634	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	160	%
Seasonal space heating energy efficieny of package in colder climate conditions	164	%
Seasonal space heating energy efficieny of package in warmer climate conditions	160	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	16,71	kW
		Warmer	Pdesignh	16,71	kW
		Colder	Pdesignh	16,71	kW

Seasonal efficiency	Heating	Average	SCOP/A	158	%
		Warmer	SCOP/W	158	%
		Colder	SCOP/C	162	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	16,8	kW	3,41	COPd
			Tj = 2 °C	16,9	kW	3,96	COPd
			Tj = 7 °C	17,3	kW	4,36	COPd
			Tj = 12 °C	17,6	kW	4,75	COPd
			Tj = bivalent temperature	16,7	kW	3,25	COPd
			Tj = operation limit	16,7	kW	3,25	COPd
		Warmer	Tj = 2 °C	16,7	kW	3,25	COPd
			Tj = 7 °C	17,0	kW	3,74	COPd
			Tj = 12 °C	17,5	kW	4,48	COPd
			Tj = bivalent temperature	16,7	kW	3,25	COPd
			Tj = operation limit	16,7	kW	3,25	COPd
		Colder	Tj = -7 °C	17,1	kW	3,83	COPd
			Tj = 2 °C	17,3	kW	4,28	COPd
			Tj = 7 °C	17,7	kW	4,68	COPd
			Tj = 12 °C	18,1	kW	4,88	COPd
			Tj = bivalent temperature	16,7	kW	3,25	COPd
			Tj = operation limit	16,7	kW	3,25	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		8716	kWh/a
		Warmer	QHE/W		10145	kWh/a
		Colder	QHE/C		5634	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Emi 22

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

45 dB

00 dB

21	22
21	**22**
21	22
kW	kW

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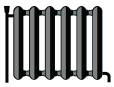
LÄMPÖÄSSÄ

Emi 22



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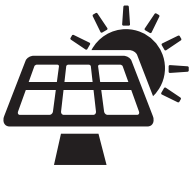
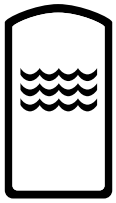
+  ☐

+  ☐

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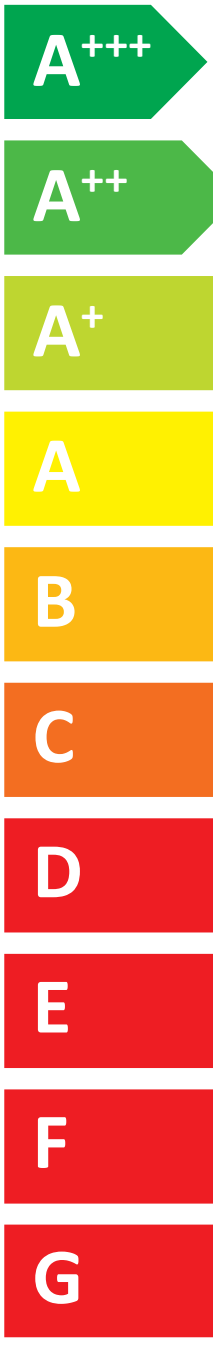
+  ☐



A+++

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Product description

Name or trademark	Lämpöässä	
Model	Emi 22	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	21	kW
Seasonal space heating energy efficiency under average climate conditions	153	%
Annual electricity consumption for space heating	11174	kWh/a
Sound power level indoors	45	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	21	kW
	Warmer	21	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	158	%
	Warmer	149	%
Annual energy consumption under colder and warmer climate conditions	Colder	12896	kWh/a
	Warmer	7407	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	155	%
Seasonal space heating energy efficieny of package in colder climate conditions	160	%
Seasonal space heating energy efficieny of package in warmer climate conditions	151	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	20,7	kW
		Warmer	Pdesignh	20,7	kW
		Colder	Pdesignh	20,7	kW

Seasonal efficiency	Heating	Average	SCOP/A	153	%
		Warmer	SCOP/W	149	%
		Colder	SCOP/C	158	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	20,8	kW	3,36	COPd
			Tj = 2 °C	21,1	kW	3,86	COPd
			Tj = 7 °C	21,7	kW	4,12	COPd
			Tj = 12 °C	22,0	kW	4,42	COPd
			Tj = bivalent temperature	20,7	kW	3,16	COPd
			Tj = operation limit	20,7	kW	3,16	COPd
		Warmer	Tj = 2 °C	20,7	kW	3,16	COPd
			Tj = 7 °C	21,4	kW	3,53	COPd
			Tj = 12 °C	21,8	kW	4,15	COPd
			Tj = bivalent temperature	20,7	kW	3,16	COPd
			Tj = operation limit	20,7	kW	3,16	COPd
		Colder	Tj = -7 °C	21,2	kW	3,77	COPd
			Tj = 2 °C	21,6	kW	4,18	COPd
			Tj = 7 °C	22,3	kW	4,43	COPd
			Tj = 12 °C	22,6	kW	4,56	COPd
			Tj = bivalent temperature	20,7	kW	3,16	COPd
			Tj = operation limit	20,7	kW	3,16	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		11174	kWh/a
		Warmer	QHE/W		12896	kWh/a
		Colder	QHE/C		7407	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Emi 22P

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

45 dB

00 dB

21	22
21	**22**
21	22
kW	kW

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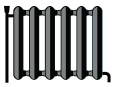
LÄMPÖÄSSÄ

Emi 22P



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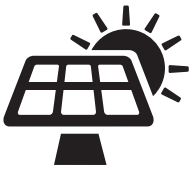
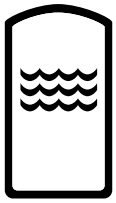
+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
C
D
E
F
G

2015

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Product description

Name or trademark	Lämpöässä	
Model	Emi 22P	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	21	kW
Seasonal space heating energy efficiency under average climate conditions	153	%
Annual electricity consumption for space heating	11174	kWh/a
Sound power level indoors	45	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	21	kW
	Warmer	21	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	158	%
	Warmer	149	%
Annual energy consumption under colder and warmer climate conditions	Colder	12896	kWh/a
	Warmer	7407	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	155	%
Seasonal space heating energy efficieny of package in colder climate conditions	160	%
Seasonal space heating energy efficieny of package in warmer climate conditions	151	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	20,7	kW
		Warmer	Pdesignh	20,7	kW
		Colder	Pdesignh	20,7	kW

Seasonal efficiency	Heating	Average	SCOP/A	153	%
		Warmer	SCOP/W	149	%
		Colder	SCOP/C	158	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	20,8	kW	3,36	COPd
			Tj = 2 °C	21,1	kW	3,86	COPd
			Tj = 7 °C	21,7	kW	4,12	COPd
			Tj = 12 °C	22,0	kW	4,42	COPd
			Tj = bivalent temperature	20,7	kW	3,16	COPd
			Tj = operation limit	20,7	kW	3,16	COPd
		Warmer	Tj = 2 °C	20,7	kW	3,16	COPd
			Tj = 7 °C	21,4	kW	3,53	COPd
			Tj = 12 °C	21,8	kW	4,15	COPd
			Tj = bivalent temperature	20,7	kW	3,16	COPd
			Tj = operation limit	20,7	kW	3,16	COPd
		Colder	Tj = -7 °C	21,2	kW	3,77	COPd
			Tj = 2 °C	21,6	kW	4,18	COPd
			Tj = 7 °C	22,3	kW	4,43	COPd
			Tj = 12 °C	22,6	kW	4,56	COPd
			Tj = bivalent temperature	20,7	kW	3,16	COPd
			Tj = operation limit	20,7	kW	3,16	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		11174	kWh/a
		Warmer	QHE/W		12896	kWh/a
		Colder	QHE/C		7407	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Emi 28

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

46 dB

00 dB

27	30
27	**30**
27	30
kW	kW

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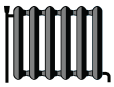
LÄMPÖÄSSÄ

Emi 28



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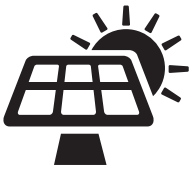
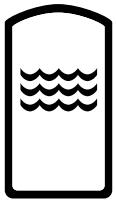
+  ☐

+  ☐

+  ☒

+  ☐

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Product description

Name or trademark	Lämpöässä	
Model	Emi 28	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	27	kW
Seasonal space heating energy efficiency under average climate conditions	146	%
Annual electricity consumption for space heating	15097	kWh/a
Sound power level indoors	46	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	27	kW
	Warmer	27	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	151	%
	Warmer	144	%
Annual energy consumption under colder and warmer climate conditions	Colder	17429	kWh/a
	Warmer	9936	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	148	%
Seasonal space heating energy efficieny of package in colder climate conditions	153	%
Seasonal space heating energy efficieny of package in warmer climate conditions	145	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	26,8	kW
		Warmer	Pdesignh	26,8	kW
		Colder	Pdesignh	26,8	kW

Seasonal efficiency	Heating	Average	SCOP/A	146	%
		Warmer	SCOP/W	144	%
		Colder	SCOP/C	151	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	26,6	kW	3,18	COPd
			Tj = 2 °C	27,5	kW	3,65	COPd
			Tj = 7 °C	27,8	kW	3,92	COPd
			Tj = 12 °C	28,6	kW	4,26	COPd
			Tj = bivalent temperature	26,8	kW	3,10	COPd
			Tj = operation limit	26,8	kW	3,10	COPd
		Warmer	Tj = 2 °C	26,8	kW	3,10	COPd
			Tj = 7 °C	27,3	kW	3,35	COPd
			Tj = 12 °C	28,3	kW	3,99	COPd
			Tj = bivalent temperature	26,8	kW	3,10	COPd
			Tj = operation limit	26,8	kW	3,10	COPd
		Colder	Tj = -7 °C	27,1	kW	3,57	COPd
			Tj = 2 °C	28,1	kW	3,96	COPd
			Tj = 7 °C	28,5	kW	4,22	COPd
			Tj = 12 °C	29,3	kW	4,42	COPd
			Tj = bivalent temperature	26,8	kW	3,10	COPd
			Tj = operation limit	26,8	kW	3,10	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		15097	kWh/a
		Warmer	QHE/W		17429	kWh/a
		Colder	QHE/C		9936	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ Emi 28P

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

46 dB

00 dB

27	30
27	**30**
27	30
kW	kW

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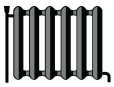
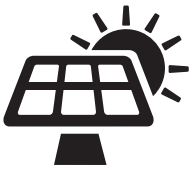
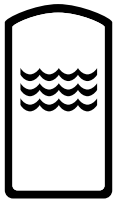
LÄMPÖÄSSÄ

Emi 28P



A++

+  ☐

+  ☐

+  ☒

+  ☐

A+++
A++
A+
A
B
C
D
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F
G

A++

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Product description

Name or trademark	Lämpöässä	
Model	Emi 28P	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	27	kW
Seasonal space heating energy efficiency under average climate conditions	146	%
Annual electricity consumption for space heating	15097	kWh/a
Sound power level indoors	46	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	27	kW
	Warmer	27	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	151	%
	Warmer	144	%
Annual energy consumption under colder and warmer climate conditions	Colder	17429	kWh/a
	Warmer	9936	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	148	%
Seasonal space heating energy efficieny of package in colder climate conditions	153	%
Seasonal space heating energy efficieny of package in warmer climate conditions	145	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	26,8	kW
		Warmer	Pdesignh	26,8	kW
		Colder	Pdesignh	26,8	kW

Seasonal efficiency	Heating	Average	SCOP/A	146	%
		Warmer	SCOP/W	144	%
		Colder	SCOP/C	151	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	26,6	kW	3,18	COPd
			Tj = 2 °C	27,5	kW	3,65	COPd
			Tj = 7 °C	27,8	kW	3,92	COPd
			Tj = 12 °C	28,6	kW	4,26	COPd
			Tj = bivalent temperature	26,8	kW	3,10	COPd
			Tj = operation limit	26,8	kW	3,10	COPd
		Warmer	Tj = 2 °C	26,8	kW	3,10	COPd
			Tj = 7 °C	27,3	kW	3,35	COPd
			Tj = 12 °C	28,3	kW	3,99	COPd
			Tj = bivalent temperature	26,8	kW	3,10	COPd
			Tj = operation limit	26,8	kW	3,10	COPd
		Colder	Tj = -7 °C	27,1	kW	3,57	COPd
			Tj = 2 °C	28,1	kW	3,96	COPd
			Tj = 7 °C	28,5	kW	4,22	COPd
			Tj = 12 °C	29,3	kW	4,42	COPd
			Tj = bivalent temperature	26,8	kW	3,10	COPd
			Tj = operation limit	26,8	kW	3,10	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		15097	kWh/a
		Warmer	QHE/W		17429	kWh/a
		Colder	QHE/C		9936	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ

Emi 43

	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

49 dB

00 dB

43	46
43	**46**
43	46
kW	kW

2015

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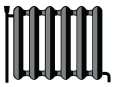
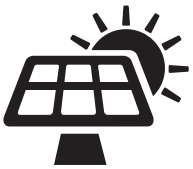
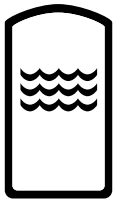
LÄMPÖÄSSÄ

Emi 43



A++

+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
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F
G

Product description

Name or trademark	Lämpöässä	
Model	Emi 43	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	43	kW
Seasonal space heating energy efficiency under average climate conditions	155	%
Annual electricity consumption for space heating	22794	kWh/a
Sound power level indoors	49	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	43	kW
	Warmer	43	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	160	%
	Warmer	152	%
Annual energy consumption under colder and warmer climate conditions	Colder	26329	kWh/a
	Warmer	15037	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	157	%
Seasonal space heating energy efficieny of package in colder climate conditions	162	%
Seasonal space heating energy efficieny of package in warmer climate conditions	154	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	42,8	kW
		Warmer	Pdesignh	42,8	kW
		Colder	Pdesignh	42,8	kW

Seasonal efficiency	Heating	Average	SCOP/A	155	%
		Warmer	SCOP/W	152	%
		Colder	SCOP/C	160	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	43,2	kW	3,35	COPd
			Tj = 2 °C	44,0	kW	3,87	COPd
			Tj = 7 °C	44,7	kW	4,16	COPd
			Tj = 12 °C	45,3	kW	4,50	COPd
			Tj = bivalent temperature	42,8	kW	3,22	COPd
			Tj = operation limit	42,8	kW	3,22	COPd
		Warmer	Tj = 2 °C	42,8	kW	3,22	COPd
			Tj = 7 °C	44,0	kW	3,55	COPd
			Tj = 12 °C	44,9	kW	4,20	COPd
			Tj = bivalent temperature	42,8	kW	3,22	COPd
			Tj = operation limit	42,8	kW	3,22	COPd
		Colder	Tj = -7 °C	44,1	kW	3,76	COPd
			Tj = 2 °C	45,0	kW	4,20	COPd
			Tj = 7 °C	45,8	kW	4,48	COPd
			Tj = 12 °C	46,4	kW	4,67	COPd
			Tj = bivalent temperature	42,8	kW	3,22	COPd
			Tj = operation limit	42,8	kW	3,22	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		22794	kWh/a
		Warmer	QHE/W		26329	kWh/a
		Colder	QHE/C		15037	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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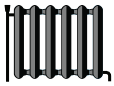
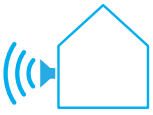
LÄMPÖÄSSÄ Emi 43P



	55 °C	35 °C
	A++	A++

A++
A+
A
B
C
D
E
F
G

49 dB



00 dB

55 °C	35 °C
43	46
43	**46**
43	46
kW	kW

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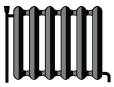
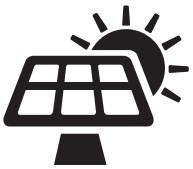
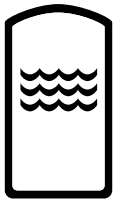
LÄMPÖÄSSÄ

Emi 43P



A++

+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
C
D
E
F
G

Product description

Name or trademark	Lämpöässä	
Model	Emi 43P	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	43	kW
Seasonal space heating energy efficiency under average climate conditions	155	%
Annual electricity consumption for space heating	22794	kWh/a
Sound power level indoors	49	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	43	kW
	Warmer	43	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	160	%
	Warmer	152	%
Annual energy consumption under colder and warmer climate conditions	Colder	26329	kWh/a
	Warmer	15037	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	157	%
Seasonal space heating energy efficieny of package in colder climate conditions	162	%
Seasonal space heating energy efficieny of package in warmer climate conditions	154	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	42,8	kW
		Warmer	Pdesignh	42,8	kW
		Colder	Pdesignh	42,8	kW

Seasonal efficiency	Heating	Average	SCOP/A	155	%
		Warmer	SCOP/W	152	%
		Colder	SCOP/C	160	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	43,2	kW	3,35	COPd
			Tj = 2 °C	44,0	kW	3,87	COPd
			Tj = 7 °C	44,7	kW	4,16	COPd
			Tj = 12 °C	45,3	kW	4,50	COPd
			Tj = bivalent temperature	42,8	kW	3,22	COPd
			Tj = operation limit	42,8	kW	3,22	COPd
		Warmer	Tj = 2 °C	42,8	kW	3,22	COPd
			Tj = 7 °C	44,0	kW	3,55	COPd
			Tj = 12 °C	44,9	kW	4,20	COPd
			Tj = bivalent temperature	42,8	kW	3,22	COPd
			Tj = operation limit	42,8	kW	3,22	COPd
		Colder	Tj = -7 °C	44,1	kW	3,76	COPd
			Tj = 2 °C	45,0	kW	4,20	COPd
			Tj = 7 °C	45,8	kW	4,48	COPd
			Tj = 12 °C	46,4	kW	4,67	COPd
			Tj = bivalent temperature	42,8	kW	3,22	COPd
			Tj = operation limit	42,8	kW	3,22	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		22794	kWh/a
		Warmer	QHE/W		26329	kWh/a
		Colder	QHE/C		15037	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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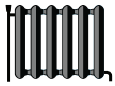
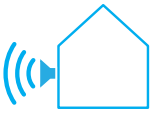
LÄMPÖÄSSÄ ELi 60



	55 °C	35 °C
	A+	A++

A++
A+
A
B
C
D
E
F
G

- dB



00 dB

	55 °C	35 °C
	58	61
	58	**61**
	58	61
	kW	kW

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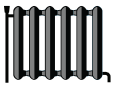
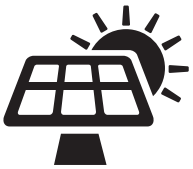
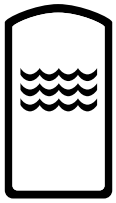
LÄMPÖÄSSÄ

ELi 60



A+

+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
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G

Product description

Name or trademark	Lämpöässä	
Model	ELi 60	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	58	kW
Seasonal space heating energy efficiency under average climate conditions	153	%
Annual electricity consumption for space heating	31414	kWh/a
Sound power level indoors	49	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	58	kW
	Warmer	58	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	157	%
	Warmer	154	%
Annual energy consumption under colder and warmer climate conditions	Colder	36542	kWh/a
	Warmer	20178	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	154	%
Seasonal space heating energy efficieny of package in colder climate conditions	158	%
Seasonal space heating energy efficieny of package in warmer climate conditions	155	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	154	kW
		Warmer	Pdesignh	158	kW
		Colder	Pdesignh	155	kW

Seasonal efficiency	Heating	Average	SCOP/A	155	%
		Warmer	SCOP/W	152	%
		Colder	SCOP/C	160	%

Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	58,0	kW	3,23	COPd
			Tj = 2 °C	58,8	kW	3,78	COPd
			Tj = 7 °C	59,3	kW	4,17	COPd
			Tj = 12 °C	59,9	kW	4,58	COPd
			Tj = bivalent temperature	58,1	kW	3,08	COPd
			Tj = operation limit	58,1	kW	3,08	COPd
		Warmer	Tj = 2 °C	58,1	kW	3,08	COPd
			Tj = 7 °C	58,3	kW	3,53	COPd
			Tj = 12 °C	59,5	kW	4,33	COPd
			Tj = bivalent temperature	58,1	kW	3,08	COPd
			Tj = operation limit	58,1	kW	3,08	COPd
		Colder	Tj = -7 °C	58,6	kW	3,66	COPd
			Tj = 2 °C	59,1	kW	4,10	COPd
			Tj = 7 °C	59,7	kW	4,47	COPd
			Tj = 12 °C	60,1	kW	4,73	COPd
			Tj = bivalent temperature	58,1	kW	3,08	COPd
			Tj = operation limit	58,1	kW	3,08	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		31414	kWh/a
		Warmer	QHE/W		36542	kWh/a
		Colder	QHE/C		20178	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND

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LÄMPÖÄSSÄ ELi 60P

	55 °C	35 °C
	A+	A++

A++
A+
A
B
C
D
E
F
G

- dB

00 dB

55 °C	35 °C
58	61
58	**61**
58	61
kW	kW

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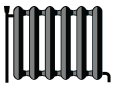
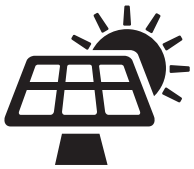
енергия · ενεργεια
Y IJA IE IA

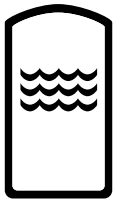
LÄMPÖÄSSÄ

ELi 60P



A+

+  ☐

+  ☐

+  ☒

+  ☐

A+++

A+++
A++
A+
A
B
C
D
E
F
G

2015

811/2013

Product description

Name or trademark	Lämpöässä	
Model	ELi 60P	
Seasonal space heating energy efficiency class	A++	
Rated output under average climate conditions	58	kW
Seasonal space heating energy efficiency under average climate conditions	153	%
Annual electricity consumption for space heating	31414	kWh/a
Sound power level indoors	49	dB

Rated heat output, included the rated heat output of any supplementary heater under colder and warmer climate coditions	Colder	58	kW
	Warmer	58	kW
Seasonal space heating energy efficiency under colder and warmer climate conditions	Colder	157	%
	Warmer	154	%
Annual energy consumption under colder and warmer climate conditions	Colder	36542	kWh/a
	Warmer	20178	kWh/a

Package information

Controller class	III	
Controller contribution to efficiency	1,5	%
Seasonal space heating energy efficieny class of package	**A+++**	
Seasonal space heating energy efficieny of package in average climate conditions	154	%
Seasonal space heating energy efficieny of package in colder climate conditions	158	%
Seasonal space heating energy efficieny of package in warmer climate conditions	155	%

Function	Heating	Average
		Warmer (if designated)
		Colder (if designated)
	Capacity control	Fixed

Design load	Heating	Average	Pdesignh	154	kW
		Warmer	Pdesignh	158	kW
		Colder	Pdesignh	155	kW

Seasonal efficiency	Heating	Average	SCOP/A	155	%
		Warmer	SCOP/W	152	%
		Colder	SCOP/C	160	%

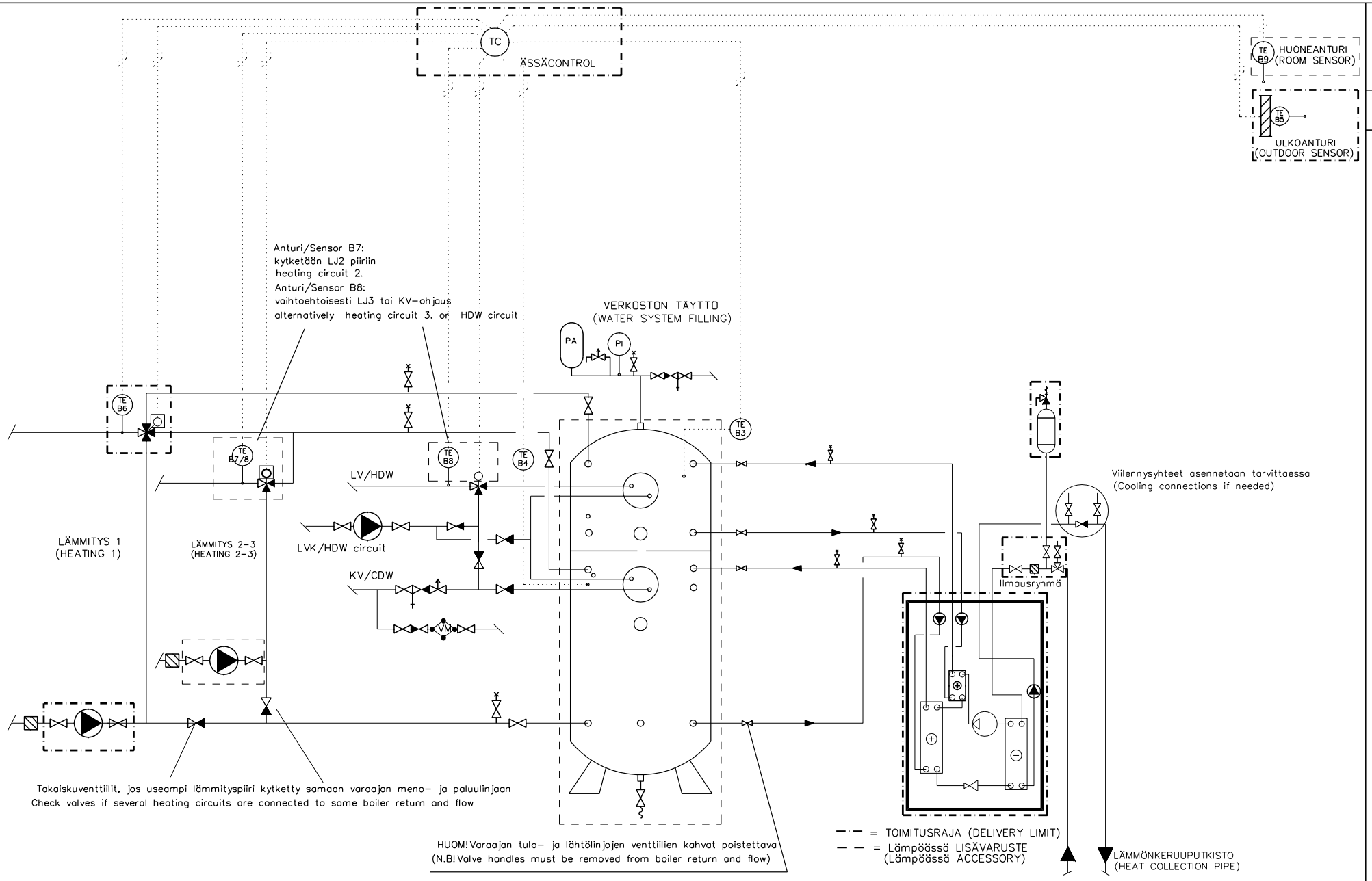
Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	Heating	Average	Tj = -7 °C	58,0	kW	3,23	COPd
			Tj = 2 °C	58,8	kW	3,78	COPd
			Tj = 7 °C	59,3	kW	4,17	COPd
			Tj = 12 °C	59,9	kW	4,58	COPd
			Tj = bivalent temperature	58,1	kW	3,08	COPd
			Tj = operation limit	58,1	kW	3,08	COPd
		Warmer	Tj = 2 °C	58,1	kW	3,08	COPd
			Tj = 7 °C	58,3	kW	3,53	COPd
			Tj = 12 °C	59,5	kW	4,33	COPd
			Tj = bivalent temperature	58,1	kW	3,08	COPd
			Tj = operation limit	58,1	kW	3,08	COPd
		Colder	Tj = -7 °C	58,6	kW	3,66	COPd
			Tj = 2 °C	59,1	kW	4,10	COPd
			Tj = 7 °C	59,7	kW	4,47	COPd
			Tj = 12 °C	60,1	kW	4,73	COPd
			Tj = bivalent temperature	58,1	kW	3,08	COPd
			Tj = operation limit	58,1	kW	3,08	COPd
		Degradiation coefficient when Tj = -7°C			Cdh	1,00	

Bivalent temperatures	Heating	Average.	Tbivalent	-10	°C
		Warmer	Tbivalent	-22	°C
		Colder	Tbivalent	2	°C

Operation limit temperatures	Heating	Average.	TOL	-10	°C
		Warmer	TOL	-22	°C
		Colder	TOL	2	°C

Seasonal electricity consumption	Heating	Average.	QHE/A		31414	kWh/a
		Warmer	QHE/W		36542	kWh/a
		Colder	QHE/C		20178	kWh/a
Modes other than "active mode"			Off mode	P_{OFF}	0,017	kWh
			Standby mode	P_{SB}	0,017	kWh
			Thermostat off mode	P_{TO}	0,017	kWh
			Cranckcaseheater mode	P_{CK}	0,017	kWh

Contact detalis for obtaining more information	Name manufacturer	Suomen Lämpöpumpputekniikka Oy
	Address	Unikontie 2, 62100 LAPUA, FINLAND



PÄIVÄYS | NIM. | MUUTOS | LUKUM. | TUNN.

