

Electric Steam Boiler H-120-E

The Professional's choice since 1935

Installation & operation instructions



Note!

Maintenance of the boiler must be carried out according to this instruction.

All supervision of the boiler must be performed by trained personnel who are qualified specifically to work with boilers and its associated boiler equipment.

Before any activities are carried out on the boiler, the maintenance manual and other related information shall be read through and understood.

1700 890 87-1 EN 2018-11-28

Table of contents

General information	1
Installation instructions.....	1
Exterior drawing	4
Boiler operation	6
Commissioning	7
Maintenance instructions	8
Troubleshooting (general)	8
Level controller ER-Ipsx	9
Level controller ER-8	13
Level switch (NRS 1-50)	18
Component list.....	21
Appendix 1: Electric circuit diagram	24
Appendix 2: Certificate of conformity (PED).....	38
Appendix 3: CE-certificate (LVD & EMC)	39
Appendix 4: Safety circuit approval	40
Appendix 5: Steam flow velocity in pipe systems	41
Appendix 6: Saturation data for water and steam	42
Appendix 7: Steam table.....	43
Appendix 8: Steam installation examples.....	44

Technical Data						
Type H-120-E	Power kW	Steam cap. kg/h	Op. pressure bar	Voltage V	Current A	Power stages amount
48	48	62	7,0	3x400,PEN, 50 Hz	70	2
72	72	94	7,0	3x400,PEN, 50 Hz	105	3
96	96	125	7,0	3x400,PEN, 50 Hz	140	4
120	120	156	7,0	3x400,PEN, 50 Hz	174	5

Dimensions				
Type H-120-E	Length mm	Width mm	Height mm	Weight kg
48	1900	1100	1300	450
72	1900	1100	1300	450
96	1900	1100	1300	450
120	1900	1100	1300	450

General information

Osby Parca H-120-E is a fully automatic electric steam boiler. The heating is done with acid-proof steel and acid resistant pipe elements. When using these materials one minimises servicing and maintenance needs. A pressure sensor keeps the boiler's operating pressure constant. The feed water supply is controlled by level electrodes that also switch off the electrodes if the water level should be too low/high. If the water level drops outside the low/high point, the boiler is turned off.

The electrical cabinet is fitted on spacers on one of the long sides of the boiler. All electrical equipment is internally connected and placed in the electrical cabinet.

Installation instructions

Location

Place the boiler on a horizontal and stable ground. There must be space in front of both cable ends and above the boiler for service of electrical heaters, electrode stands, pressure gauges etc.

Should the pressure vessel get damaged during transport or during installation there may occur unforeseen problems and damages. The parts for lifting and transport have to be used when moving the boiler.

There must be a free space of (at least) 1.2 m in front of the electric cabinet.

Ambient temperature should not exceed 35 °C. Higher ambient temperatures may cause damage to electrical equipment. When higher ambient temperature extra cooling device for the electrical cabinet is recommended.

Safety valves, bottom blow, steam pipes and feed water have to be supported well so that forces and momentum are minimized on the pressure vessel's connections.

The pressure vessel can't be filled with water when there is risk of freezing.

During operation and during the time that the boiler water is cooling of the pressure inside the boiler are higher than the atmosphere pressure, therefore the temperature is higher than the air temperature. During these circumstances neither the pressure vessel nor the connections can be opened, as this may lead to person or material damage. The boiler have to be turned off and the water must be cooled down before opening.

Electrical Installation

Main switches are included in the steam boiler's automatic cabinet. The electrical connection is made directly on the upper side of the switch and according to the provided circuit diagrams.

- ! Before start all cable connections, terminal connection etc must be checked and retightened.
- Check-up and retightening must be done after about 100 operation hours and then annually.
- ! **After approximately 8 hours of operation, all power cables should be checked and secured.**
- An authorised electrician should carry out all electrical work and the power has to be turned off when performing electricity work.

Steam piping

All pressurised pipes and fittings should have at least the same pressure class as the steam boiler. The opening pressure of the safety valves decides the lowest approved pressure material strength. Pressure vessel pipes should be used for steam pipes as a rule. In certain cases, thick wall copper pipes soldered using high temperature solder could be used. Please ask for details from the local authority in case of doubt.

The pipe dimension should be selected in order to keep the steam pipe speed below 25 m/s. When long pipes are used, a larger dimension should be selected in order to keep the pressure loss at a minimum. The steam pipe is connected to the boiler's regulator valve with a drop of at least 0.5% in the steam flow direction.

All low points and one point before the steam consuming equipment should be equipped with a drain pocket and connected to a condensate diverter.

Steam connections to steam consuming equipment should be made on top of the steam pipe. At the final point of the steam pipe, a manual or automatic de-airing device should be fitted. It's very important that all gaskets are totally sealed. Leakages may result in damage to person and machine.

Exhaust piping

Exhaust pipes from the non-insulated feed water tank shall ensure that the pressureless feed water tank remains pressureless.

The exhaust pipe and the drain pipe from the de-tensioning container should discharge outdoors, in a personnel safe manner and may not be equipped with a tap.

The exhaust pipe from the de-tensioning container should not have too many bends. If the pipe becomes too long with too many bends, the pressure drop must be calculated.

The drainage from the de-tensioning container and from the feed water tank must not be connected!

Drain piping

From the safety valves, water levels and water pipes, the drainpipes should be drawn to the sewer line. It is recommended that the drain pipes discharge into a heat-protected funnel and from there in a joint pipe to the sewer line.

The bottom tap from the de-tensioning container must be plugged.

Blow down

When using automatic blowdown the water leads to a de-tensioning container.

Water quality

Dilution water is a water type that has been treated so that hardeners, salts and other contamination sources have been reduced to a level acceptable to the plant.

This means that de-hardened water should be used as dilution water.

A low pH value speeds up corrosion. Water dosage may be necessary in order to avoid this type of corrosion. The pH value of the water should be between 8.8–10.5.

Insulation

Steam pipes normally have a high temperature. They should therefore be well insulated and the covering should be made using AL-sheets or similar. Avoid using plastic materials for insulation. There are hot surfaces on the boiler, therefore carefulness is vital for avoiding burn wounds.