LÄMPÖÄSSÄ

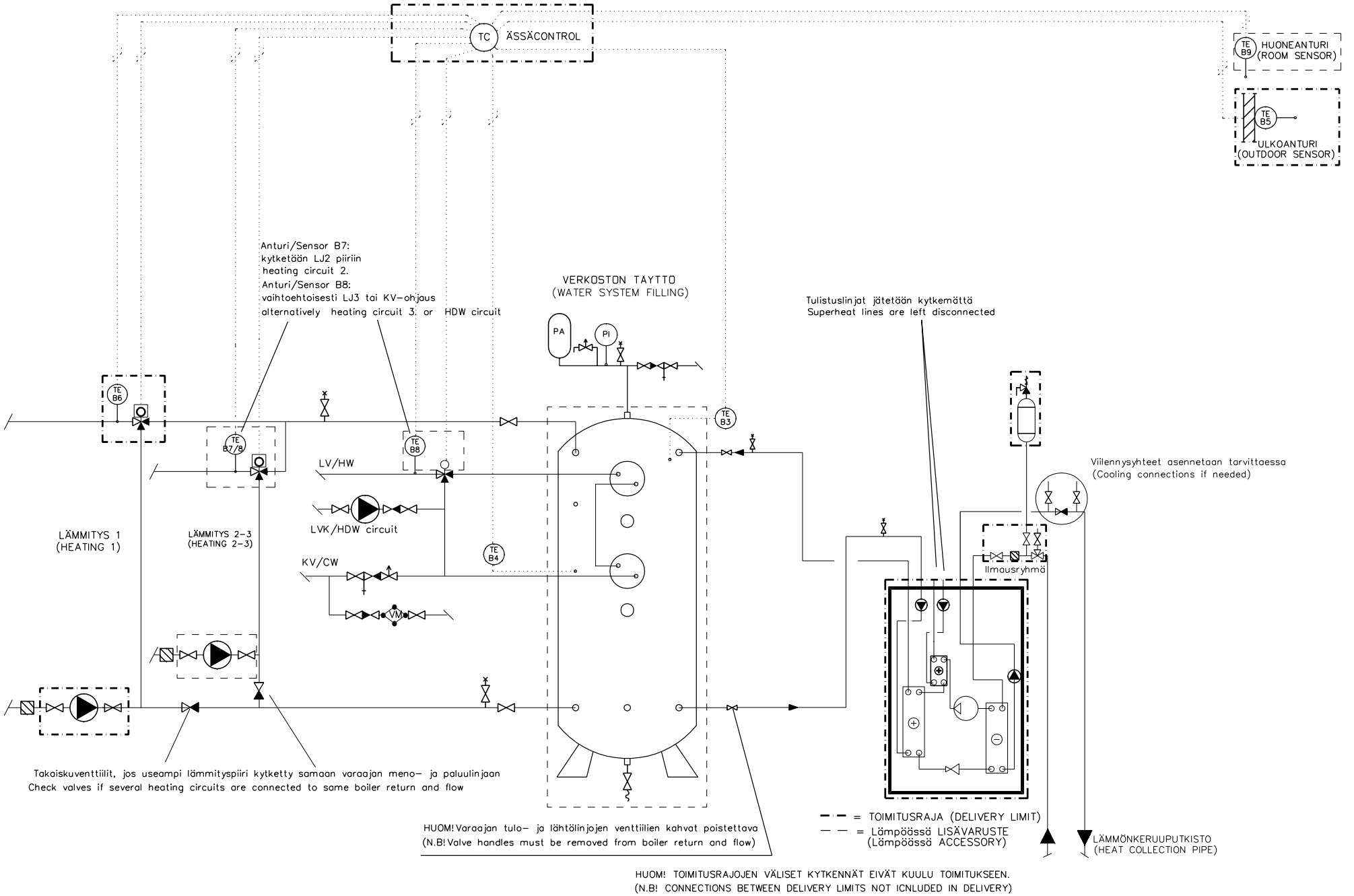
SUUNN.	PIIRT.
HSa	
PVM.	
26.11.2013	
ALLEKIRJOITUS	

HVAC SCHEMATIC
Superheat tank
LÄMPÖÄSSÄ Esi 6-17

LVI KYTKENTÄKAAVIO/2-PIIRIKYTKENTÄ
Tulistusvaraaja
LÄMPÖÄSSÄ Esi 6-17

SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O MUUTOS
L_Esi617_TV_13C

LEHTI	LEHDISTÄ	TILAAJAN N:O



PÄIVÄYS | NIM. | MUUTOS | LUKUM. | TUNN.

LÄMPÖÄSSÄ

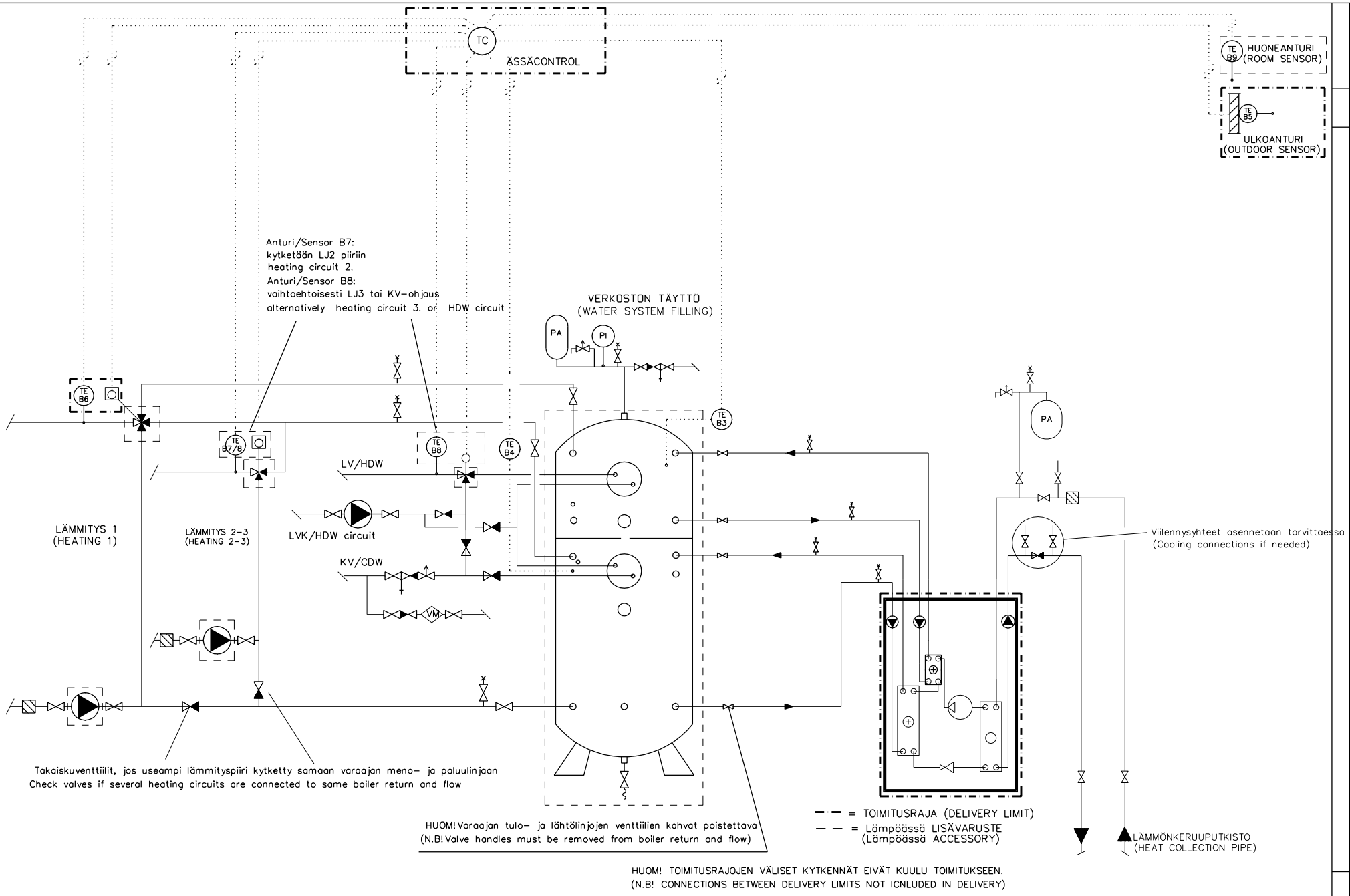
SUUNN.	PIIRT.
HSa	
PVM. 26.11.2013	
ALLEKIRJOITUS	

HVAC SCHEMATIC
Basic tank
LÄMPÖÄSSÄ Esi 6–17

LVI KYTKENTÄKAAVIO/2–PIIRIKYTKENTÄ
Perusvaraaja
LÄMPÖÄSSÄ Esi 6–17

SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O MUUTOS
L_Esi617_PV_13B

LEHTI	LEHDISTÄ	TILAAJAN N:O



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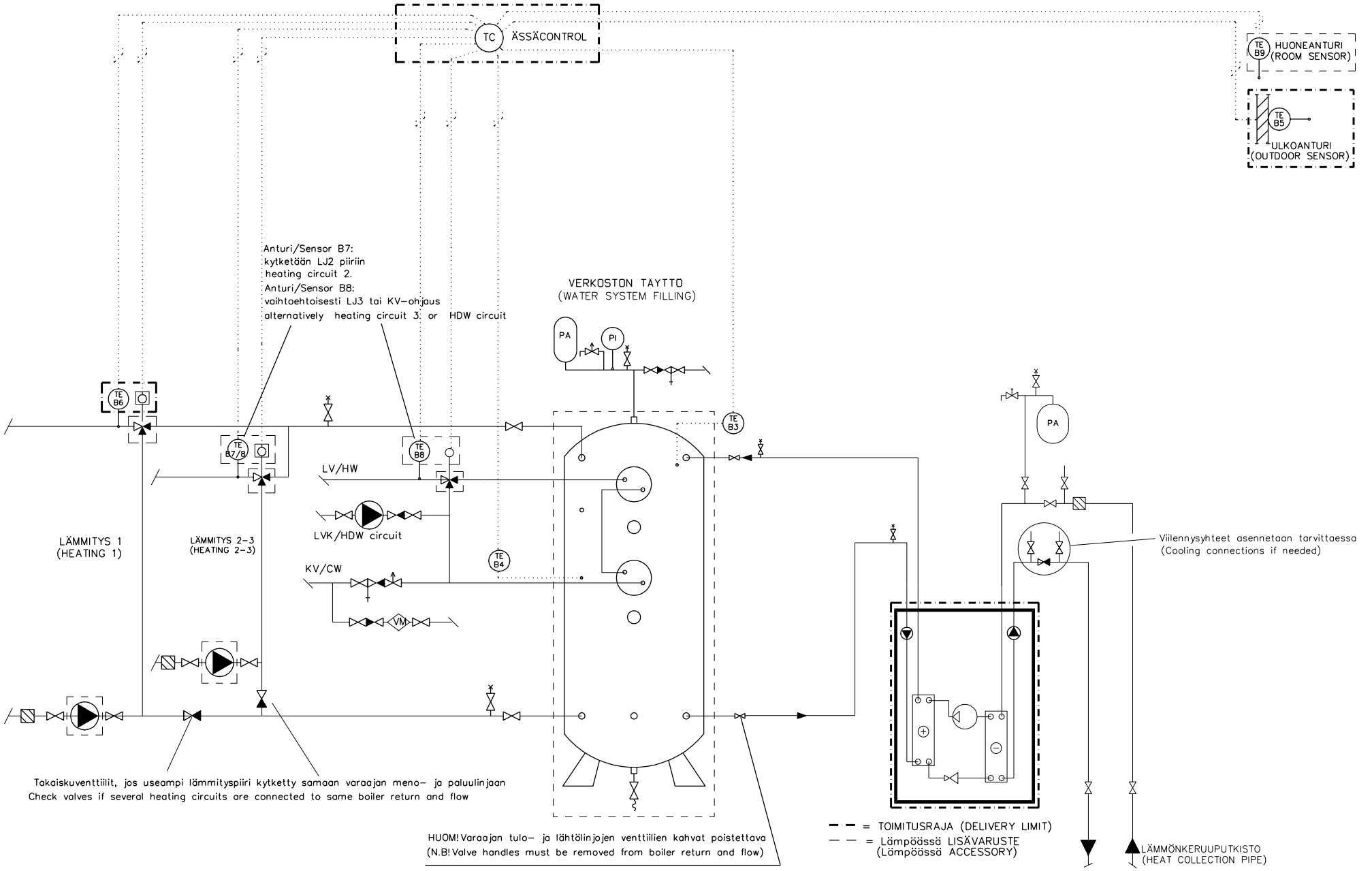
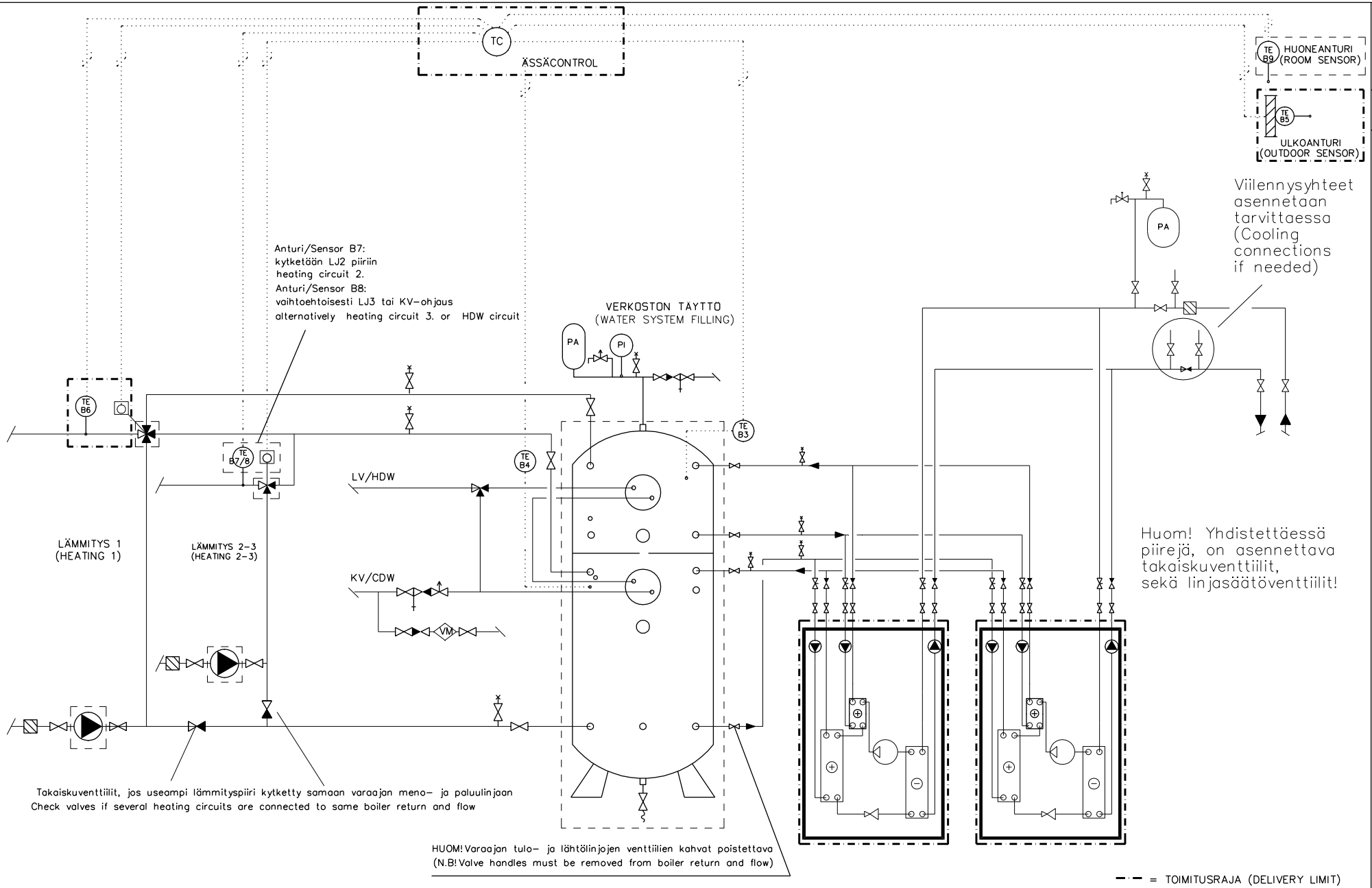
	PVM. 22.07.2014			LEHTI	LEHDISTÄ / TILAAJAN N:O
	ALLEKIRJOITUS				

NIM. PÄIVÄYS
TUNN. LUKUM. MUUTOS



LÄMPÖÄSSÄ	SUUNN. ASa / PIIRT.	HVAC SCHEMATIC Basic tank LÄMPÖÄSSÄ EmiP	LVI KYTKENTÄKAAVIO Perusvaraaja LÄMPÖÄSSÄ EmiP	SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O L_EMiP_PV_14A	MUUTOS
	PVM. 24.07.2014			LEHTI	LEHDISTÄ / TILAAJAN N:O
	ALLEKIRJOITUS				

NIM. PÄIVÄYS
TUNN. LUKUM. MUUTOS



NIM. PÄIVÄYS

TUNN. LUKUM. MUUTOS

LÄMPÖÄSSÄ

SUUNN.	PIIRT.
ASa	
PVM. 24.07.2014	
ALLEKIRJOITUS	

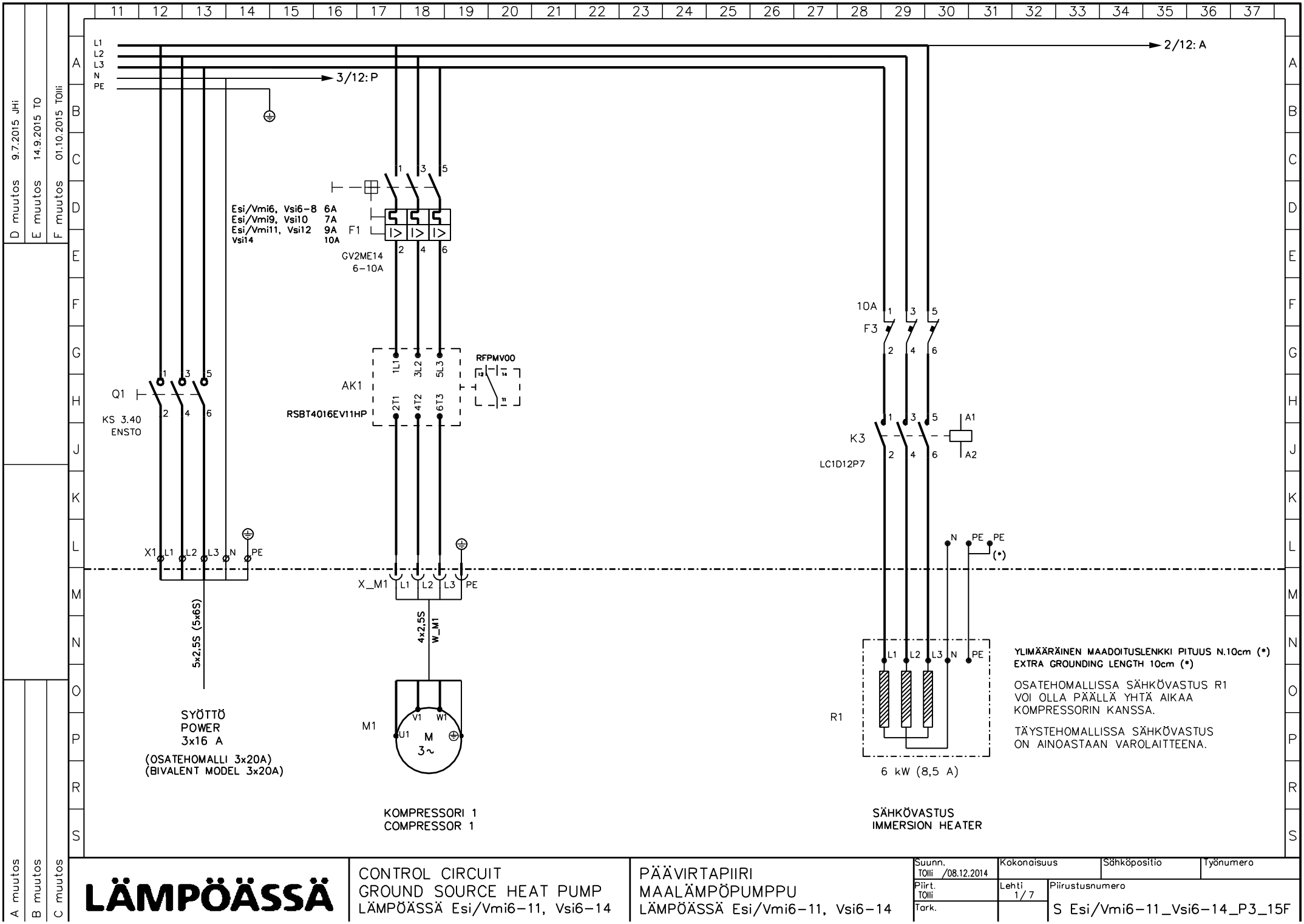
HVAC SCHEMATIC
Superheat tank
LÄMPÖÄSSÄ 2 x Emi +superheater

LVI KYTKENTÄKAAVIO
Tulistusvaraaja
LÄMPÖÄSSÄ 2 x Emi +superheater

SUUNNITTELUALA, TYÖN JA PIIRUSTUKSEN N:O MUUTOS

L_2xEmi_TV_14A

LEHTI	LEHDISTÄ	TILAAJAN N:O



D muutos 9.7.2015 JHi
E muutos 14.9.2015 TO
F muutos 01.10.2015 TOlli

A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

PÄÄVIRTAPIIRI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 1/7	Piirustusnumero	
Tark.		S Esi/Vmi6-11_Vsi6-14_P3_15F	

D muutos 9.7.2015 JHi
E muutos 14.9.2015 TO
F muutos 01.10.2015 TOlli

A muutos
B muutos
C muutos

1/35: A ► 230VAC

10A
F10
1
2

3/12: A

1*) Asennetaan kohteessa.
Will be installed at the site.

A1 C1 N01
C4 N05
N06
C14 N014
C15 N015
C16 N016

X_P1 N PE L — 3x1.5S W_P1 — P1 1A — M 1~ — MAAPIIRIN PUMPPU 1 / BRINE PUMP 1

X_P10 N PE L — 3x1.5S W_P10 — P10 0,25A — M 1~ — LAUHDUTINPUMPPU 1 / CONDENSER PUMP 1

X_P11 N PE L — 3x1.5S W_P11 — P11 0,25A — M 1~ — TULISTINPUMPPU 1 / SUPER HEAT PUMP 1

X_Y1 N PE L — 3x0,75S W_Y1 — Ruke/vi Si — 0,1A — A1 A2 — MAGNEETTIVENTTIILI 1 / MAGNETIC VALVE 1

X_P12 N PE L — 3x1.5S W_P12 — P12 0,25A — M 1~ — LJ1 PUMPPU / 1-CIRCUIT PUMP

X_P13 N PE L — 3x1.5S W_P13 — P13 0,25A — M 1~ — LJ2 PUMPPU / 2-CIRCUIT PUMP

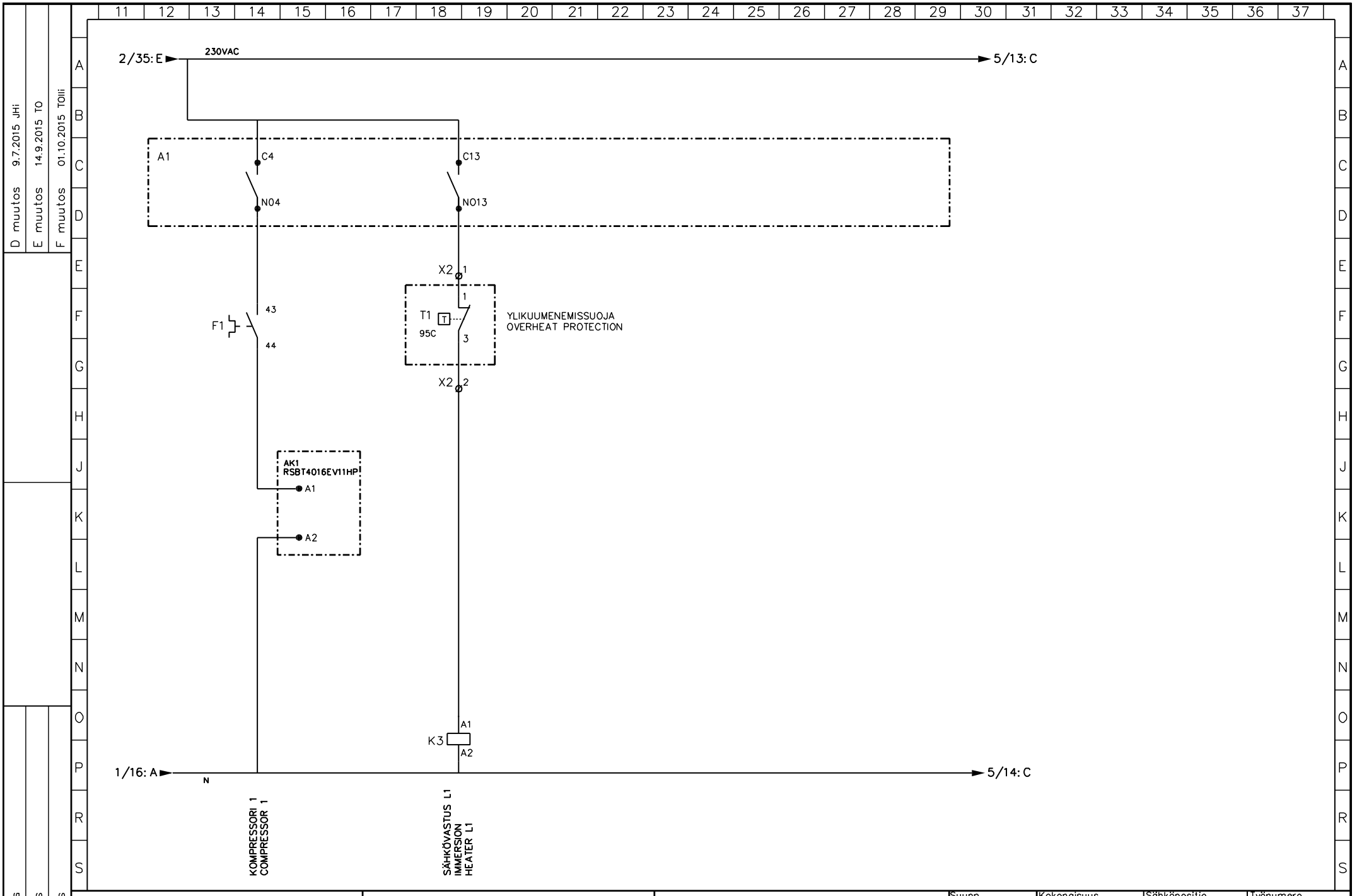
1*) X_P14 N PE L — 3x1.5S W_P14 — P14 0,25A — M 1~ — LJ3 PUMPPU / 3-CIRCUIT PUMP

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 2/7	Piirustusnumero	
Tark.		S Esi/Vmi6-11_Vsi6-14_P3_15F	



D muutos 9.7.2015 JHi
E muutos 14.9.2015 TO
F muutos 01.10.2015 TOlli

A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

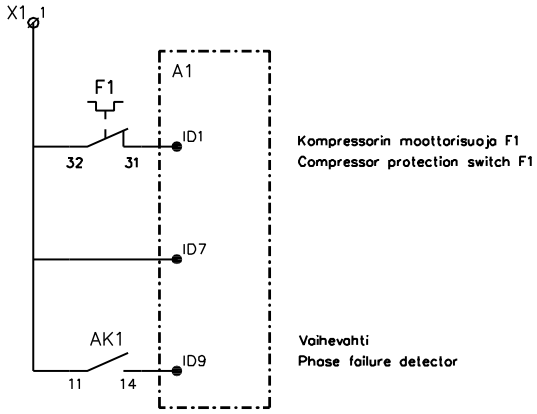
CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

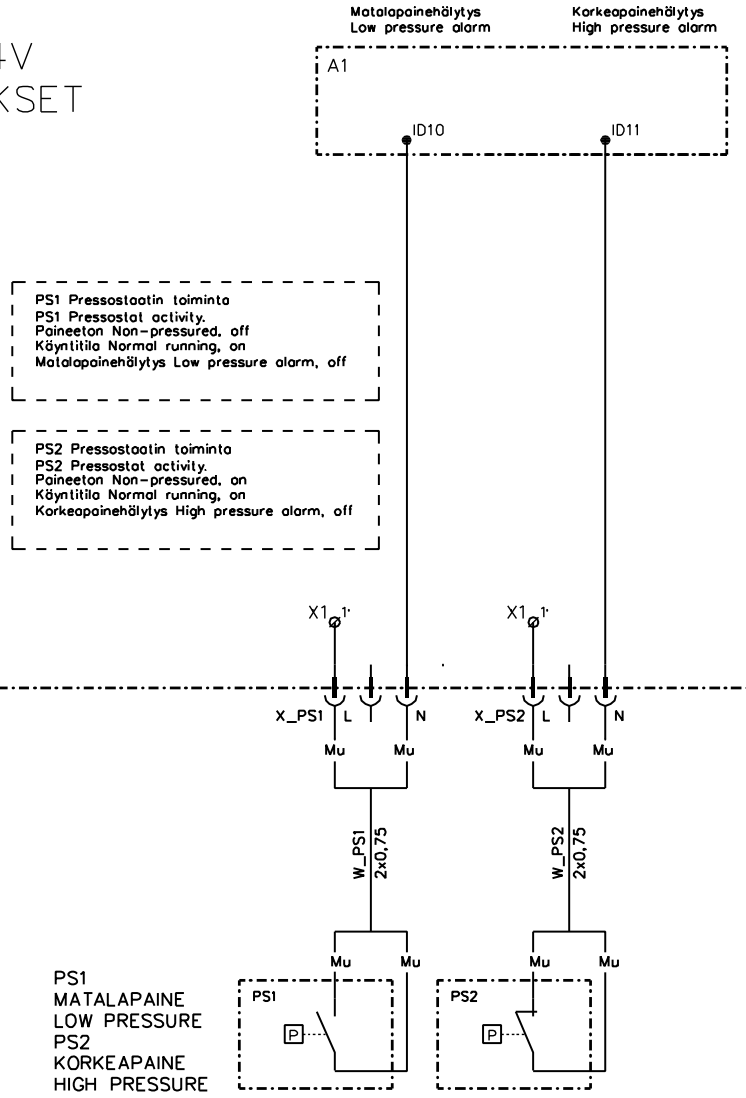
Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 3/7	Piirustusnumero	
Tark.		S Esi/Vmi6-11_Vsi6-14_P3_15F	

D muutos 9.7.2015 JHi
E muutos 14.9.2015 TO
F muutos 01.10.2015 TOlli

HÄLYTYSKYTKENTÄ
ALARM CONNECTION



KAIKKI 24V
JOHDOTUKSET
0,75MM2



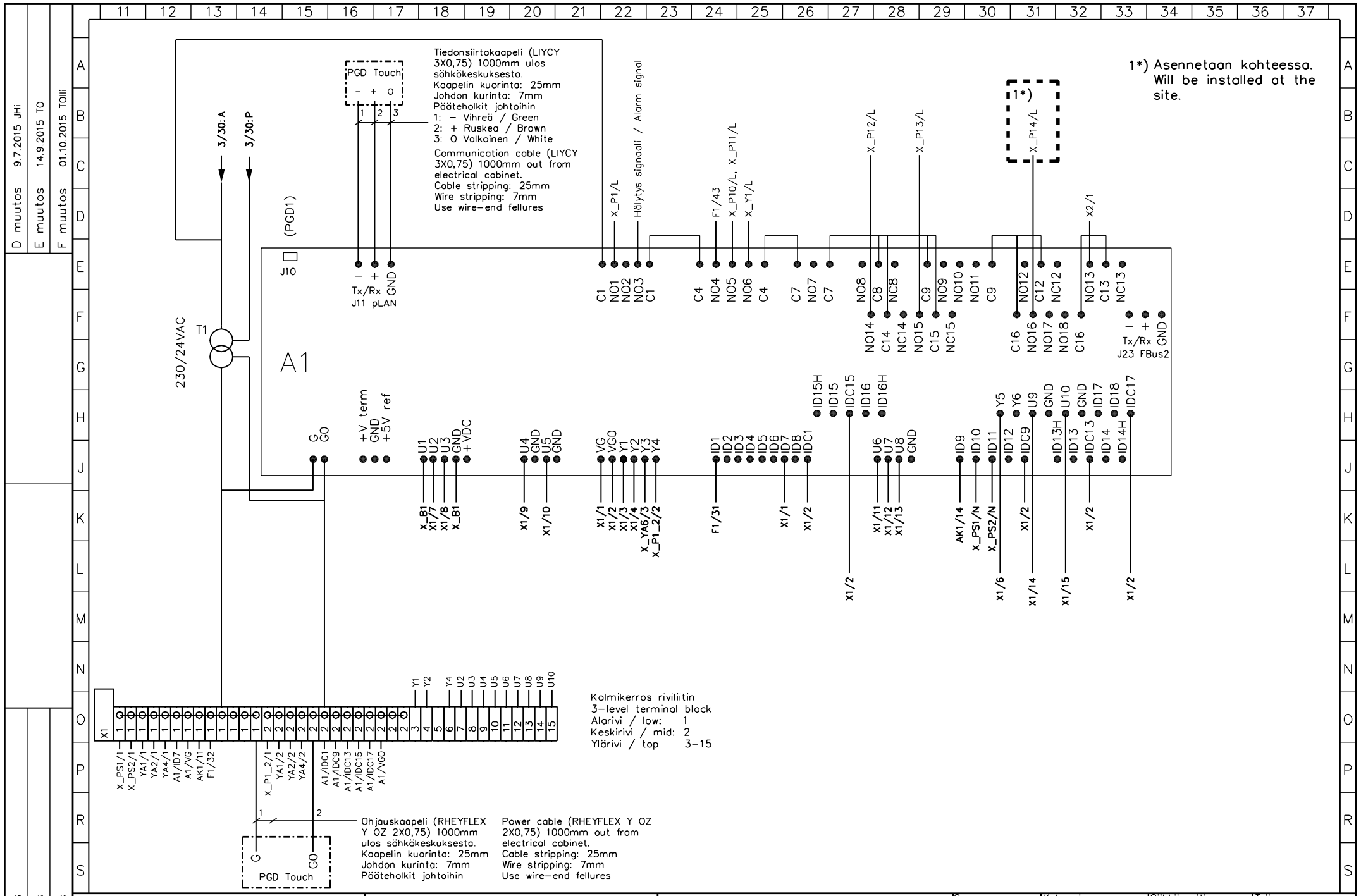
A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 4 / 7	Piirustusnumero	
Tark.		S Esi/Vmi6-11_Vsi6-14_P3_15F	



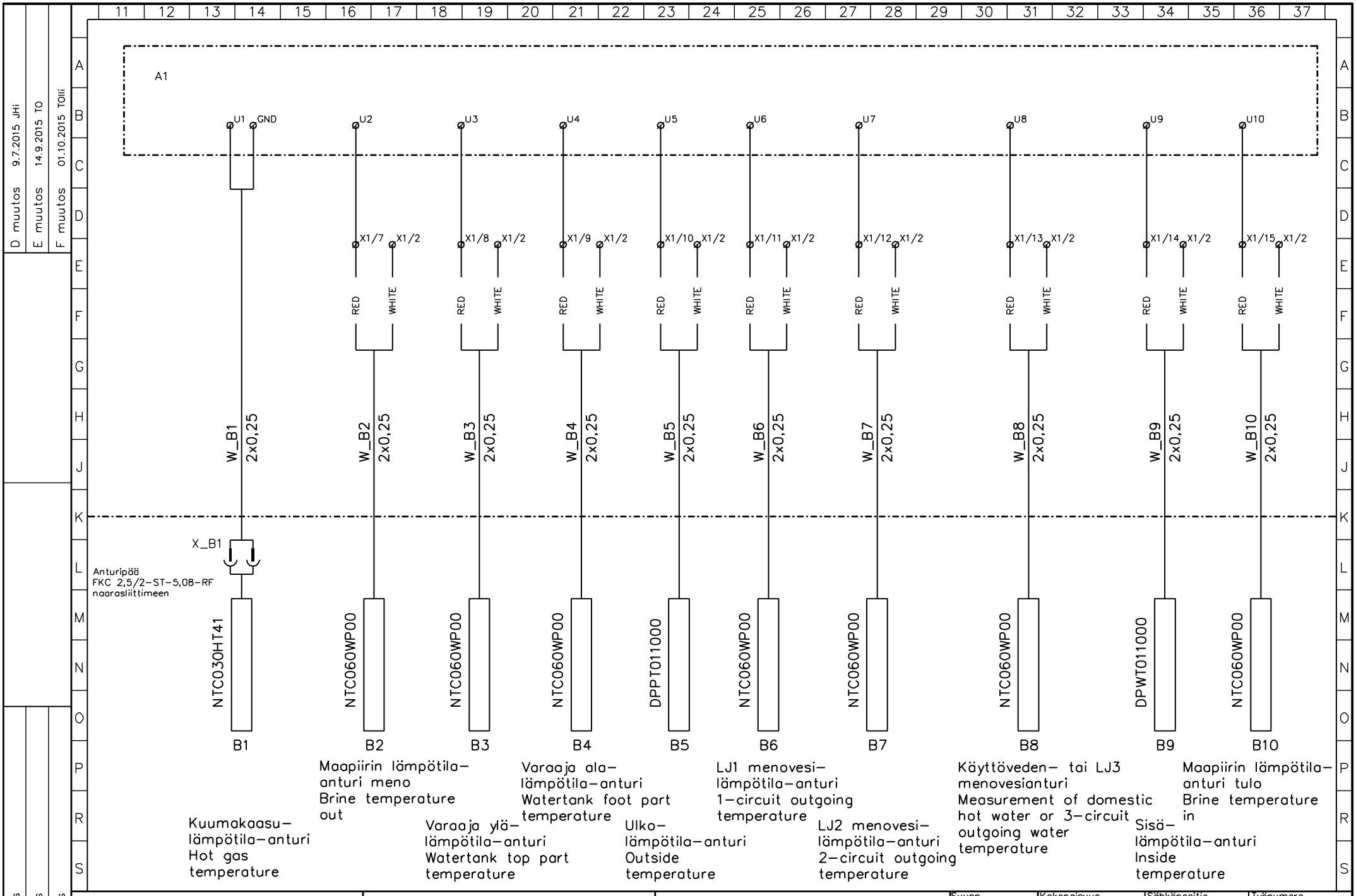
A muutos	B muutos	C muutos	D muutos 9.7.2015 JHi	E muutos 14.9.2015 TO	F muutos 01.10.2015 TOlli

LÄMPÖÄSSÄ

CONTROL BOARD
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6−11, Vsi6−14

OHJAUSKORTTI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6−11, Vsi6−14

Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 5/7	Piirustusnumero	
Tark.		S Esi/Vmi6−11_Vsi6−14_P3_15F	



D muutos 9.7.2015 JHi
E muutos 14.9.2015 TO
F muutos 01.10.2015 TOlli

A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

CONTROL BOARD / SENSORS
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

OHJAUSKORTTI / ANTURIT
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 6 / 7	Piirustusnumero	
Tark.		S Esi/Vmi6-11_Vsi6-14_P3_15F	

D muutos 9.7.2015 JHi
E muutos 14.9.2015 TO
F muutos 01.10.2015 TOlli

A1

Y1 Y2 Y3 Y4 Y5 Y6

X1 1 2 3 | X1 1 2 4 | X1 2 5 | X1 2 | X1 1 2 6

1 2 3

XP1_2 N PE 2 1

1 Sininen/Blue
2 Ruskea/Brown

X_YA6 1 2 3

Venttiili / pumppu
FKC 2,5/3-ST-5,08-RF
urosliittimeen

Esbe
Venttiilimoottorin
kytkentä
Regulation motor
connection
1 Ruskea/Brown
2 Sininen/Blue
3 Musta/Black

Pumppu:
1 Sininen/Blue
2 -
3 Ruskea/Brown

W_YA1 3x0,75 | W_YA2 3x0,75 | W_YA6 3x0,75 | W_P1_2 3x0,75 | W_YA4 3x0,75

Ø1 Ø2 Ø3

M 1~ | M 1~ | | P1 | M 1~

YA1 | YA2 | P11 | P1 | YA4

LJ1 venttiilimoottori
1-circuit regulation
motor

LJ2 venttiilimoottori
2-circuit regulation
motor

Tulistinpumpun ohjaus
Superheat pump
control

Maapiirin pumpun
nopeuden ohjaus
Speed regulation
of brine pump

Käyttöveden- tai LJ3 venttiilimoottori
Adjustment of domestic hot water
or 3-circuit regulation motor

24VAC / 0-10V | 24VAC / 0-10V | PWM | PWM | 24VAC / 0-10V

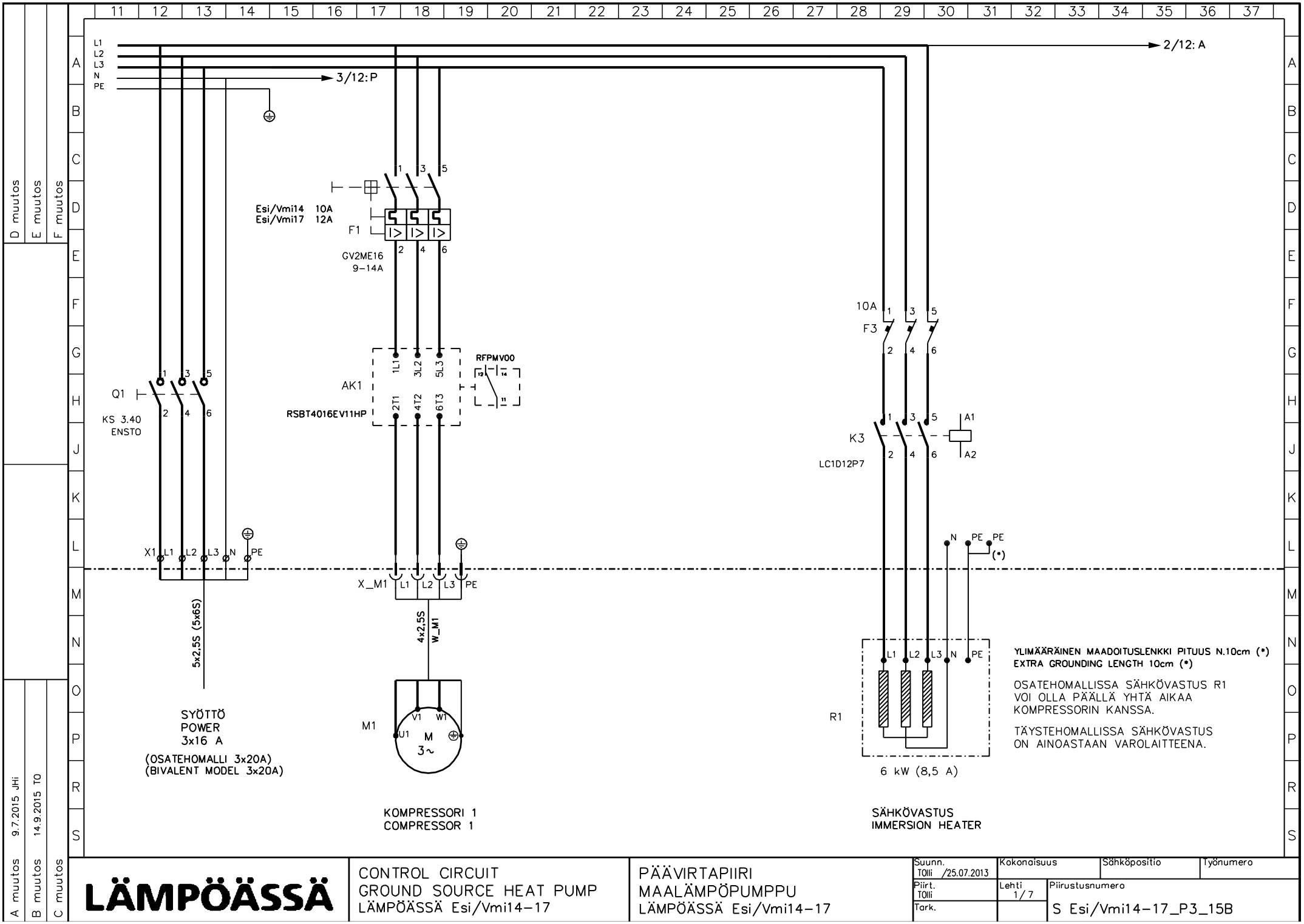
A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

CONTROL BOARD / MOTORS
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

OHJAUSKORTTI / MOOTTORIT
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi6-11, Vsi6-14

Suunn. TOlli /08.12.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 7/7	Piirustusnumero	
Tark.		S Esi/Vmi6-11_Vsi6-14_P3_15F	



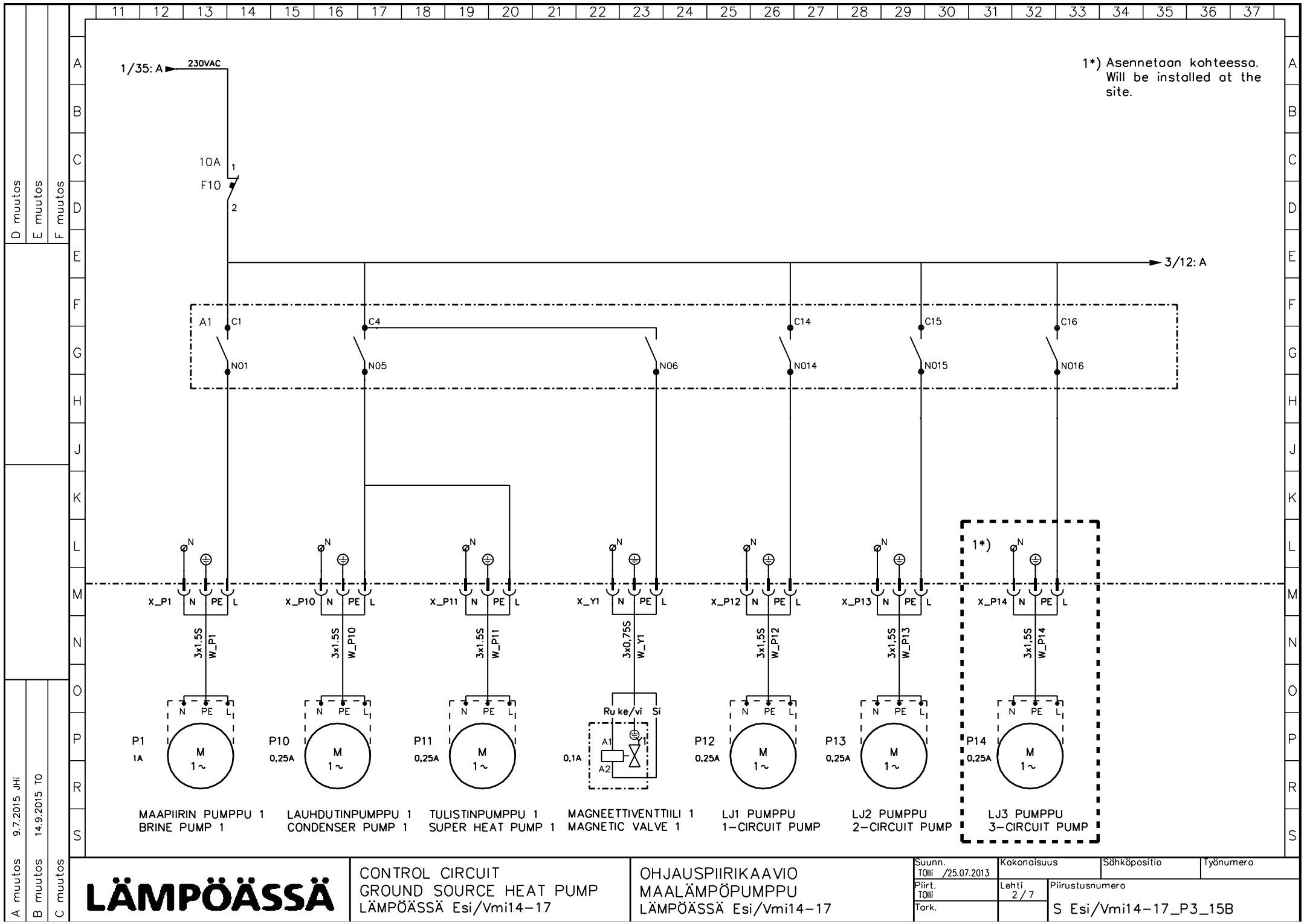
A muutos 9.7.2015 JHi	B muutos 14.9.2015 TO	C muutos	
D muutos	E muutos	F muutos	

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14–17

PÄÄVIRTAPIIRI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14–17

Suunn. TOlli /25.07.2013	Kokonaisuus	Sähköpositio	Työnumero	
Piirt. TOlli	Lehti 1/7	Piirustusnumero S Esi/Vmi14–17_P3_15B		
Tark.				



D muutos
E muutos
F muutos

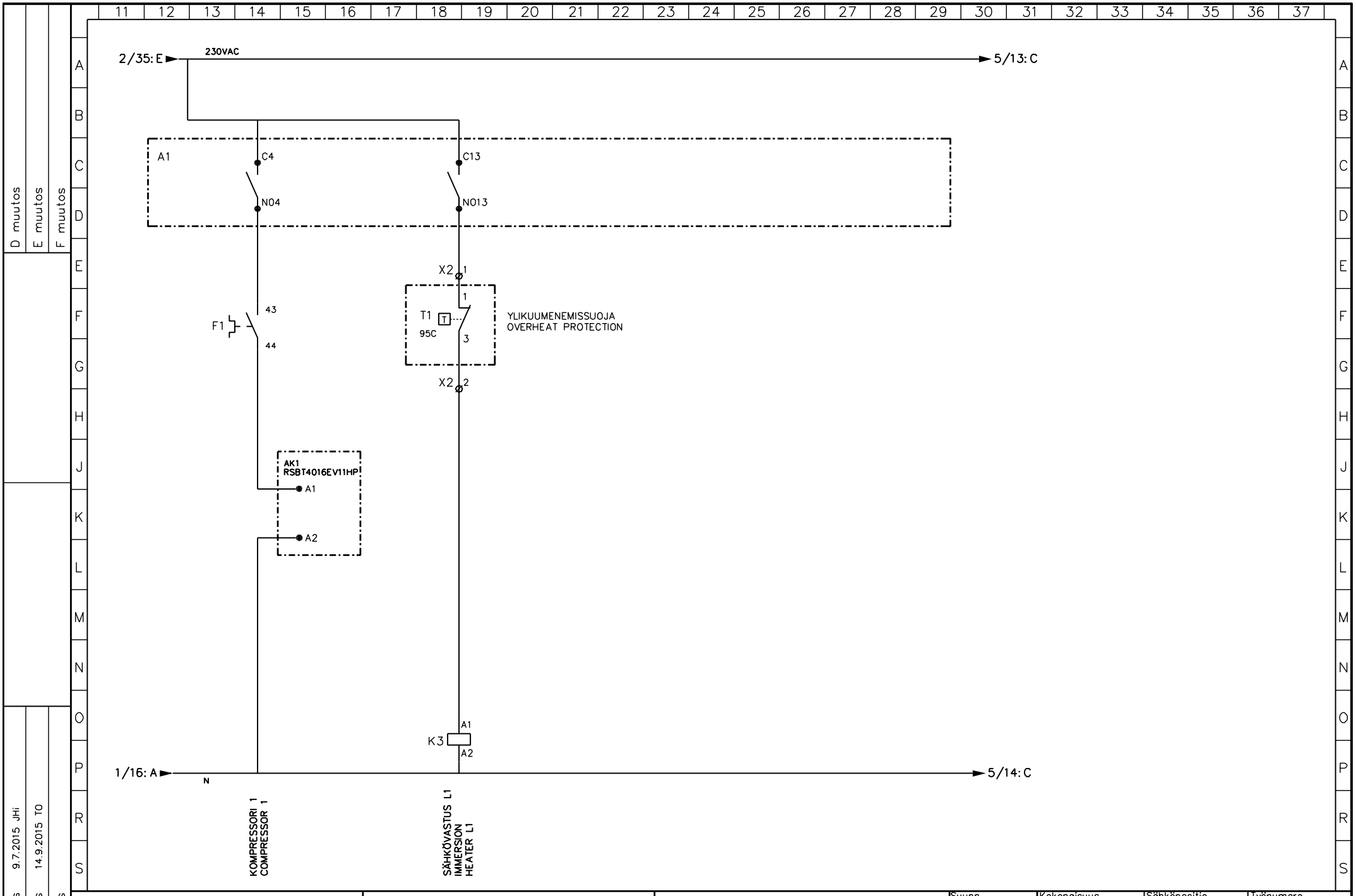
A muutos 9.7.2015 JHi
B muutos 14.9.2015 TO
C muutos

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14-17

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14-17

Suunn.	Kokonaisuus	Sähköposition	Työnumero
TOlli /25.07.2013			
Piirt. TOlli	Lehti 2 / 7	Piirustusnumero	
Tark.		S Esi/Vmi14-17_P3_15B	



D muutos
E muutos
F muutos

A muutos 9.7.2015 JHi
B muutos 14.9.2015 TO
C muutos

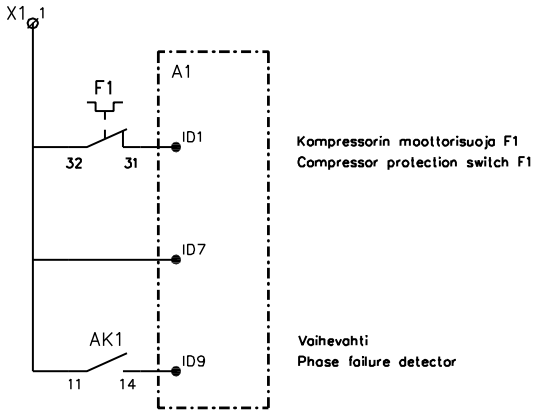
LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14-17

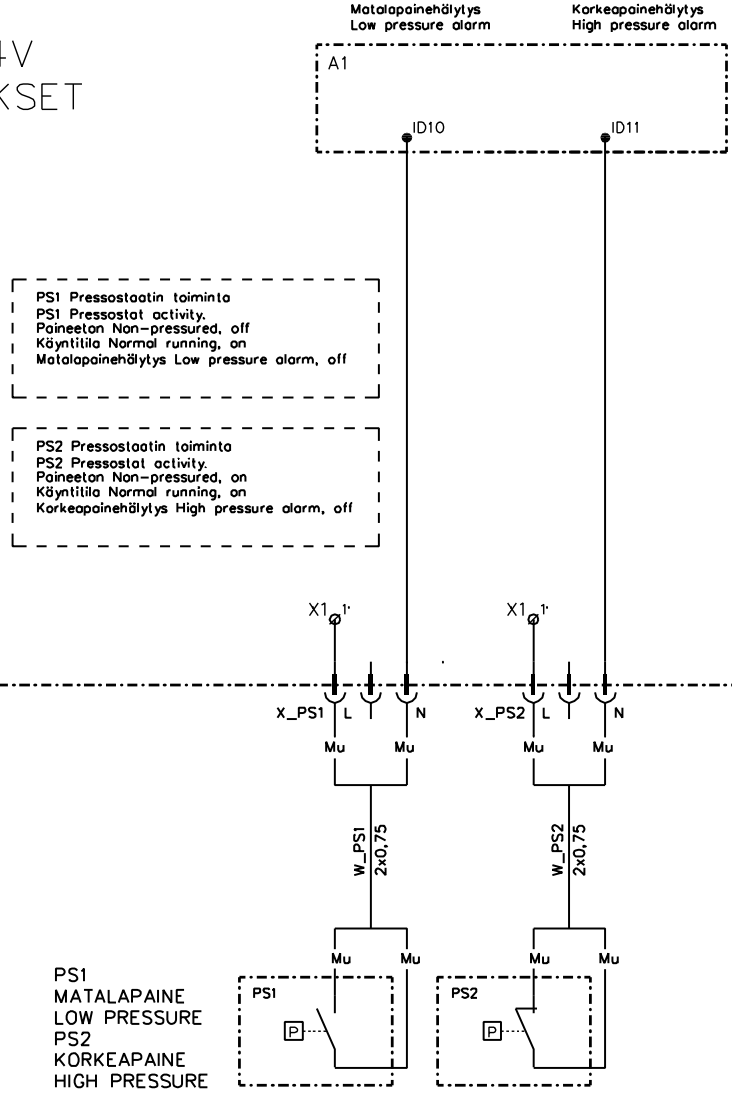
OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14-17

Suunn.	Kokonaisuus	Sähköpositio	Työnumero
TOlli /25.07.2013			
Piirt. TOlli	Lehti 3 / 7	Piirustusnumero	
Tark.		S Esi/Vmi14-17_P3_15A	

HÄLYTYSKYTKENTÄ
ALARM CONNECTION



KAIKKI 24V
JOHDOTUKSET
0,75MM2



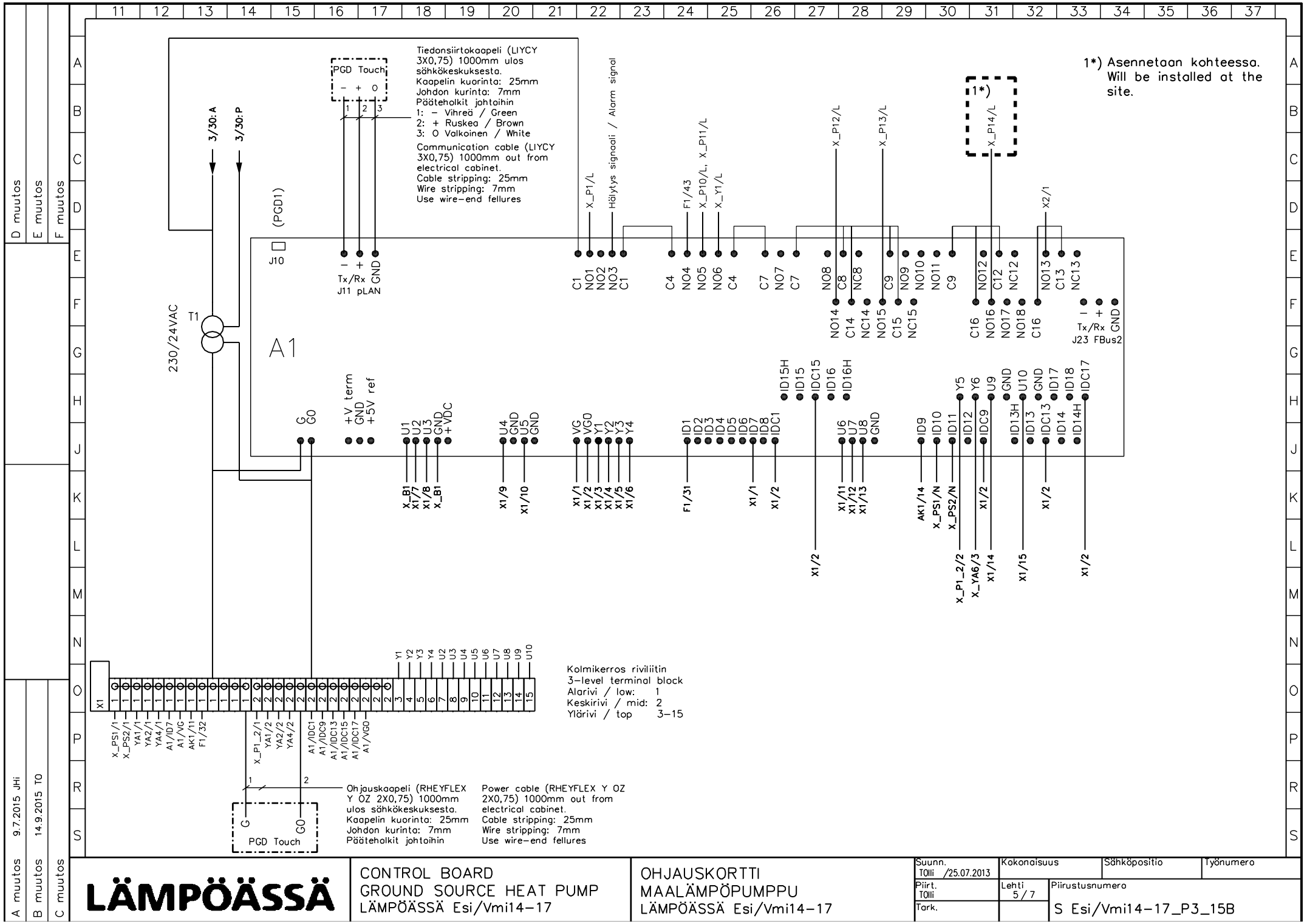
A muutos 9.7.2015 JHi	B muutos 14.9.2015 TO	C muutos	D muutos	E muutos	F muutos

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14-17

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14-17

Suunn. TOlli /25.07.2013	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 4 / 7	Piirustusnumero	
Tark.		S Esi/Vmi14-17_P3_15B	



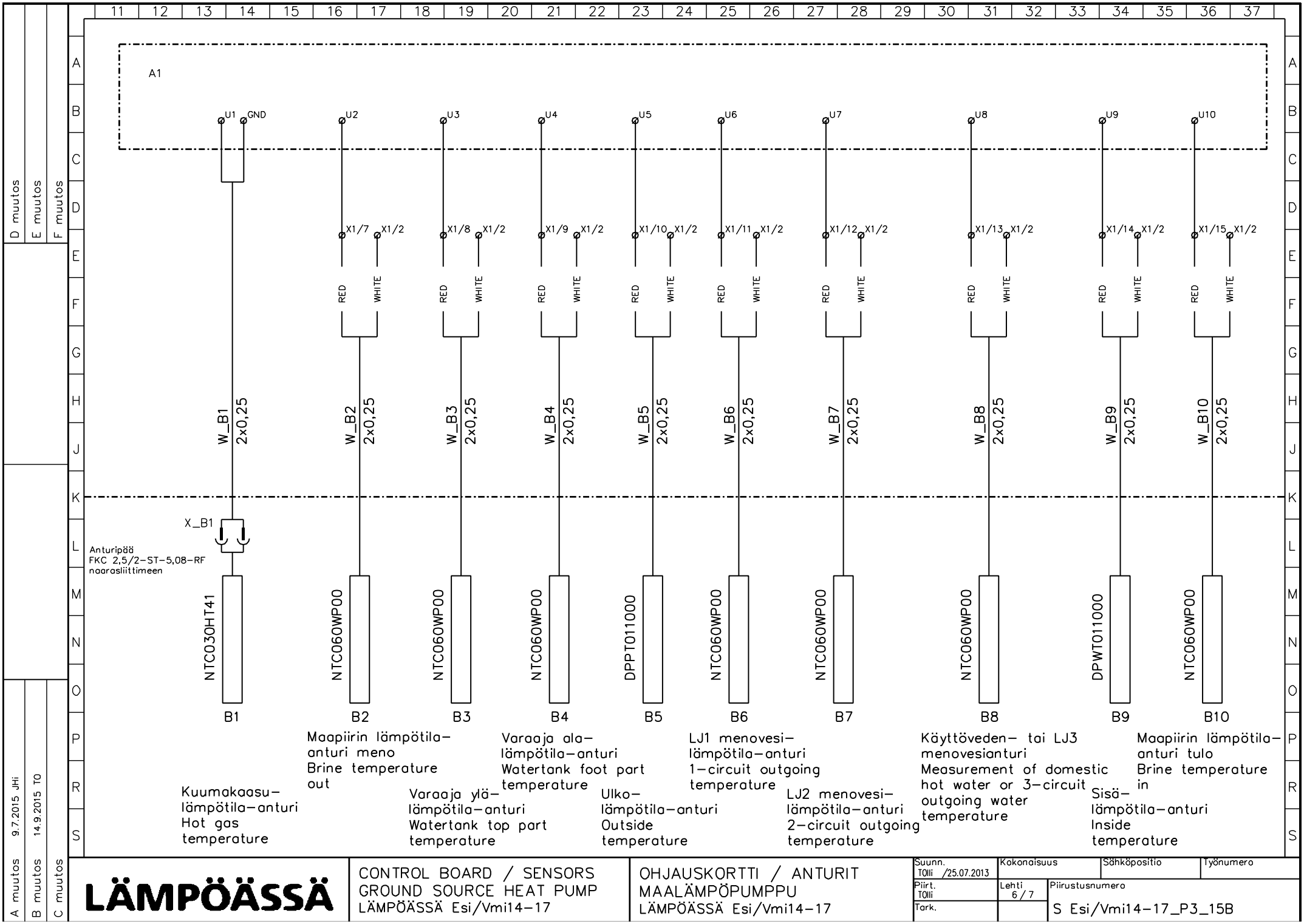
A muutus 9.7.2015 JHi					
B muutus 14.9.2015 TO					
C muutus					
D muutos					
E muutos					
F muutos					

LÄMPÖÄSSÄ

CONTROL BOARD
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14−17

OHJAUSKORTTI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14−17

Suunn. TOlli /25.07.2013	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 5 / 7	Piirustusnumero	
Tark.		S Esi/Vmi14−17_P3_15B	



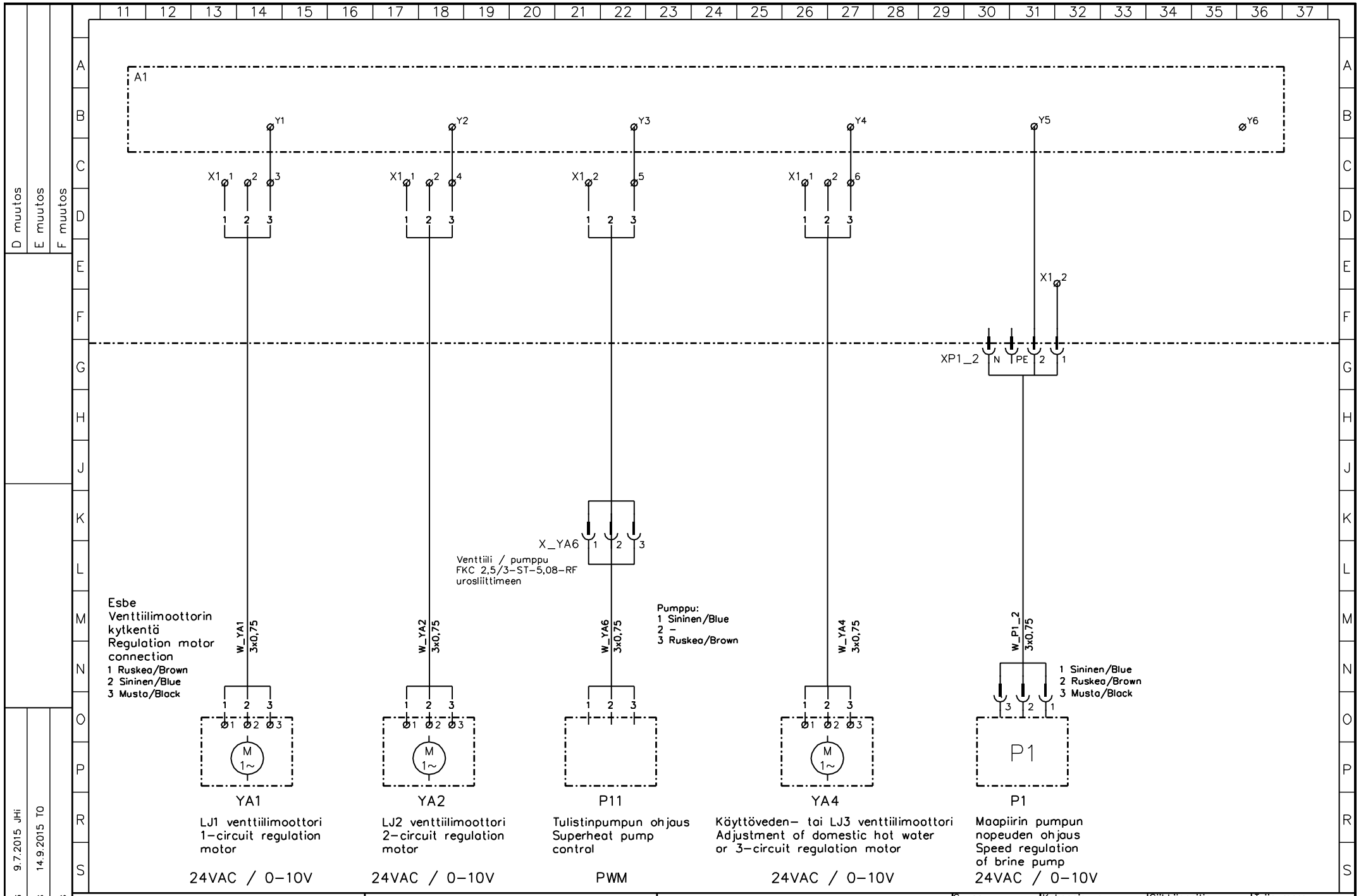
A muutus 9.7.2015 JHi	B muutus 14.9.2015 TO	C muutus
D muutos	E muutos	F muutos

LÄMPÖÄSSÄ

CONTROL BOARD / SENSORS
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14-17

OHJAUSKORTTI / ANTURIT
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14-17

Suunn. TOlli /25.07.2013	Kokonaisuus	Sähköpositio	Työnumero	
Piirt. TOlli	Lehti 6 / 7	Piirustusnumero S Esi/Vmi14-17_P3_15B		
Tark.				



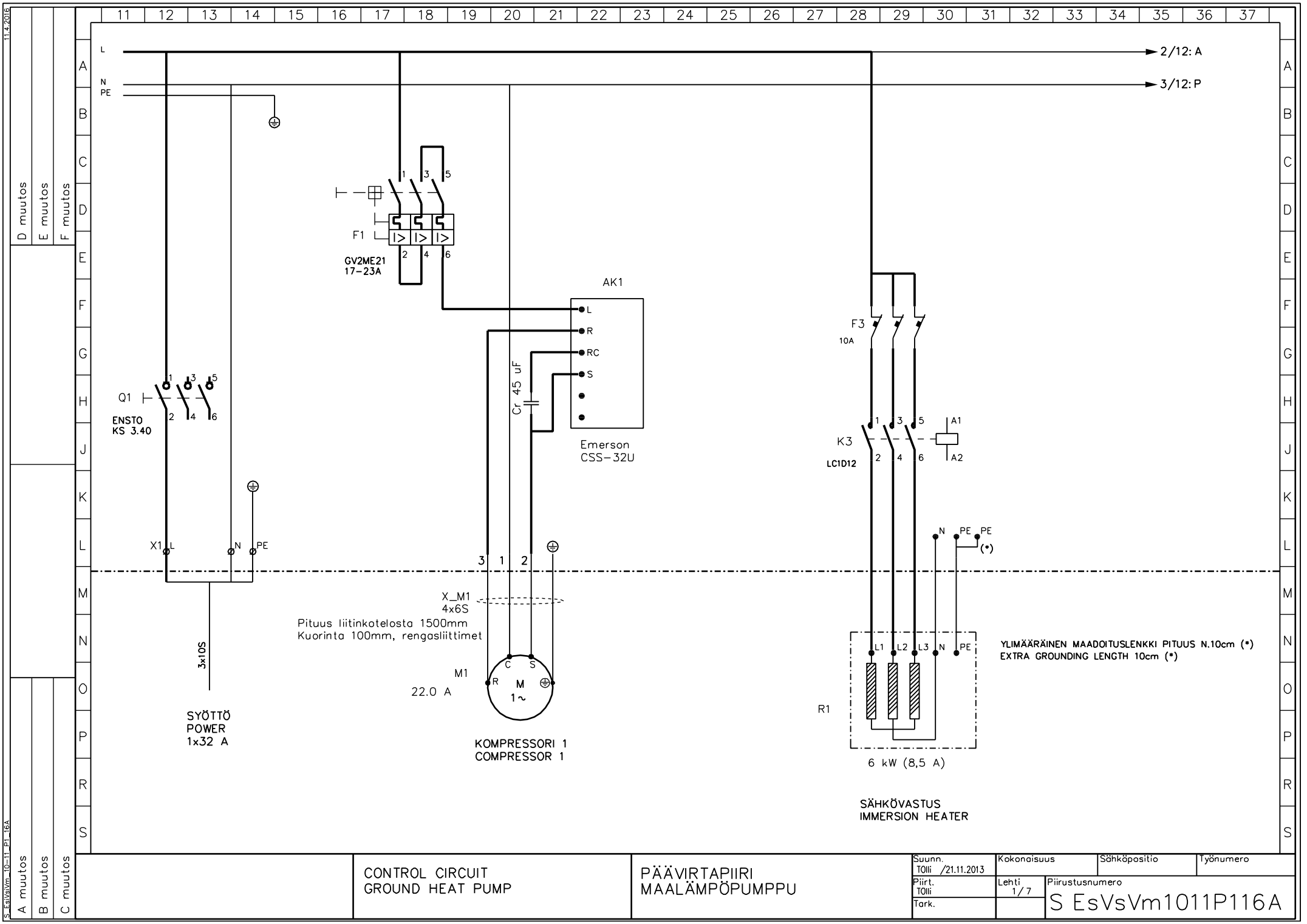
A muutus 9.7.2015 JHi	B muutus 14.9.2015 TO	C muutus	
D muutus	E muutus	F muutus	

LÄMPÖÄSSÄ

CONTROL BOARD / MOTORS
GROUND SOURCE HEAT PUMP
LÄMPÖÄSSÄ Esi/Vmi14-17

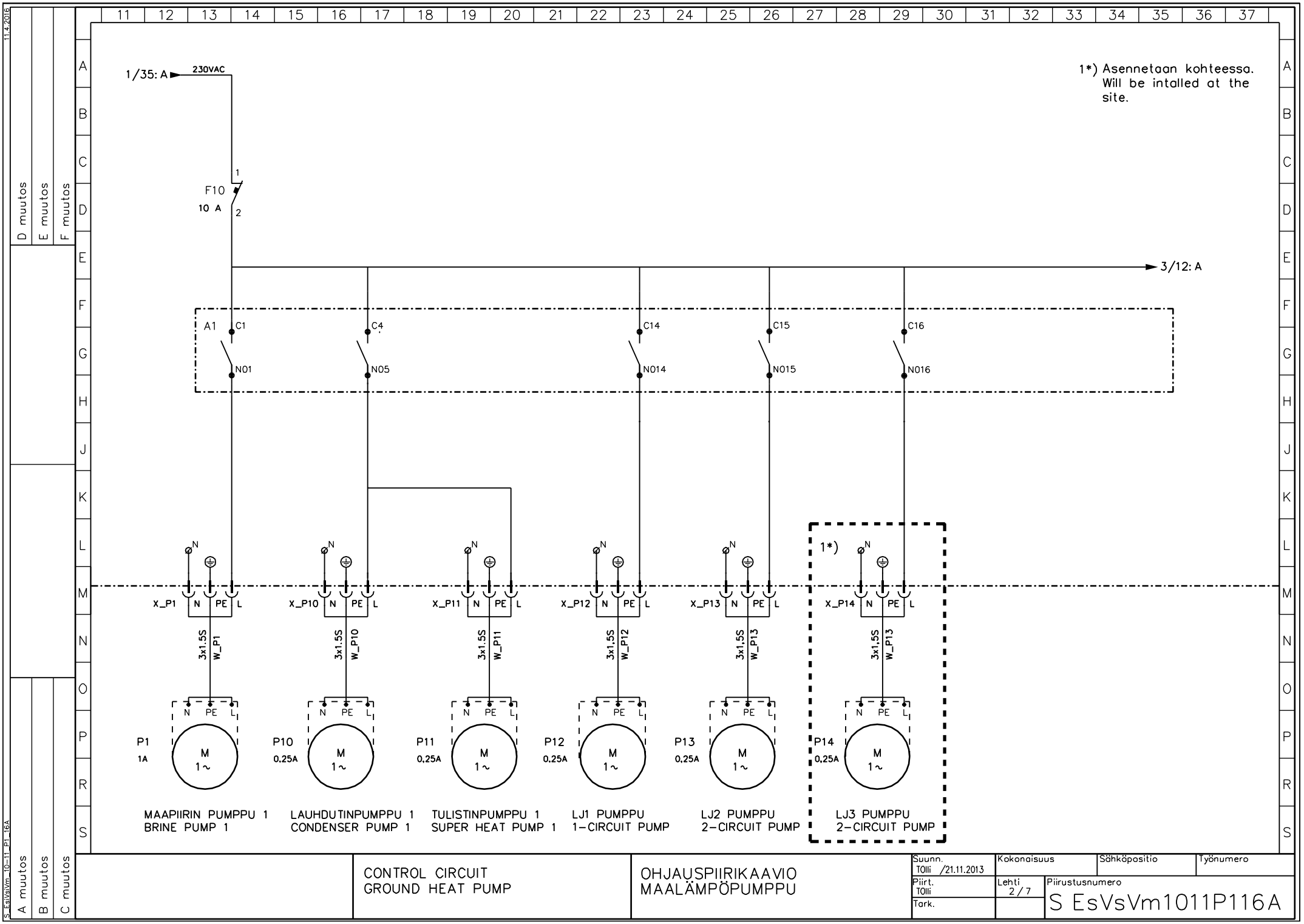
OHJAUSKORTTI / MOOTTORIT
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vmi14-17

Suunn. TOlli /25.07.2013	Kokonaisuus	Sähköpositio	Työnumero	
Piirt. TOlli	Lehti 7 / 7	Piirustusnumero S Esi/Vmi14-17_P3_15B		
Tark.				



	CONTROL CIRCUIT GROUND HEAT PUMP	PÄÄVIRTAPIIRI MAALÄMPÖPUMPPU	Suunn. TOlli /21.11.2013	Kokonaisuus	Sähköpositio	Työnumero
			Piirt. TOlli	Lehti 1/7	Piirustusnumero S EsVsVm1011P116A	
			Tark.			

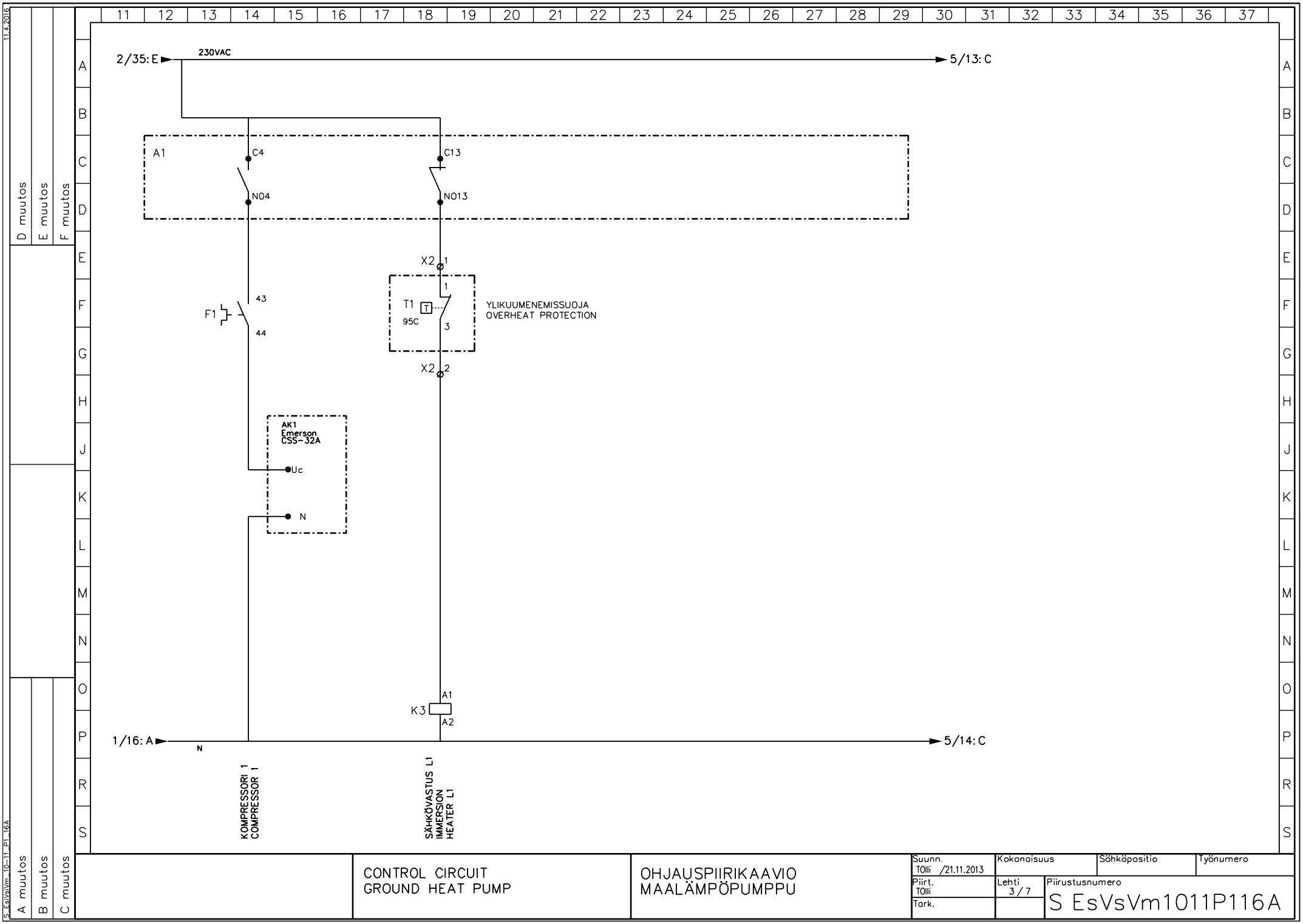
D muutos
E muutos
F muutos
A muutos
B muutos
C muutos
11.4.2016
S_EsVsVm_10-11_P1_16A



CONTROL CIRCUIT
GROUND HEAT PUMP

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU

Suunn. TOlli /21.11.2013	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 2/7	Piirustusnumero S EsVsVm1011P116A	
Tark.			

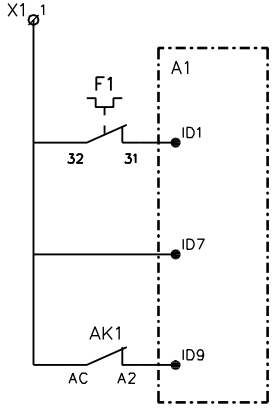


CONTROL CIRCUIT
GROUND HEAT PUMP

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU

Suunn. TOlli /21.11.2013	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 3/7	Piirustusnumero	
Tark.		S EsVsVm1011P116A	

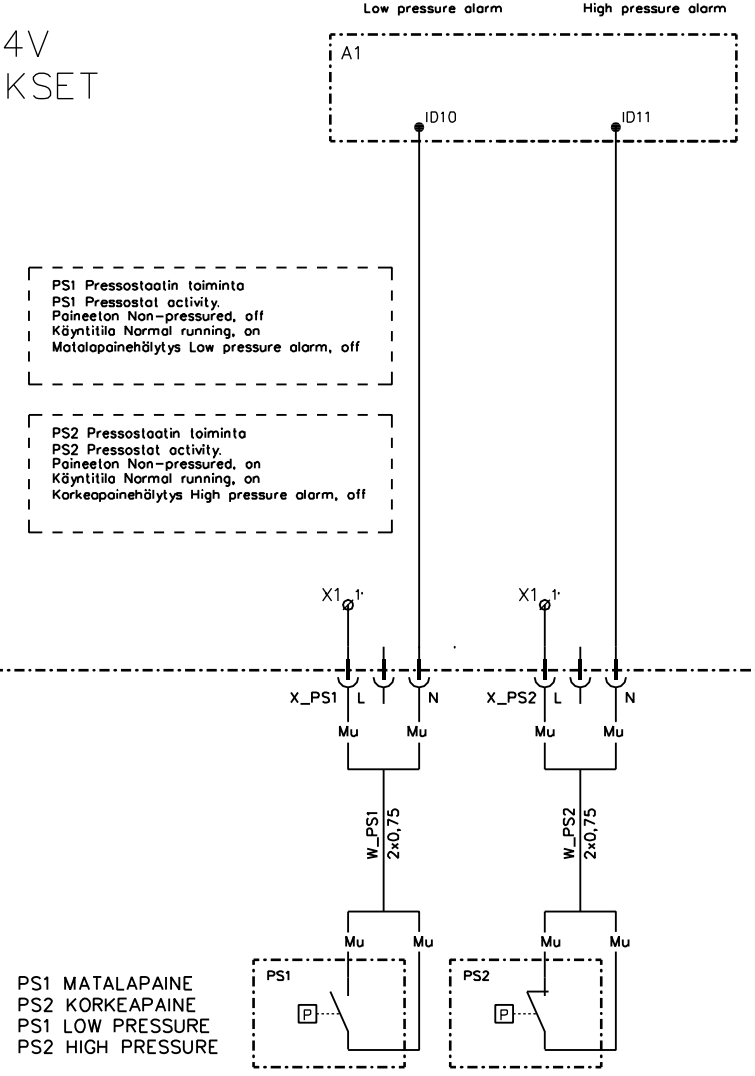
HÄLYTYSKYTKENTÄ
ALARM CONNECTION



Kompressoripiirin moottorisuoja F1
Compressor circle , Protection switch F1

Vaihevahti
Phase failure detector

KAIKKI 24V
JOHDOTUKSET
0,75MM2



PS1 MATALAPAINE
PS2 KORKEAPAINE
PS1 LOW PRESSURE
PS2 HIGH PRESSURE

CONTROL CIRCUIT
GROUND HEAT PUMP

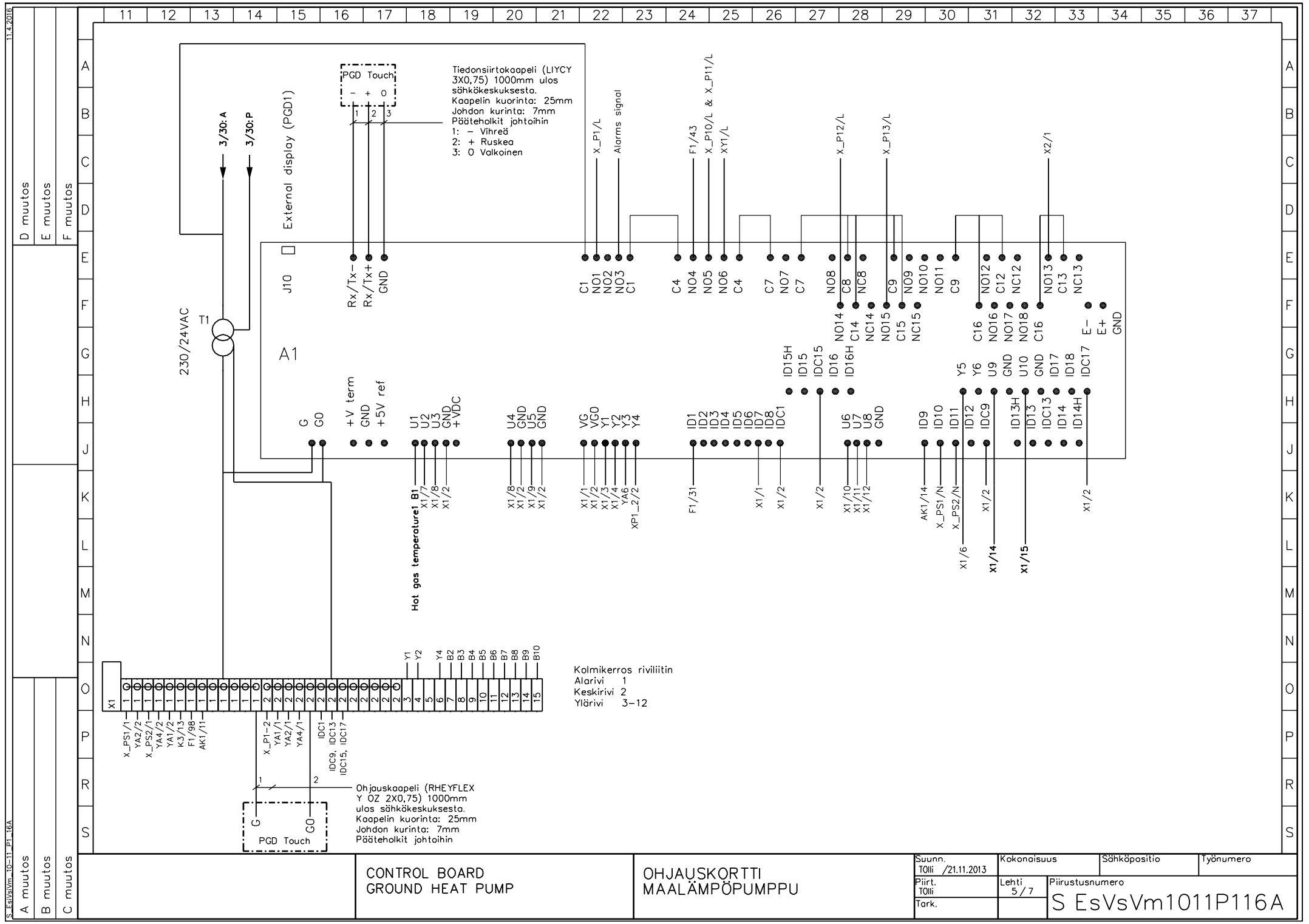
OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU

Suunn. TOlli /21.11.2013	Kokonaisuus	Sähköpositio	Työnumero	
Piirt. TOlli	Lehti 4 / 7	Piirustusnumero S EsVsVm1011P116A		
Tark.				

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

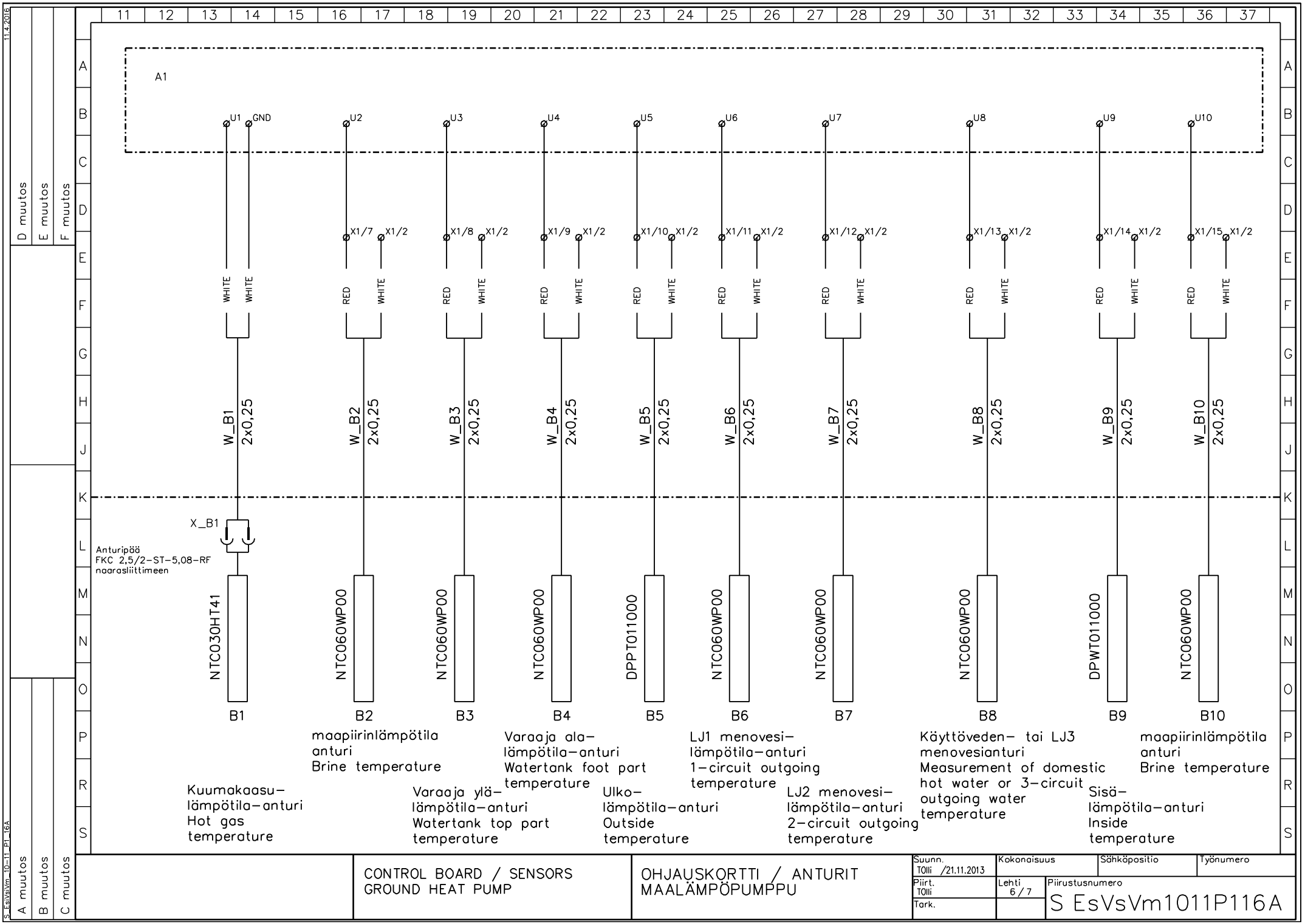
11.4.2016

S_EsVsVm_10-11_P1_16A



	CONTROL BOARD GROUND HEAT PUMP	OHJAUSKORTTI MAALÄMPÖPUMPPU	Suunn. TOlli /21.11.2013 Piirt. TOlli Tark.	Kokonaisuus Lehti 5 / 7	Sähköpositio Piirustusnumero S EsVsVm1011P116A	Työnumero

A muutos
B muutos
C muutos
D muutos
E muutos
F muutos
11.4.2016
S_EsVsVm_10-11_P1_16A



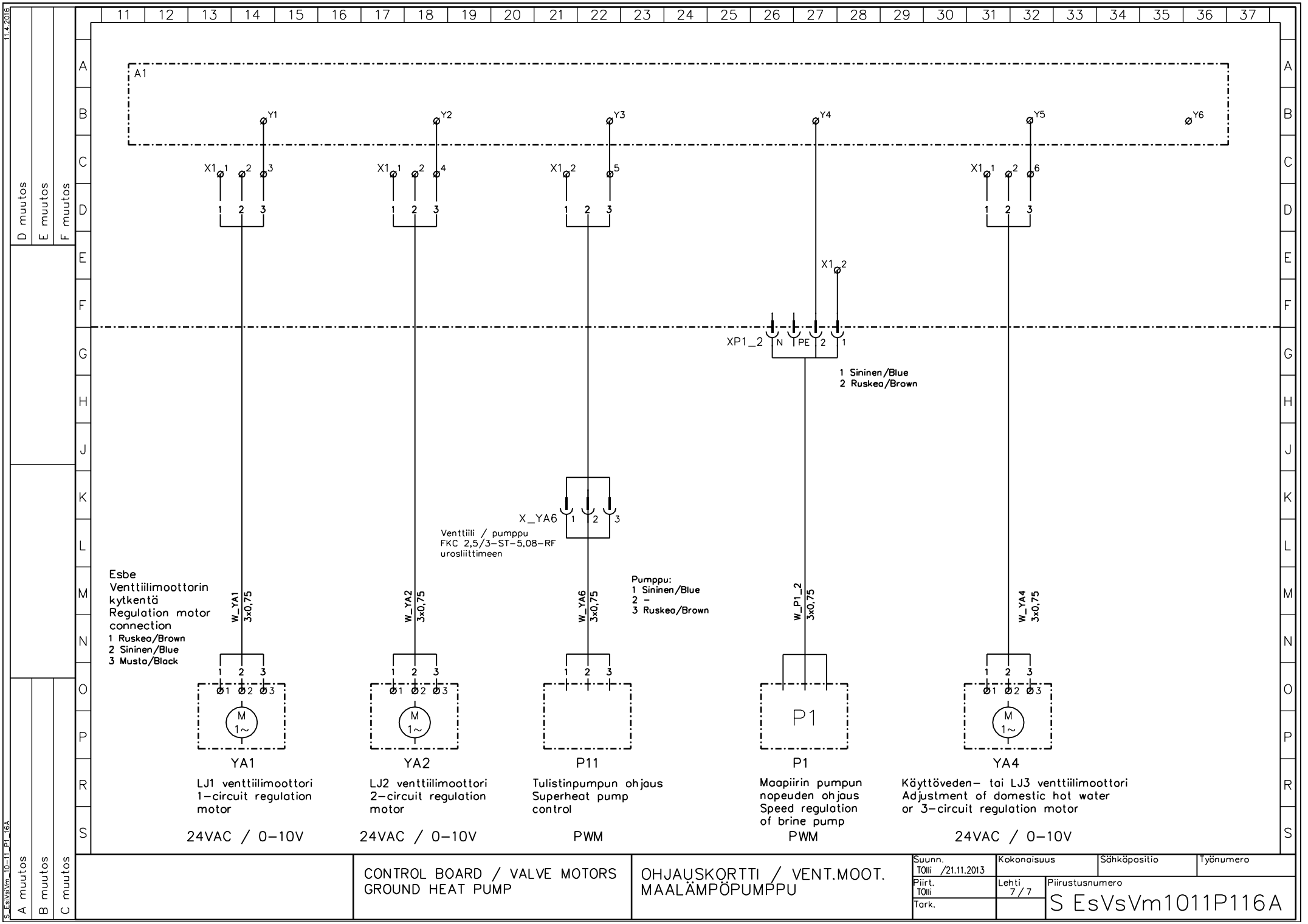
	CONTROL BOARD / SENSORS GROUND HEAT PUMP	OHJAUSKORTTI / ANTURIT MAALÄMPÖPUMPPU	Suunn. TOlli /21.11.2013 Piirt. TOlli Tark.	Kokonaisuus Lehti 6 / 7	Sähköpositio	Työnumero Piirustusnumero S EsVsVm1011P116A

11.4.2016

D muutos
E muutos
F muutos

A muutos
B muutos
C muutos

S_EsVsVm_10-11_P1_16A



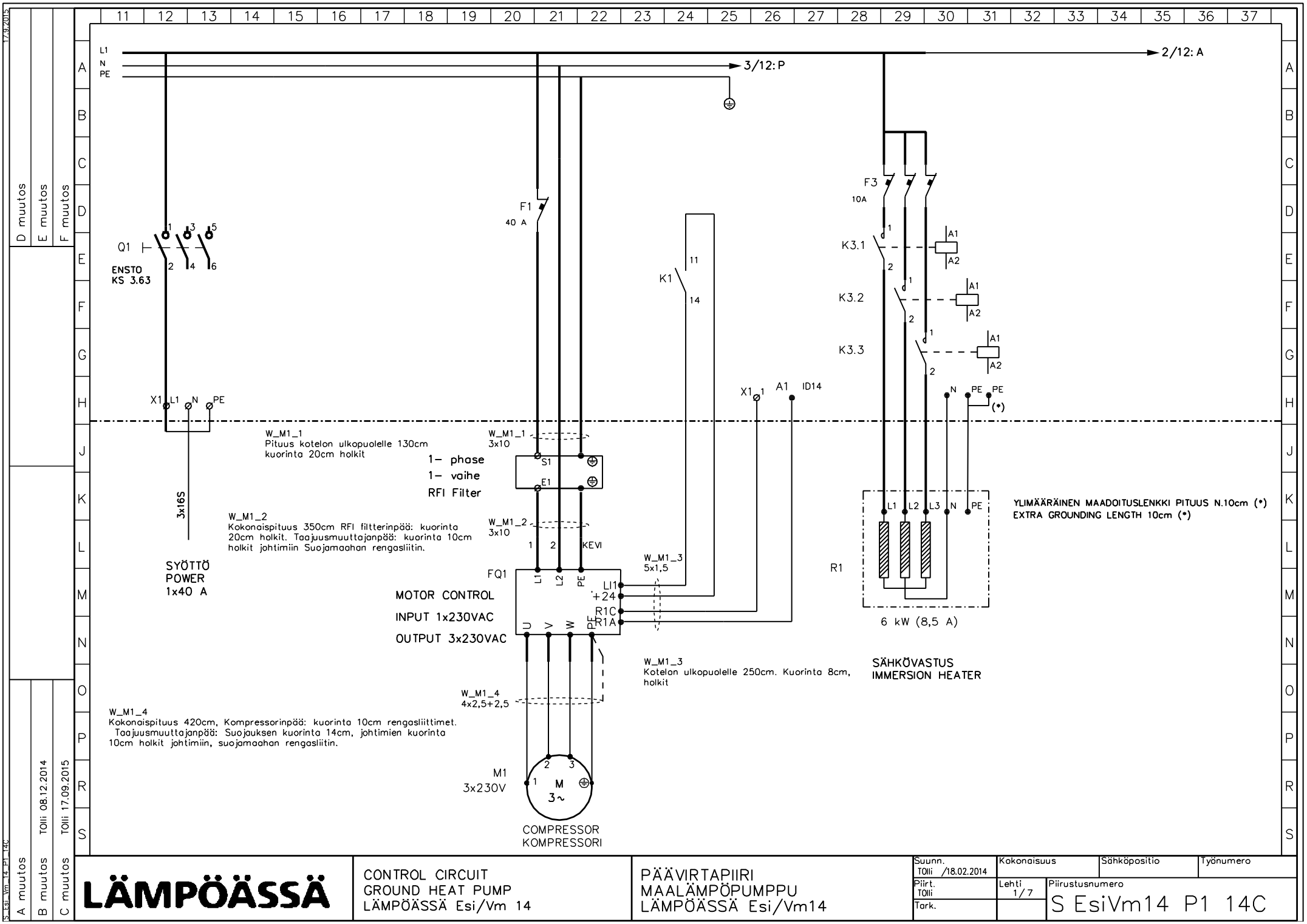
	CONTROL BOARD / VALVE MOTORS GROUND HEAT PUMP	OHJAUSKORTTI / VENT.MOOT. MAALÄMPÖPUMPPU	Suunn. TOlli /21.11.2013 Piirt. TOlli Tark.	Kokonaisuus Lehti 7/7	Sähköpositio Piirustusnumero S EsVsVm1011P116A	Työnumero

D muutos E muutos F muutos

A muutos B muutos C muutos

11.4.2016

S_EsVsVm_10-11_P1_16A



D muutos		
E muutos		
F muutos		
A muutos		
B muutos	TOlli 08.12.2014	
C muutos	TOlli 17.09.2015	

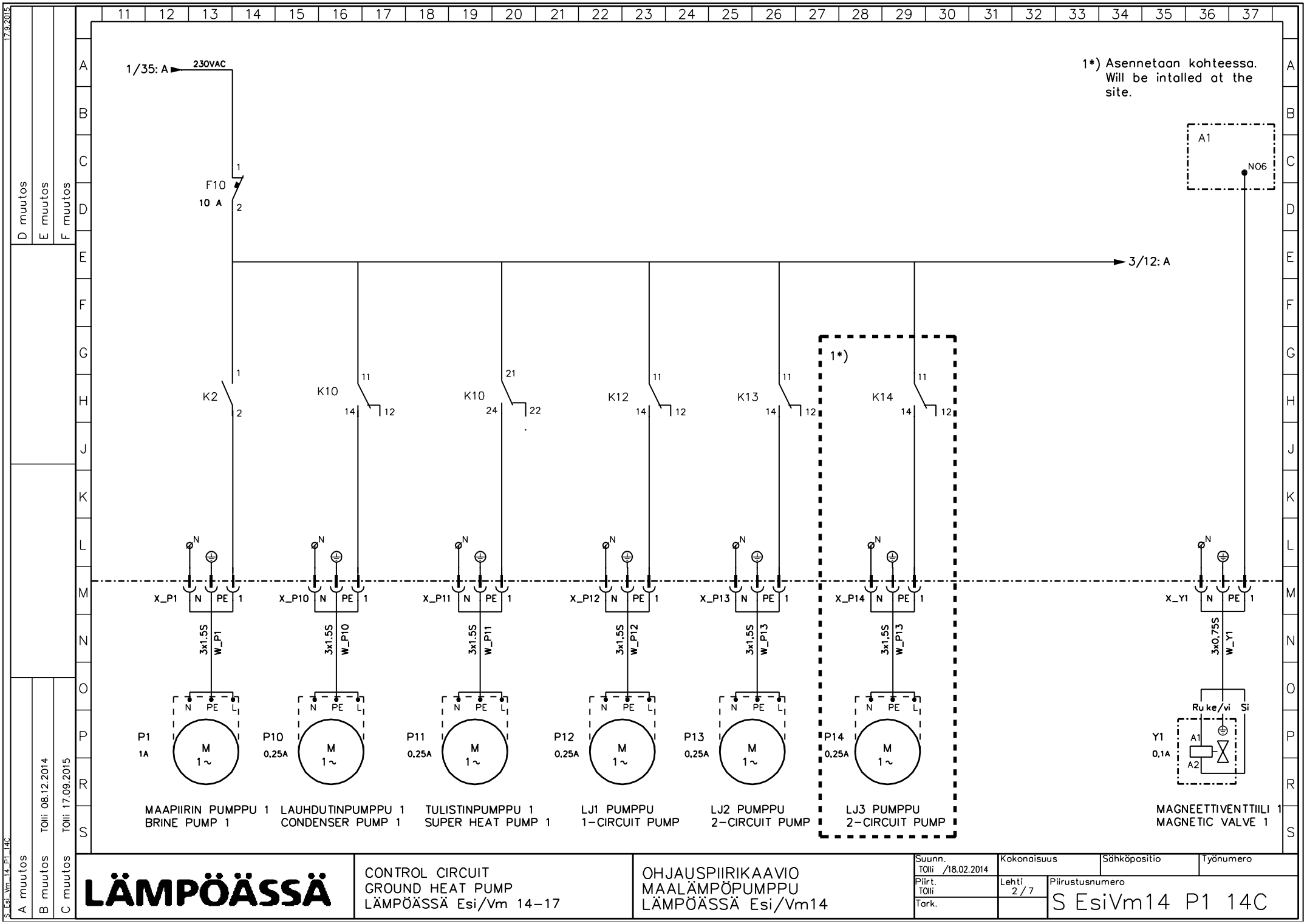
LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14

PÄÄVIRTAPIIRI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOlli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 1/7	Piirustusnumero	
Tark.		S EsiVm14 P1 14C	

S_Esi_Vm_14_P1_14C



17.9.2015

D muutos
E muutos
F muutos

A muutos
B muutos TOlli 08.12.2014
C muutos TOlli 17.09.2015

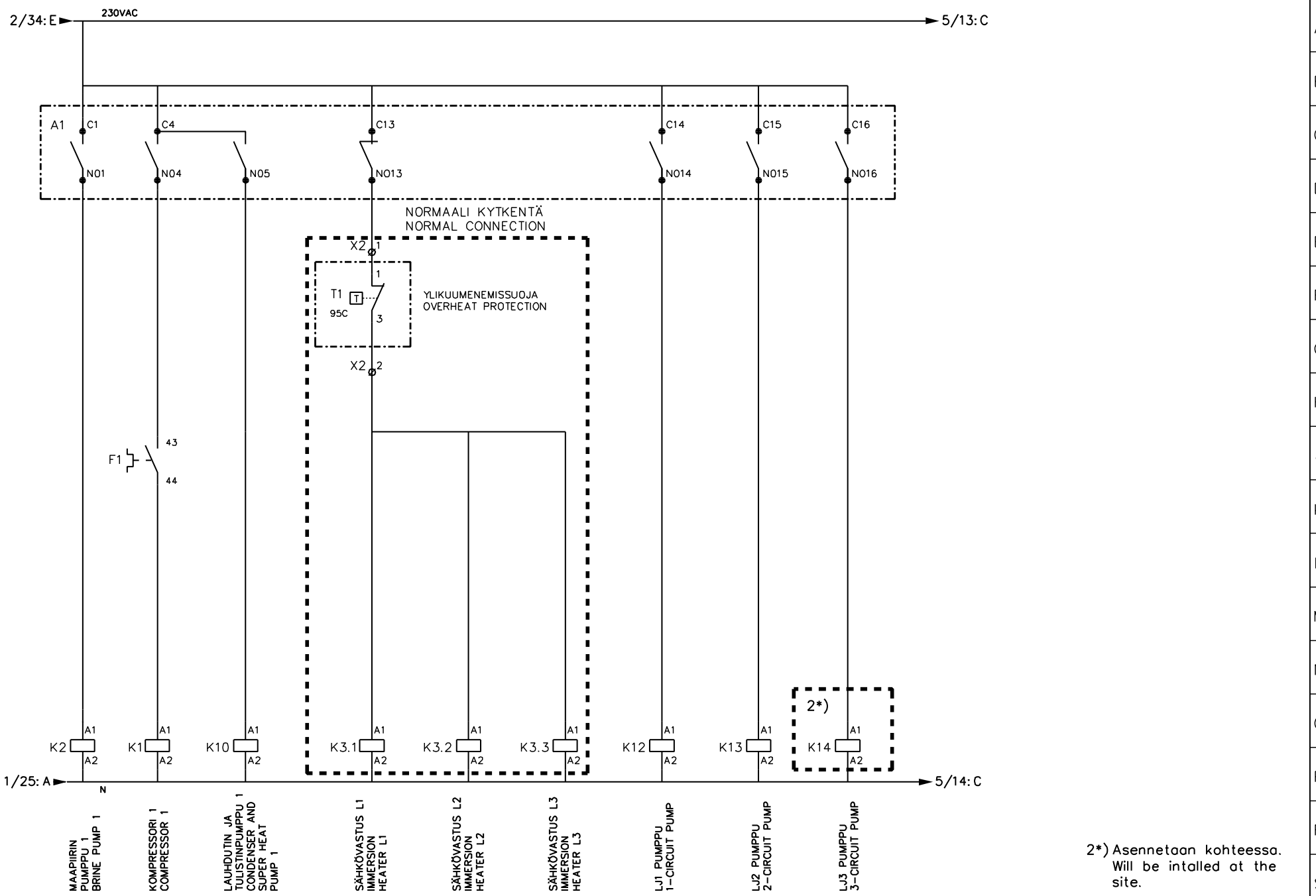
S_Esi_Vm_14_P1_14C

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14-17

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOlli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 2/7	Piirustusnumero	
Tark.		S EsiVm14 P1 14C	



2*) Asennetaan kohteessa.
Will be intalled at the site.

A muutos					
B muutos	TOli 08.12.2014				
C muutos	TOli 17.09.2015				
D muutos					
E muutos					
F muutos					

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14–17

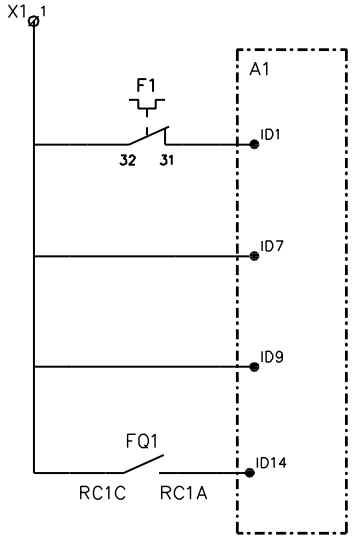
OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOli	Lehti 3/7	Piirustusnumero	
Tark.		S EsiVm14 P1 14C	

S_Esi_Vm_14_P1_14C

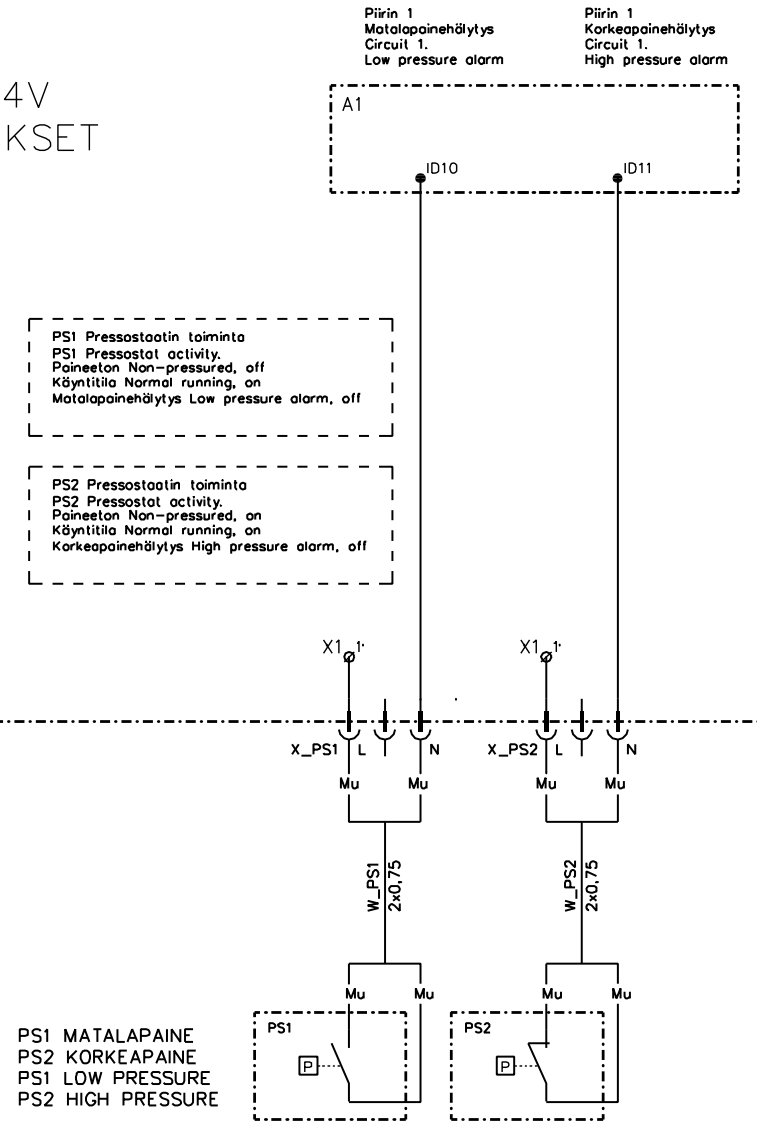
HÄLYTYSKYTKENTÄ
ALARM CONNECTION

KAIKKI 24V
JOHDOTUKSET
0,75MM2



Kompressoripiirin moottorisuoja F1
Compressor circle , Protection switch F1

Pehmokäynnistin hälytys
Soft starter alarm



PS1 MATALAPAINE
PS2 KORKEAPAINE
PS1 LOW PRESSURE
PS2 HIGH PRESSURE

D muutos		
E muutos		
F muutos		
A muutos		
B muutos	TOlli 08.12.2014	
C muutos	TOlli 17.09.2015	

17.9.2015

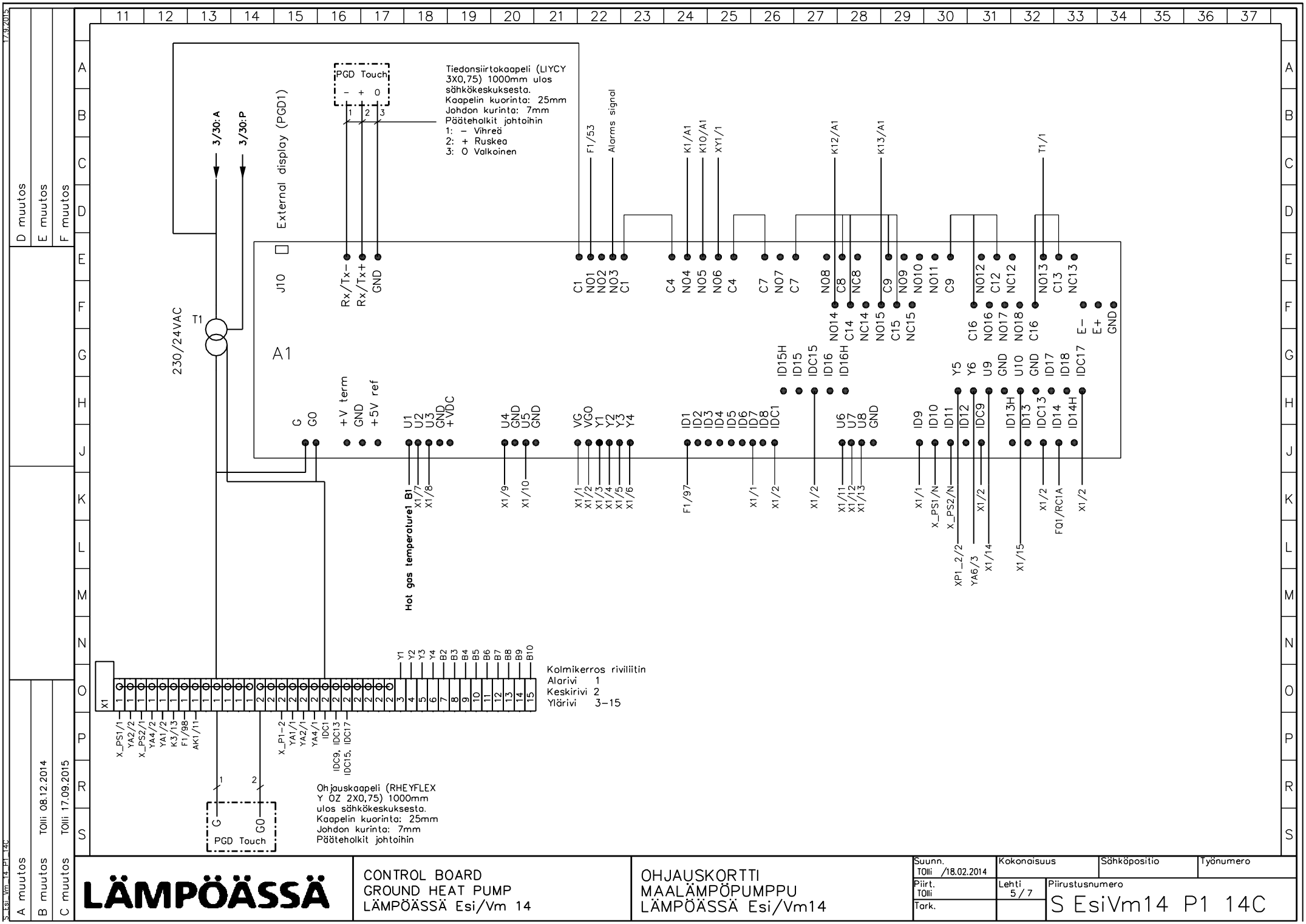
S Esi_Vm_14_P1_14C

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOlli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 4 / 7	Piirustusnumero	
Tark.		S EsiVm14 P1 14C	



A muutos			
B muutos	TOlli 08.12.2014		
C muutos	TOlli 17.09.2015		
D muutos			
E muutos			
F muutos			

17.9.2015

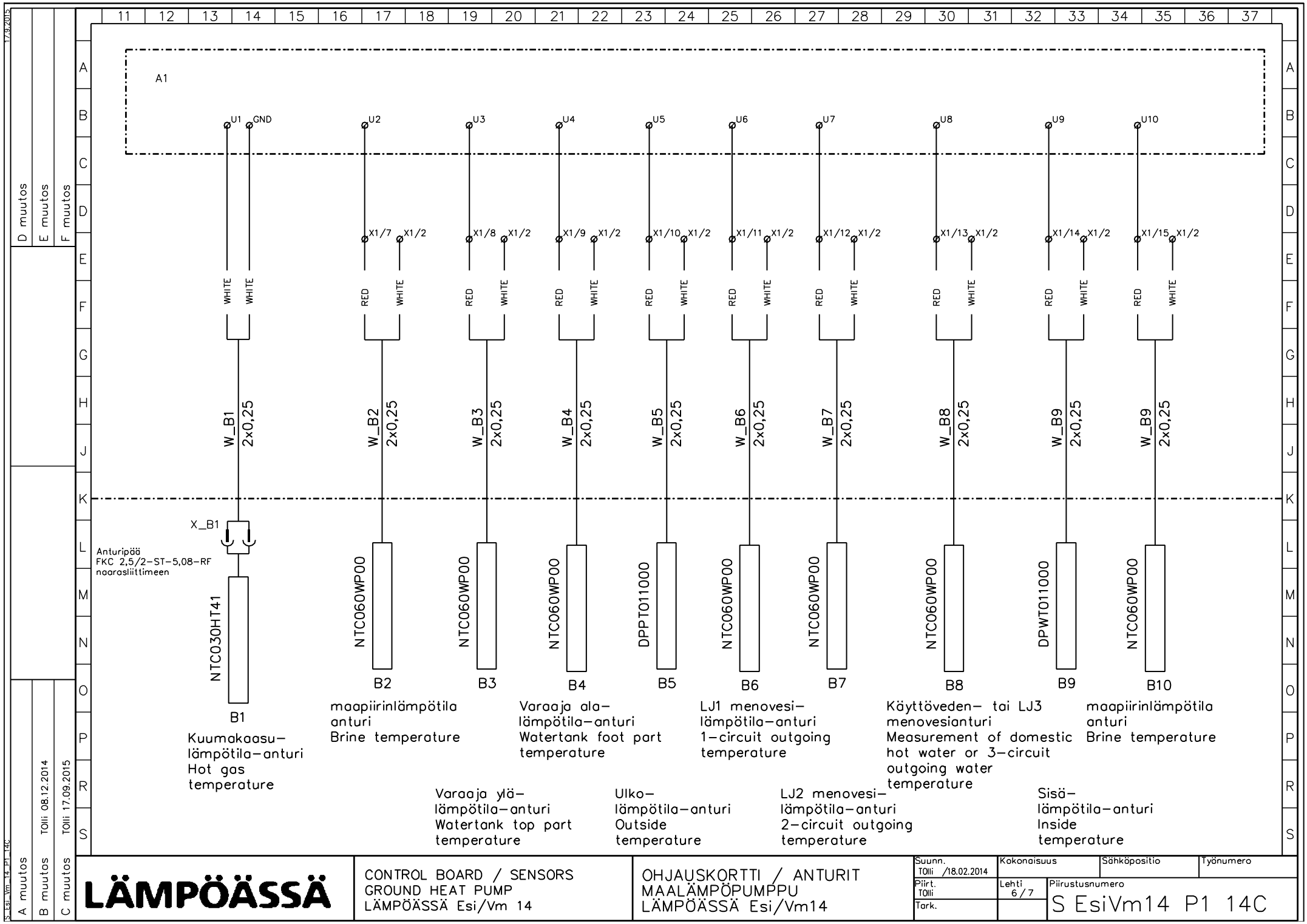
S_Esi_Vm_14_P1_14C

LÄMPÖÄSSÄ

CONTROL BOARD
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14

OHJAUSKORTTI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOlli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 5 / 7	Piirustusnumero S EsiVm14 P1 14C	
Tark.			



A muutos	
B muutos	TOlli 08.12.2014
C muutos	TOlli 17.09.2015
D muutos	
E muutos	
F muutos	

17.9.2015

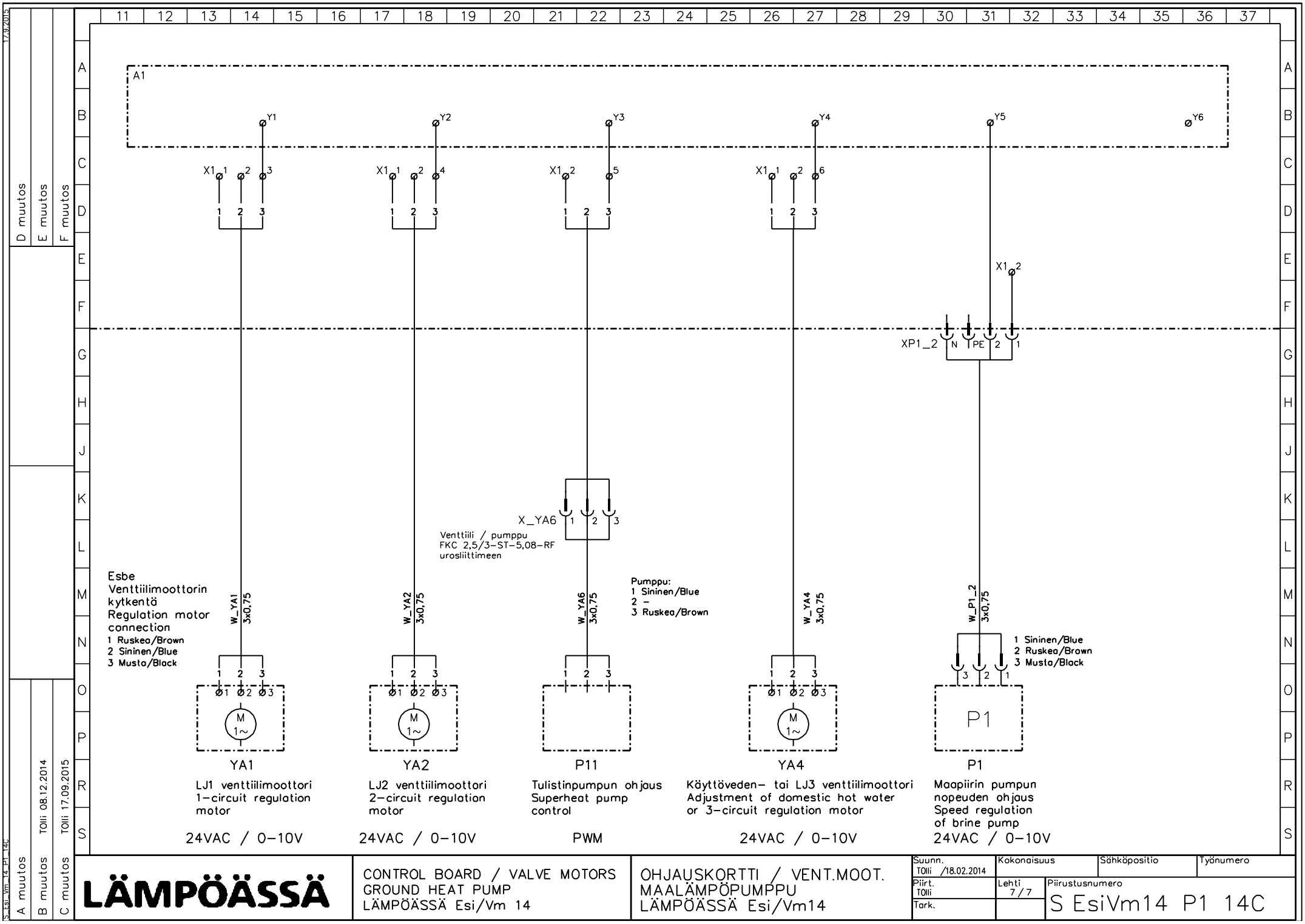
S_Esi_Vm_14_P1_14C

LÄMPÖÄSSÄ

CONTROL BOARD / SENSORS
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14

OHJAUSKORTTI / ANTURIT
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOlli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 6 / 7	Piirustusnumero S EsiVm14 P1 14C	
Tark.			



D muutos		
E muutos		
F muutos		
A muutos		
B muutos	TOlli 08.12.2014	
C muutos	TOlli 17.09.2015	

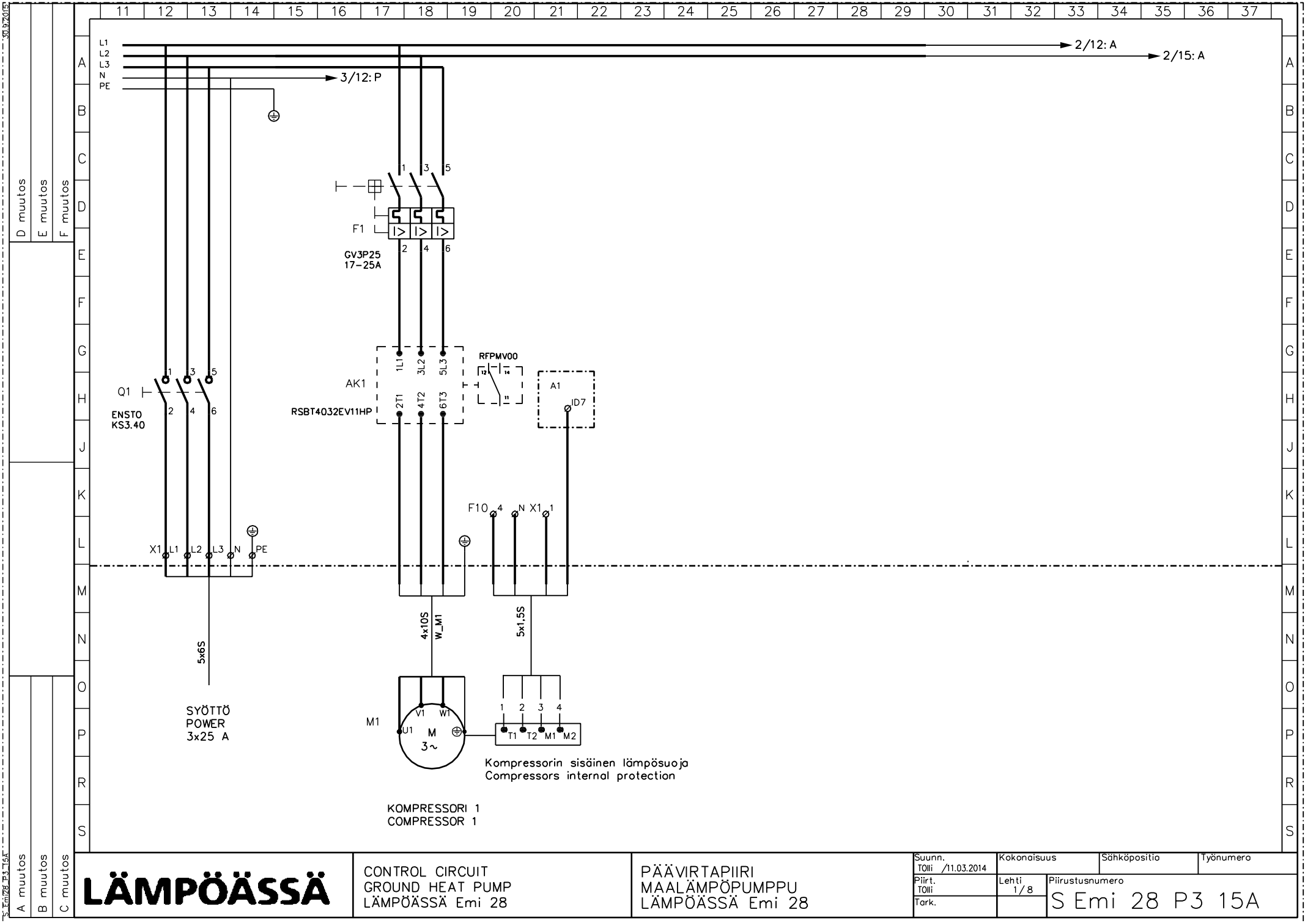
LÄMPÖÄSSÄ

CONTROL BOARD / VALVE MOTORS
GROUND HEAT PUMP
LÄMPÖÄSSÄ Esi/Vm 14

OHJAUSKORTTI / VENT.MOOT.
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Esi/Vm14

Suunn. TOlli /18.02.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 7/7	Piirustusnumero	
Tark.		S EsiVm14 P1 14C	

S_Esi_Vm_14_P1_14C



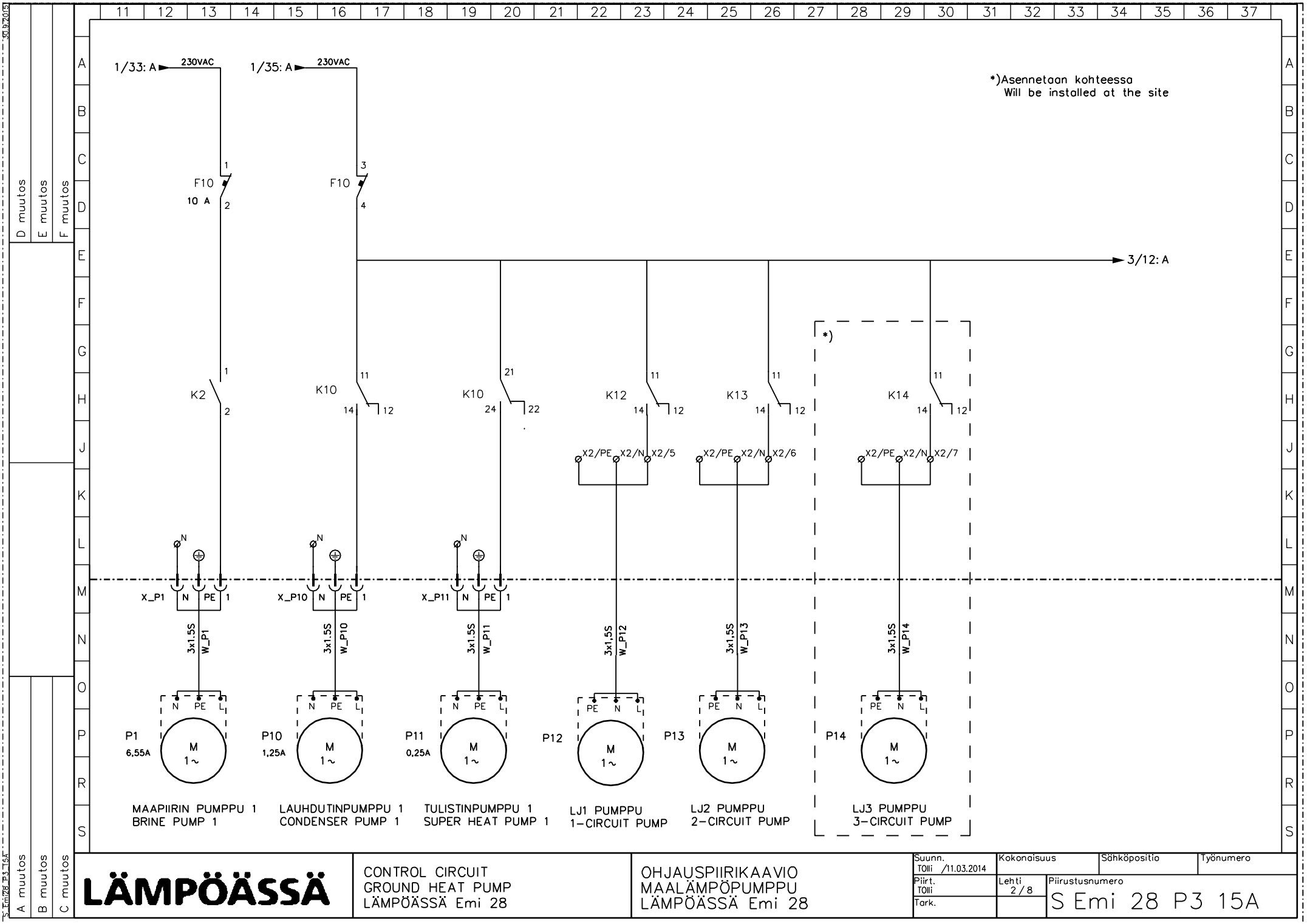
D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Emi 28

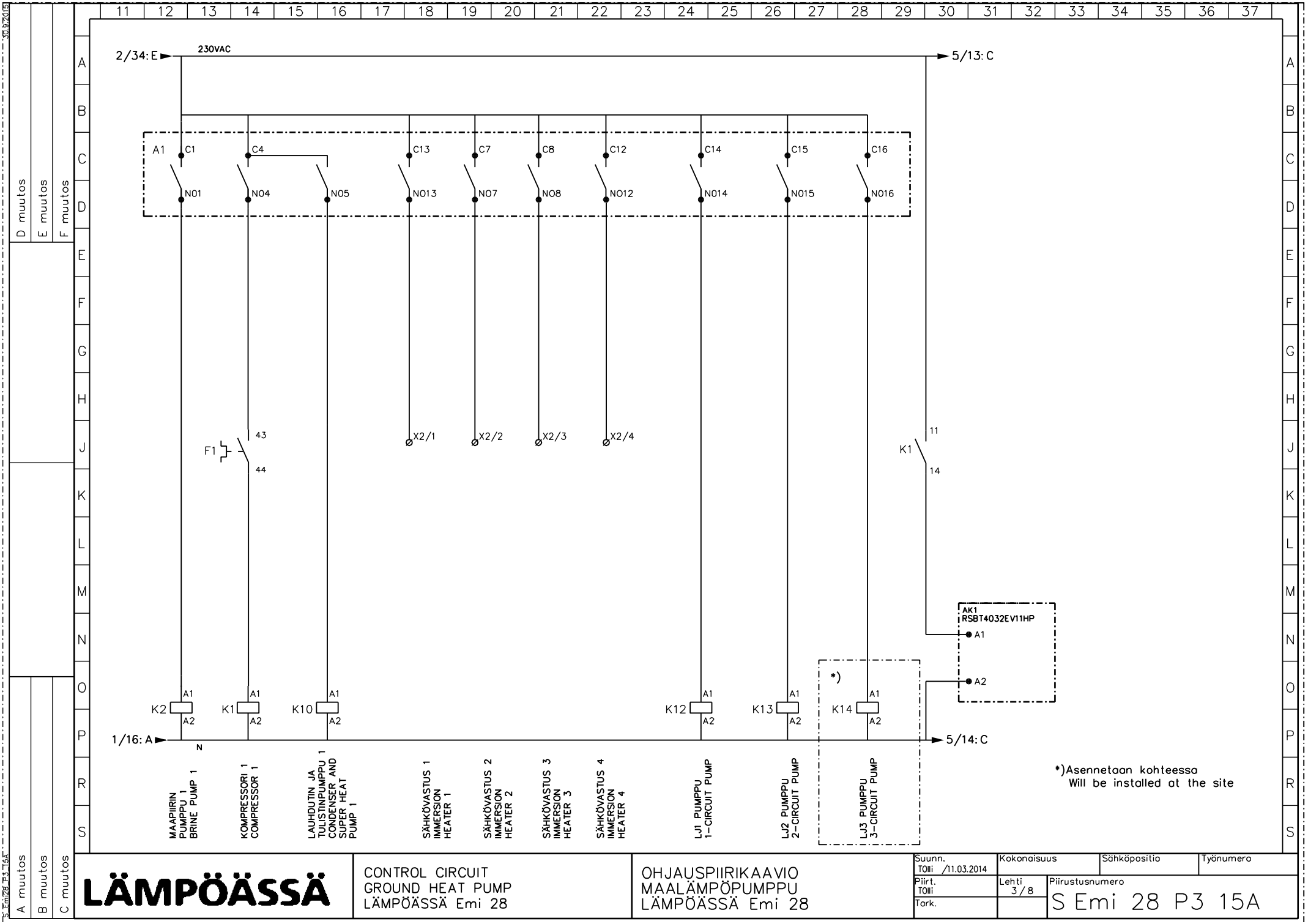
PÄÄVIRTAPIIRI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Emi 28

Suunn. TOlli /11.03.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 1/8	Piirustusnumero S Emi 28 P3 15A	
Tark.			



LÄMPÖÄSSÄ	CONTROL CIRCUIT GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 28	OHJAUSPIIRIKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 28	Suunn. TOlli /11.03.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 2/8	Sähköpositio Piirustusnumero S Emi 28 P3 15A	Työnumero

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos



LÄMPÖÄSSÄ	CONTROL CIRCUIT GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 28	OHJAUSPIIRIKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 28	Suunn. TOlli /11.03.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 3/8	Sähköpositio Piirustusnumero S Emi 28 P3 15A

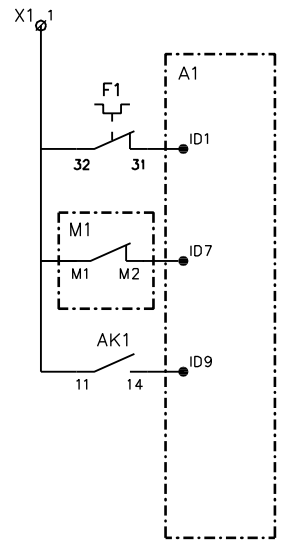
Työnumero

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

30.9.2015
S_Emi28_P3_15A

HÄLYTYSKYTKENTÄ
ALARM CONNECTION

KAIKKI 24V
JOHDOTUKSET
0,75MM2



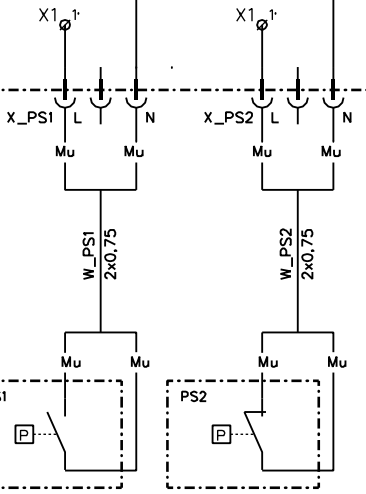
Kompressoripiirin moottorisuoja F1
Compressor circle , Protection switch F1

Kompressorin 1 sisäinen lämpösuoja
Compressor 1 internal protection

Vaihevahti
Phase failure detector

PS1 Pressostaatin toiminta
PS1 Pressostat activity.
Paineeton Non-pressured, off
Käyntitila Normal running, on
Matalapainehälytys Low pressure alarm, off

PS2 Pressostaatin toiminta
PS2 Pressostat activity.
Paineeton Non-pressured, on
Käyntitila Normal running, on
Korkeapainehälytys High pressure alarm, off

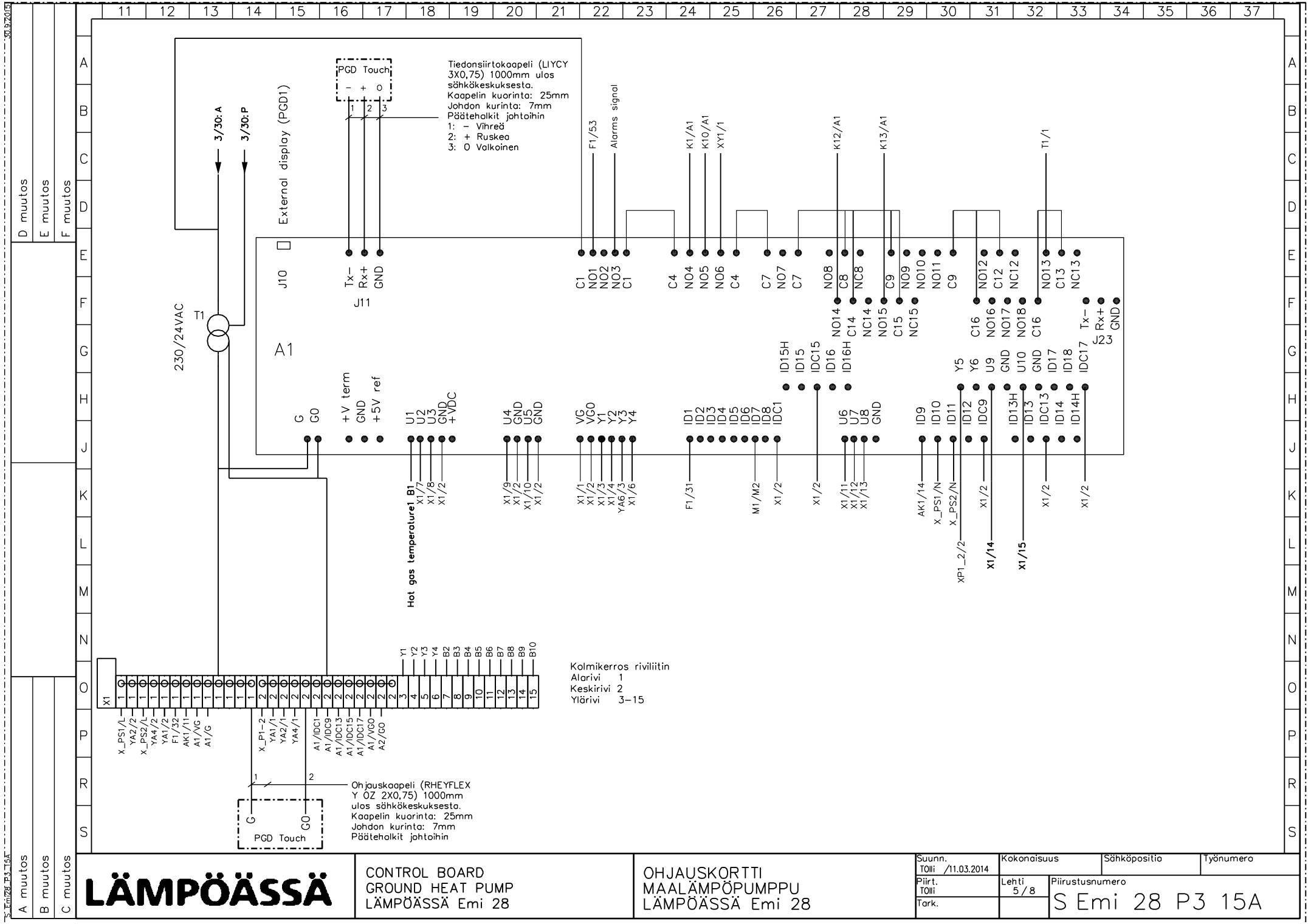


PS1 MATALAPAINE
PS2 KORKEAPAINE
PS1 LOW PRESSURE
PS2 HIGH PRESSURE

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

LÄMPÖÄSSÄ	CONTROL CIRCUIT GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 28	OHJAUSPIIRIKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 28	Suunn. TOlli /11.03.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 4/8	Sähköpositio Piirustusnumero S Emi 28 P3 15A	Työnumero

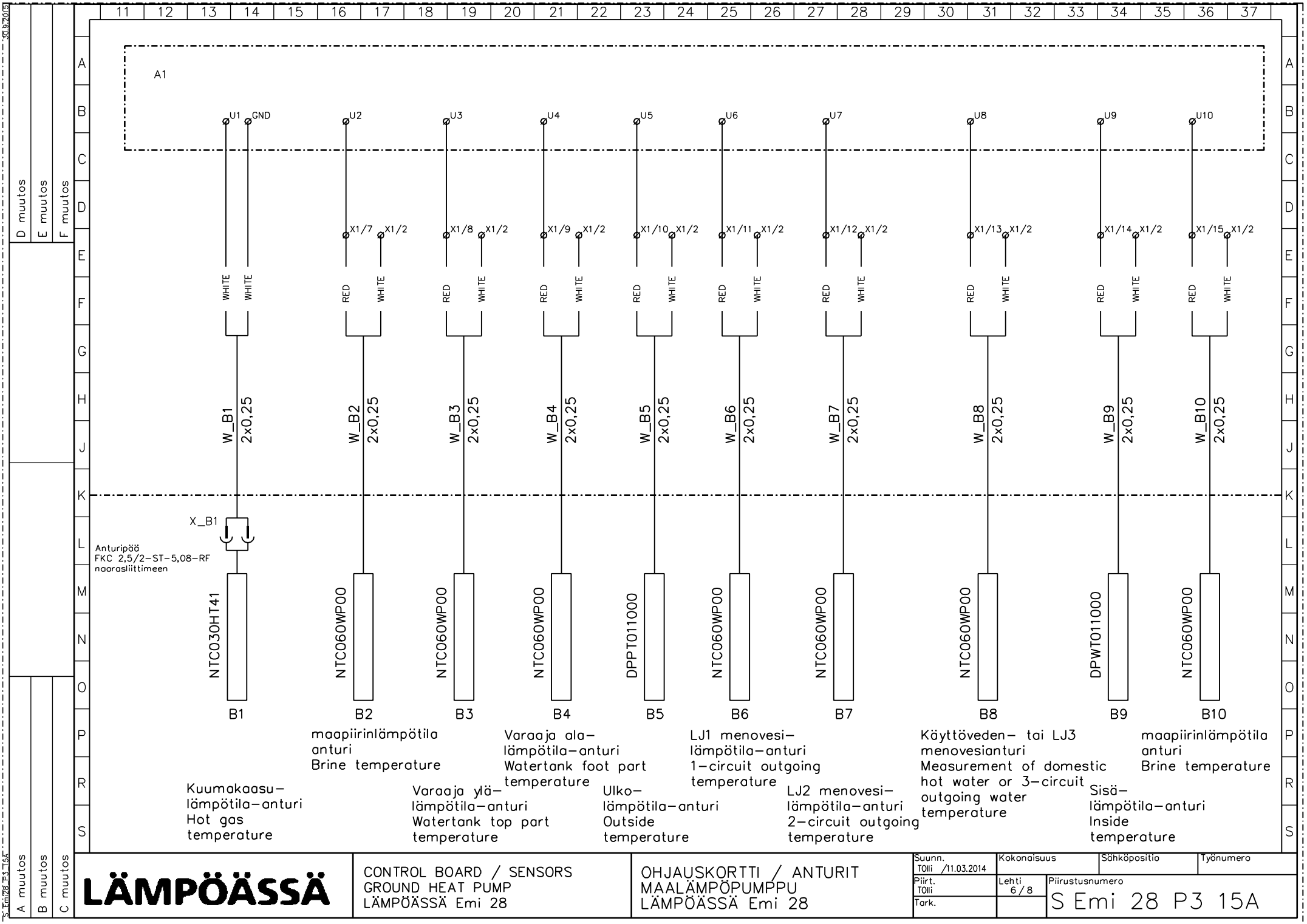
30.9.2015
S_Emi28_P3_15A



LÄMPÖÄSSÄ	CONTROL BOARD GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 28	OHJAUSKORTTI MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 28	Suunn. TOlli /11.03.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 5/8	Sähköpositio Piirustusnumero S Emi 28 P3 15A	Työnumero

A muutos
B muutos
C muutos
D muutos
E muutos
F muutos

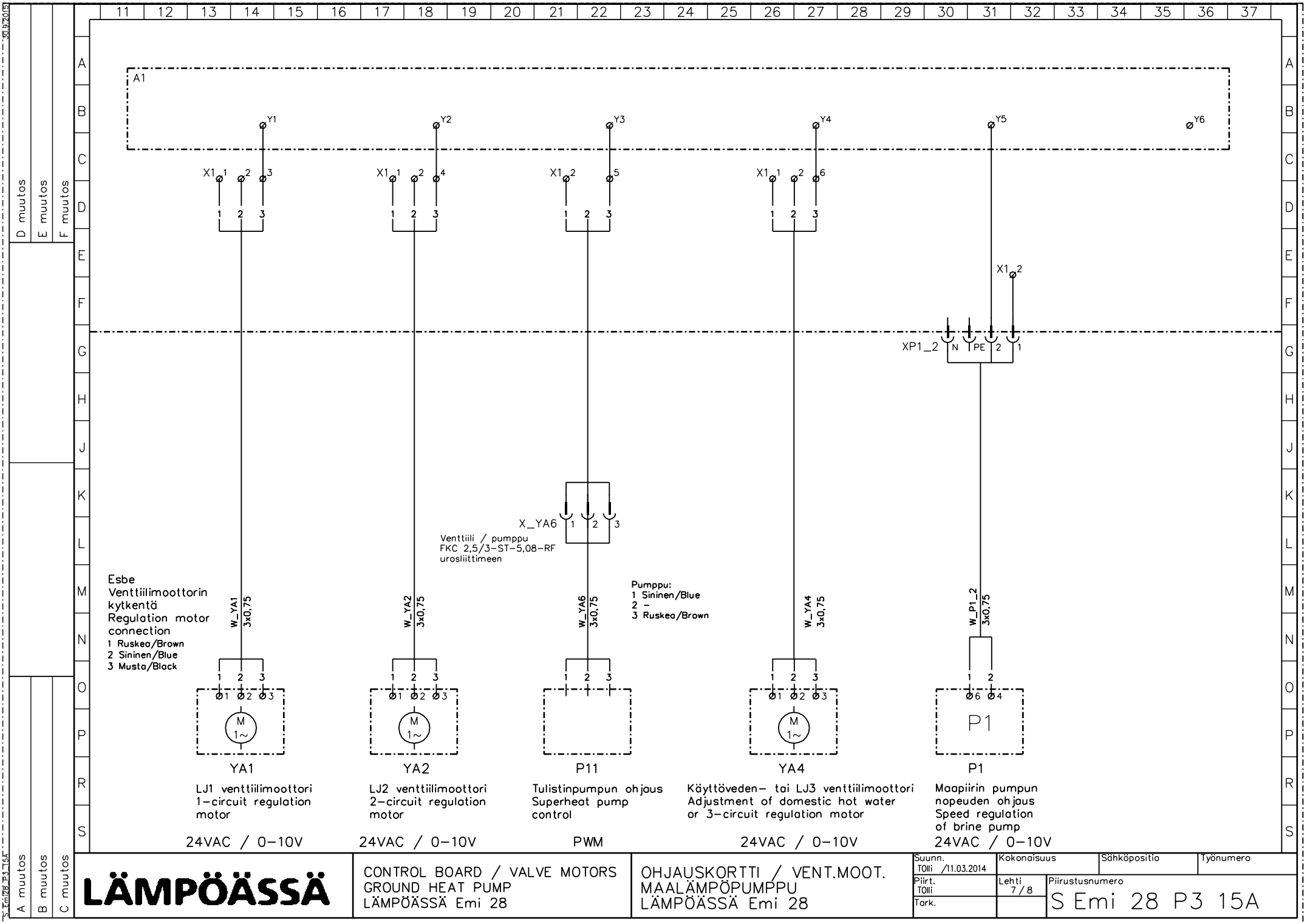
30.9.2015
S_Emi28_P3_15A



LÄMPÖÄSSÄ	CONTROL BOARD / SENSORS GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 28	OHJAUSKORTTI / ANTURIT MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 28	Suunn. TOlli /11.03.2014 Piirt. TOlli Tark.	Kokonaisuus	Sähköpositio	Työnumero
				Lehti 6/8	Piirustusnumero	S Emi 28 P3 15A

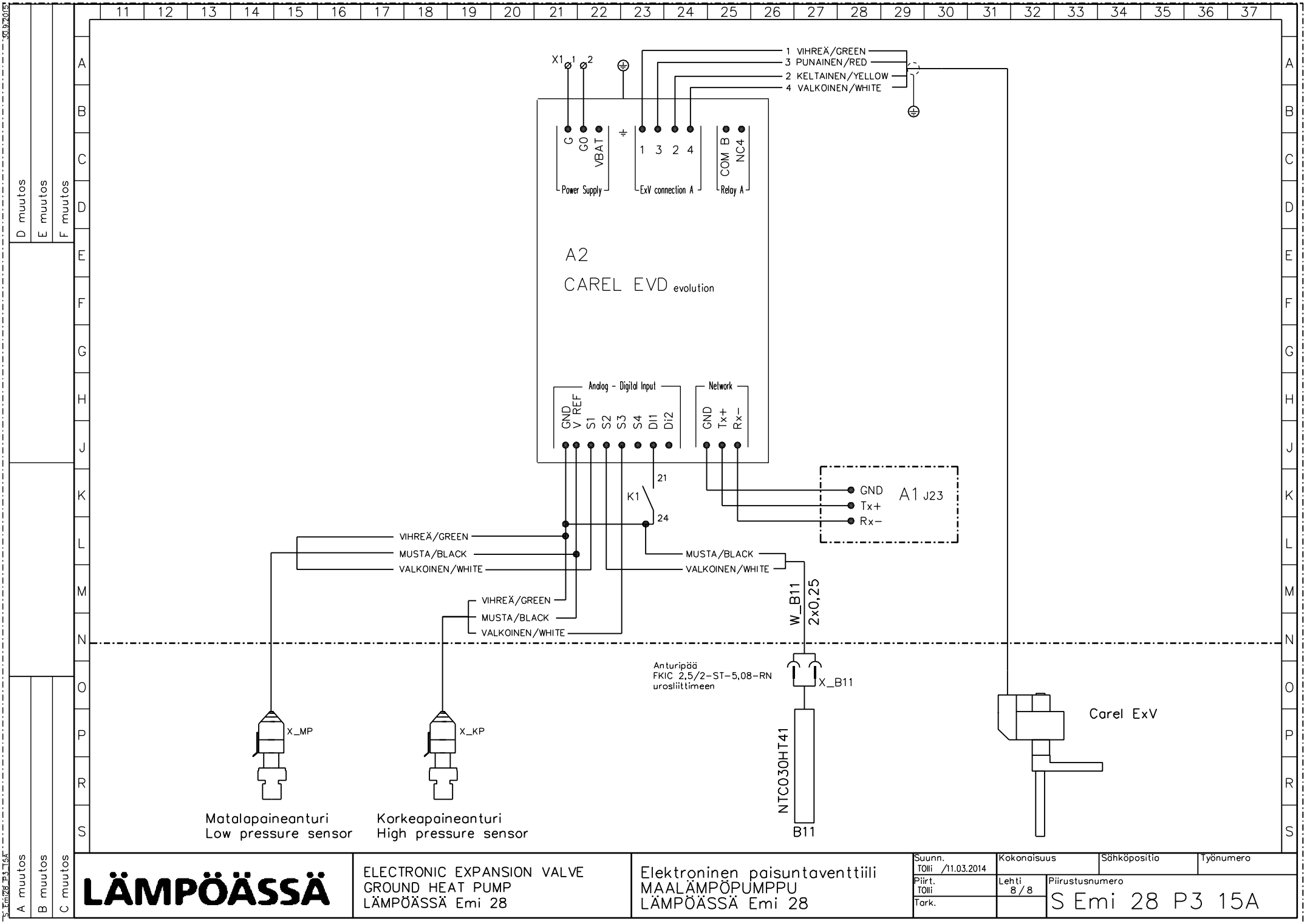
A muutos
B muutos
C muutos
D muutos
E muutos
F muutos

30.9.2015
S_Emi28_P3_15A



LÄMPÖÄSSÄ	CONTROL BOARD / VALVE MOTORS GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 28	OHJAUSKORTTI / VENT.MOOT. MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 28	Suunn. TOlli /11.03.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 7/8	Sähköpositio Piirustusnumero S Emi 28 P3 15A	Työnumero

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos
30.9.2015
S_Emi28_P3_15A



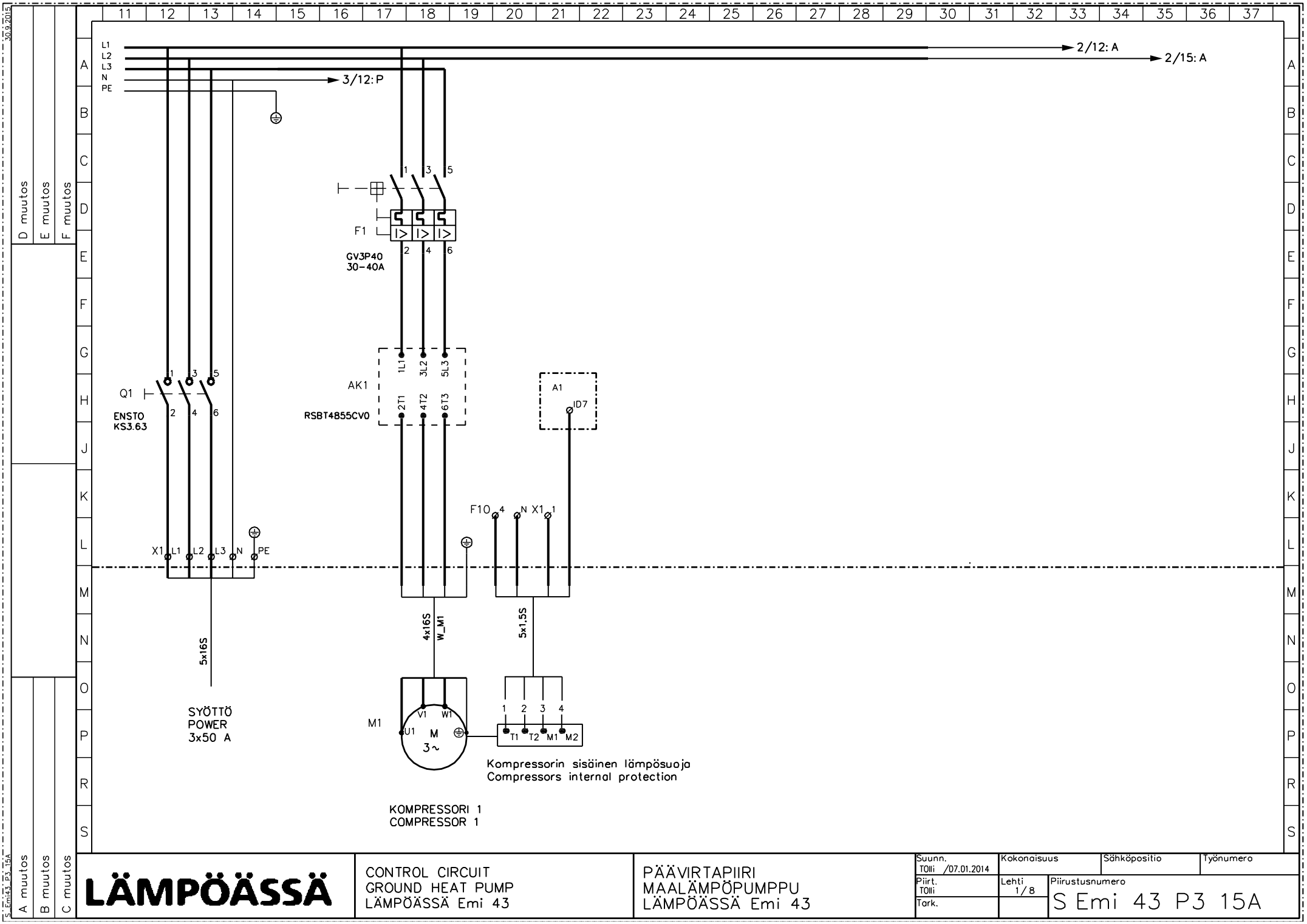
D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

LÄMPÖÄSSÄ

ELECTRONIC EXPANSION VALVE
GROUND HEAT PUMP
LÄMPÖÄSSÄ Emi 28

Elektroninen paisuntaventtiili
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Emi 28

Suunn. TOlli /11.03.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 8/8	Piirustusnumero S Emi 28 P3 15A	
Tark.			



LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Emi 43

PÄÄVIRTAPIIRI
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Emi 43

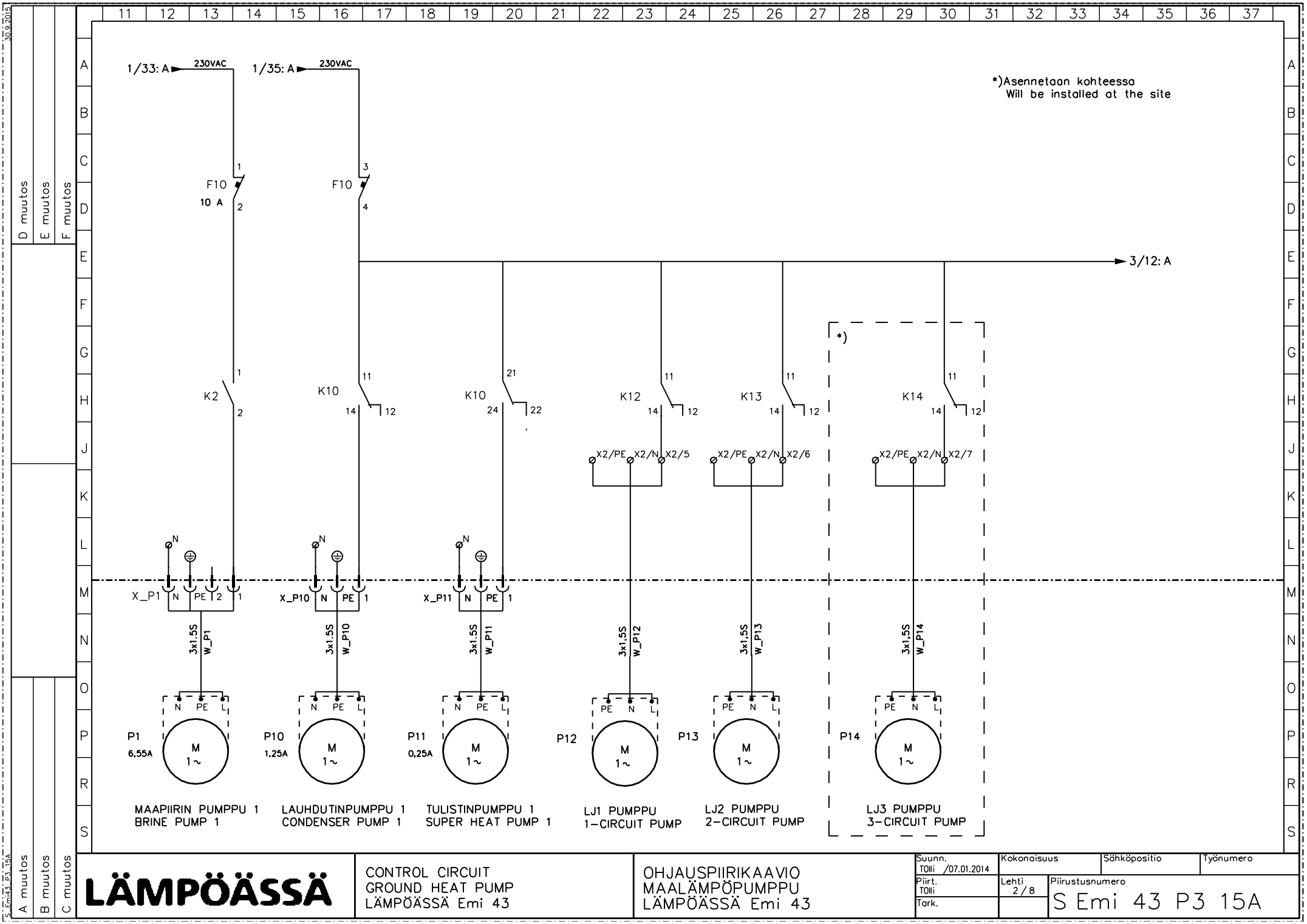
Suunn. TOlli /07.01.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 1/8	Piirustusnumero S Emi 43 P3 15A	
Tark.			

D muutos E muutos F muutos

A muutos B muutos C muutos

30.9.2015

S_Emi43_P3_15A



D muutos	E muutos	F muutos			
A muutos	B muutos	C muutos			

30.9.2015

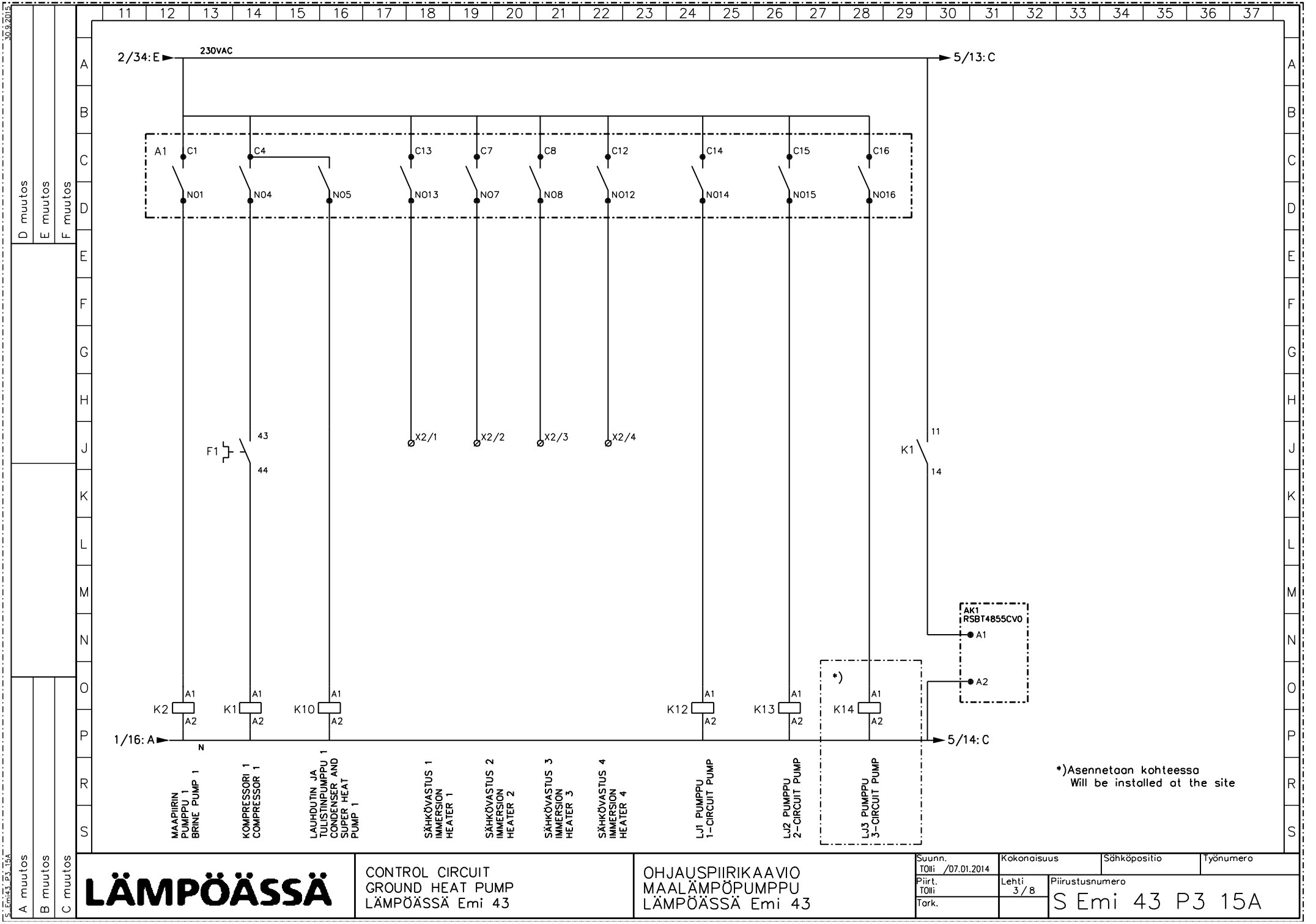
S Emi43 P3 15A

LÄMPÖÄSSÄ

CONTROL CIRCUIT
GROUND HEAT PUMP
LÄMPÖÄSSÄ Emi 43

OHJAUSPIIRIKAAVIO
MAALÄMPÖPUMPPU
LÄMPÖÄSSÄ Emi 43

Suunn. TOlli /07.01.2014	Kokonaisuus	Sähköpositio	Työnumero
Piirt. TOlli	Lehti 2/8	Piirustusnumero S Emi 43 P3 15A	
Tark.			



LÄMPÖÄSSÄ	CONTROL CIRCUIT GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 43	OHJAUSPIIRIKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 43	Suunn. TOlli /07.01.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 3/8	Sähköpositio Piirustusnumero S Emi 43 P3 15A

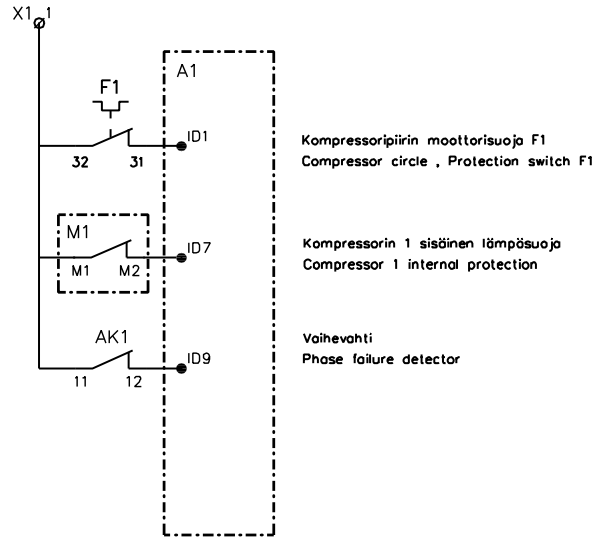
Työnumero

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

30.9.2015

s Emi43 P3 15A

HÄLYTYSKYTKENTÄ
ALARM CONNECTION

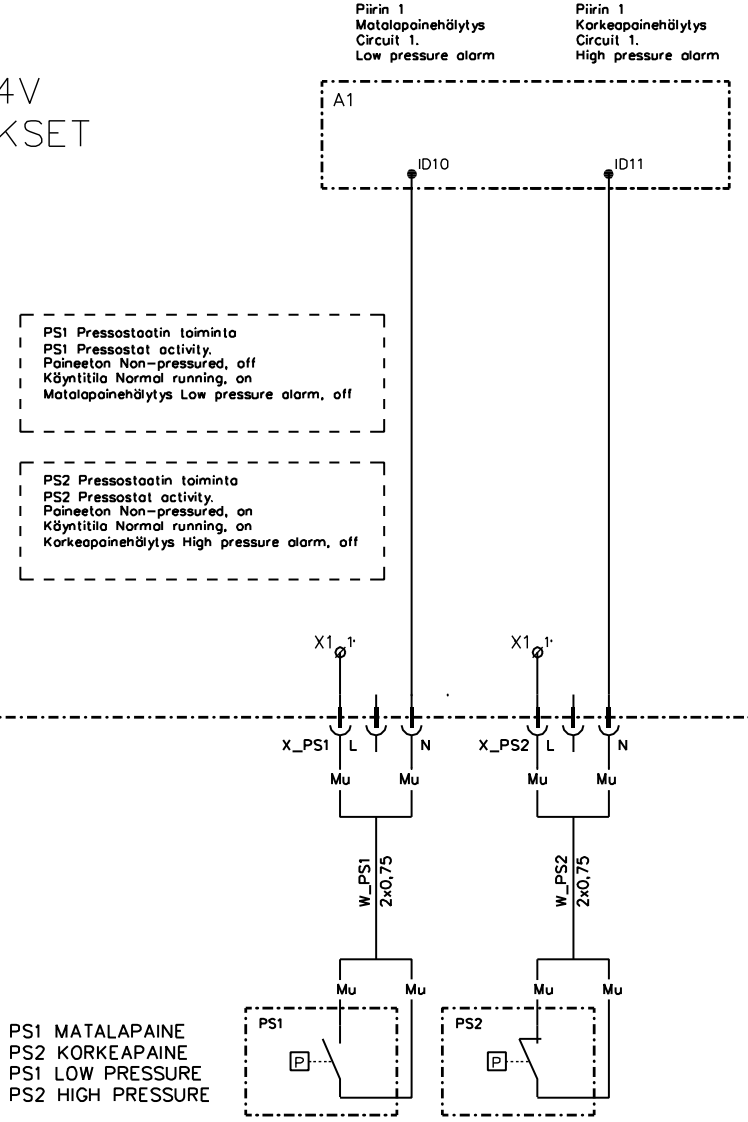


Kompressoripiirin moottorisuoja F1
Compressor circle , Protection switch F1

Kompressorin 1 sisäinen lämpösuoja
Compressor 1 internal protection

Vaihevahti
Phase failure detector

KAIKKI 24V
JOHDOTUKSET
0,75MM2

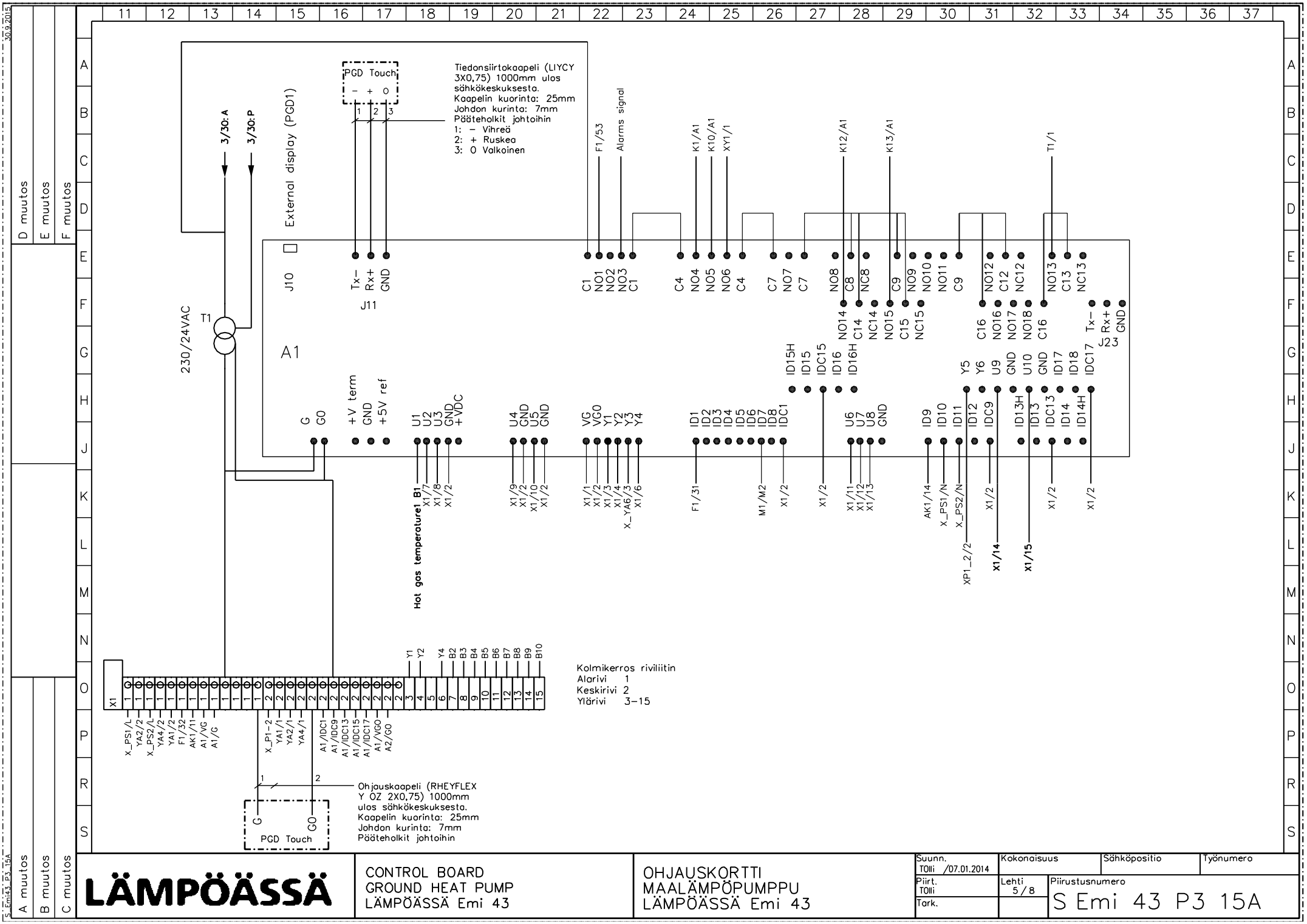


PS1 MATALAPAINE
PS2 KORKEAPAINE
PS1 LOW PRESSURE
PS2 HIGH PRESSURE

LÄMPÖÄSSÄ	CONTROL CIRCUIT GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 43	OHJAUSPIIRIKAAVIO MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 43	Suunn. TOlli /07.01.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 4/8	Sähköpositio Piirustusnumero S Emi 43 P3 15A

Työnumero

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos
30.9.2015
S Emi43 P3 15A

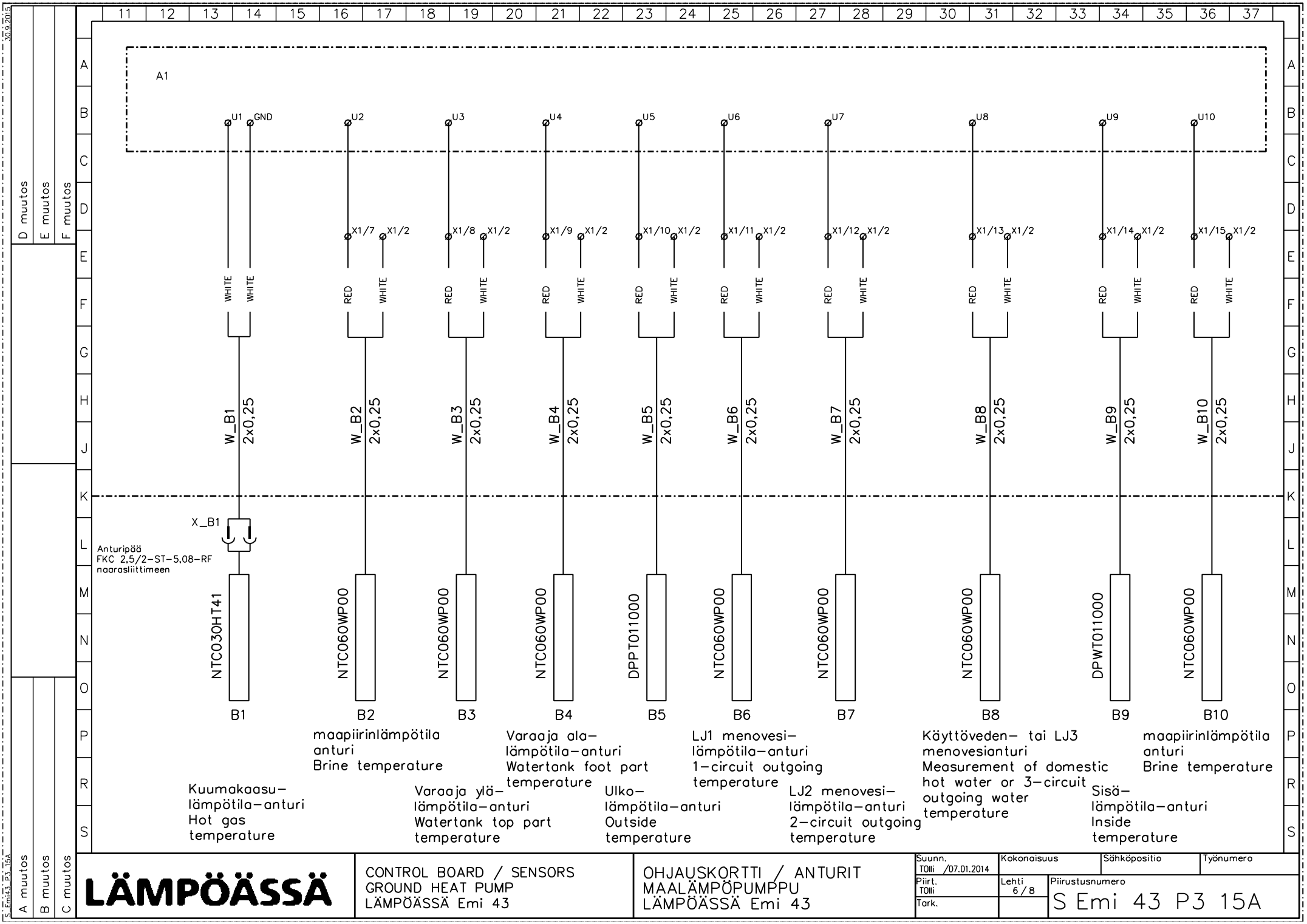


LÄMPÖÄSSÄ	CONTROL BOARD GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 43	OHJAUSKORTTI MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 43	Suunn. TOlli /07.01.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 5/8	Sähköpositio Piirustusnumero S Emi 43 P3 15A	Työnumero

A muutos B muutos C muutos D muutos E muutos F muutos

30.9.2015

S_Emi43_P3_15A



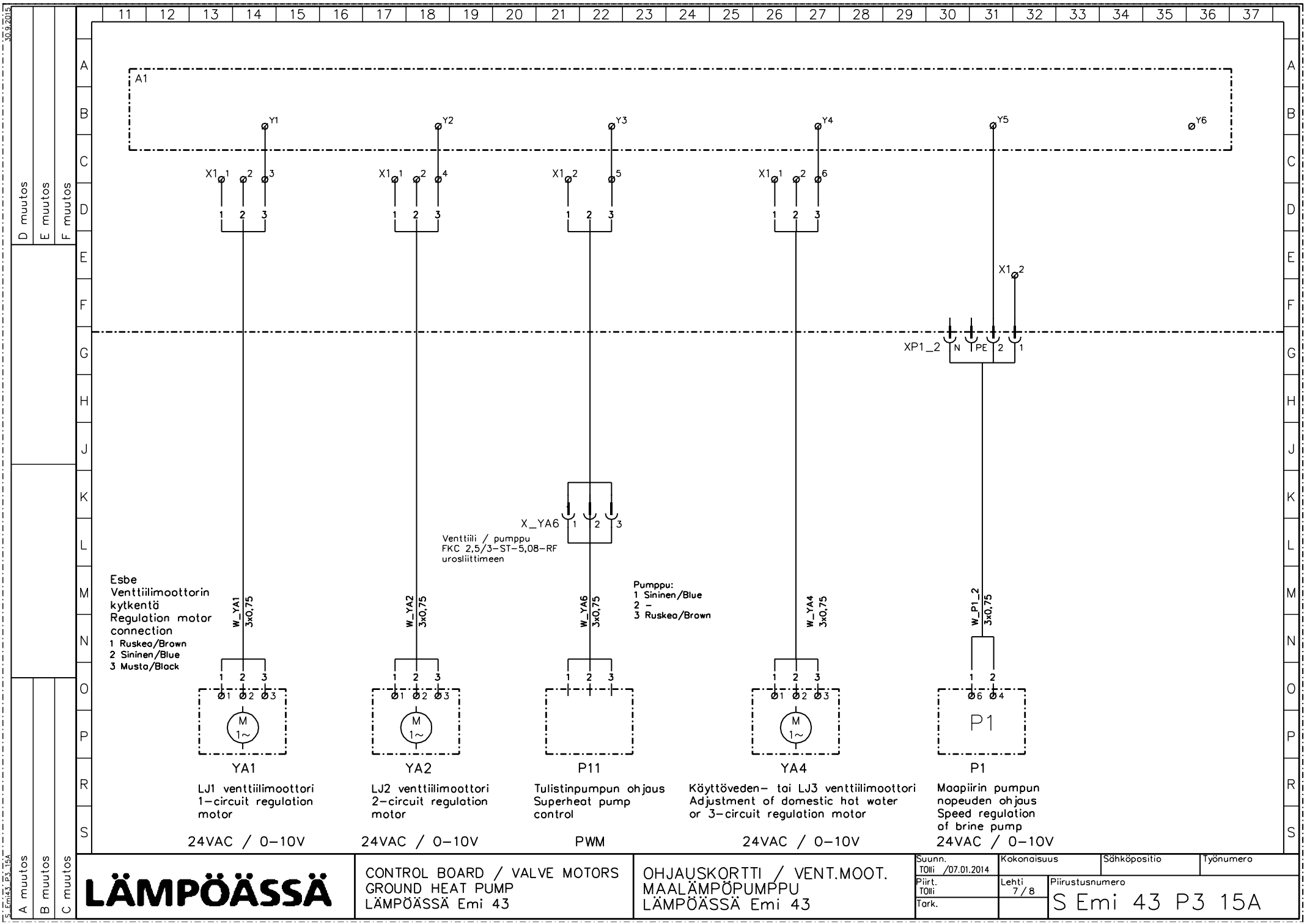
LÄMPÖÄSSÄ	CONTROL BOARD / SENSORS GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 43	OHJAUSKORTTI / ANTURIT MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 43	Suunn. TOlli /07.01.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 6/8	Sähköpositio Piirustusnumero S Emi 43 P3 15A

Työnumero

D muutos
E muutos
F muutos
A muutos
B muutos
C muutos

30.9.2015

S Emi43 P3 15A



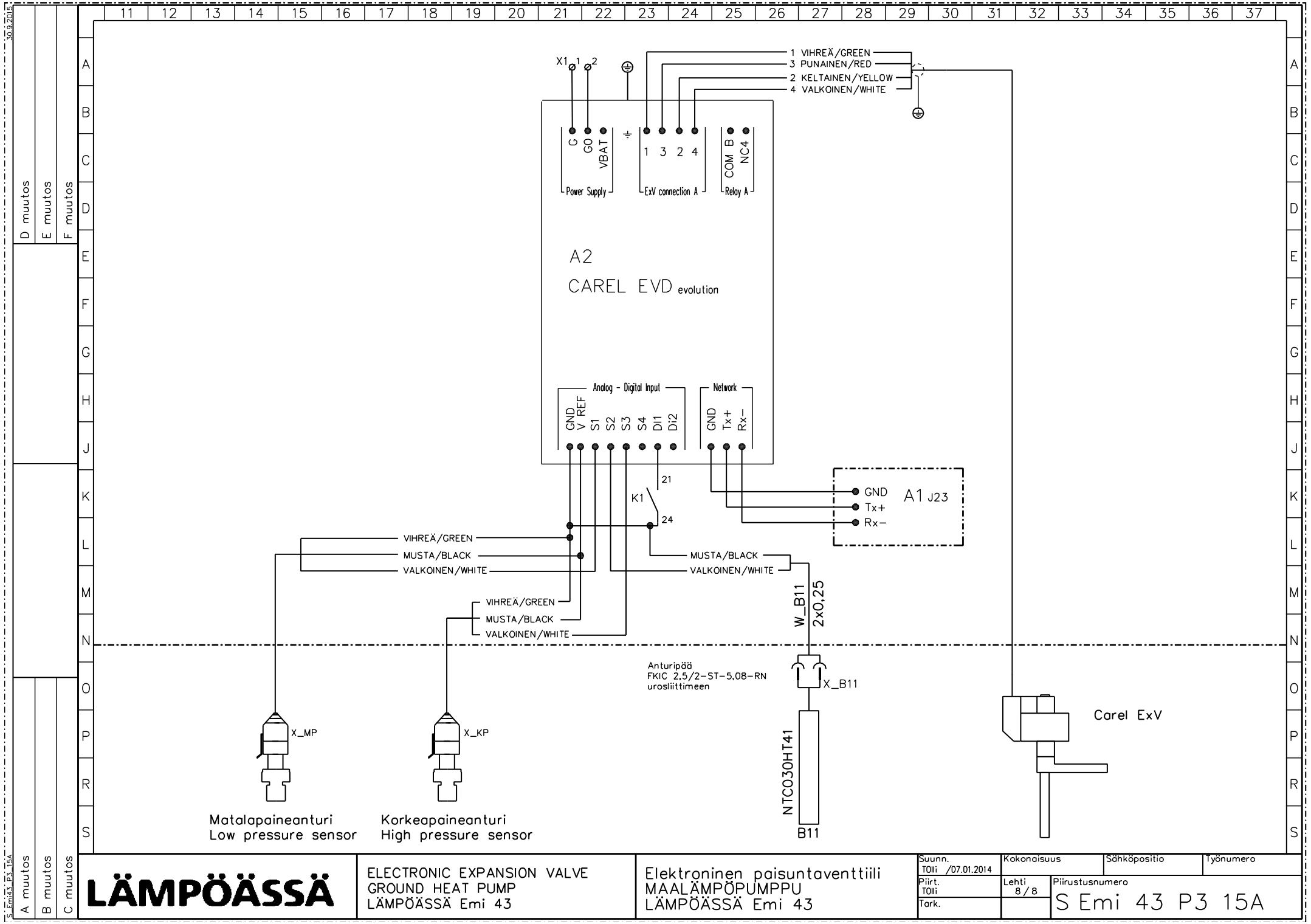
LÄMPÖÄSSÄ	CONTROL BOARD / VALVE MOTORS GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 43	OHJAUSKORTTI / VENT.MOOT. MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 43	Suunn. TOlli /07.01.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 7/8	Sähköpositio Piirustusnumero S Emi 43 P3 15A	Työnumero

D muutos E muutos F muutos

A muutos B muutos C muutos

30.9.2015

S Emi43 P3 15A



LÄMPÖÄSSÄ	ELECTRONIC EXPANSION VALVE GROUND HEAT PUMP LÄMPÖÄSSÄ Emi 43	Elektroninen paisuntaventtiili MAALÄMPÖPUMPPU LÄMPÖÄSSÄ Emi 43	Suunn. TOlli /07.01.2014 Piirt. TOlli Tark.	Kokonaisuus Lehti 8/8	Sähköpositio Piirustusnumero S Emi 43 P3 15A

Työnumero

D muutos E muutos F muutos

A muutos B muutos C muutos

30.9.2015

S Emi43 P3 15A

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Suomen Lämpöpumpputekniikka Oy
Unikontie 2
62100 Lapua
FINLAND

www.lampoassa.com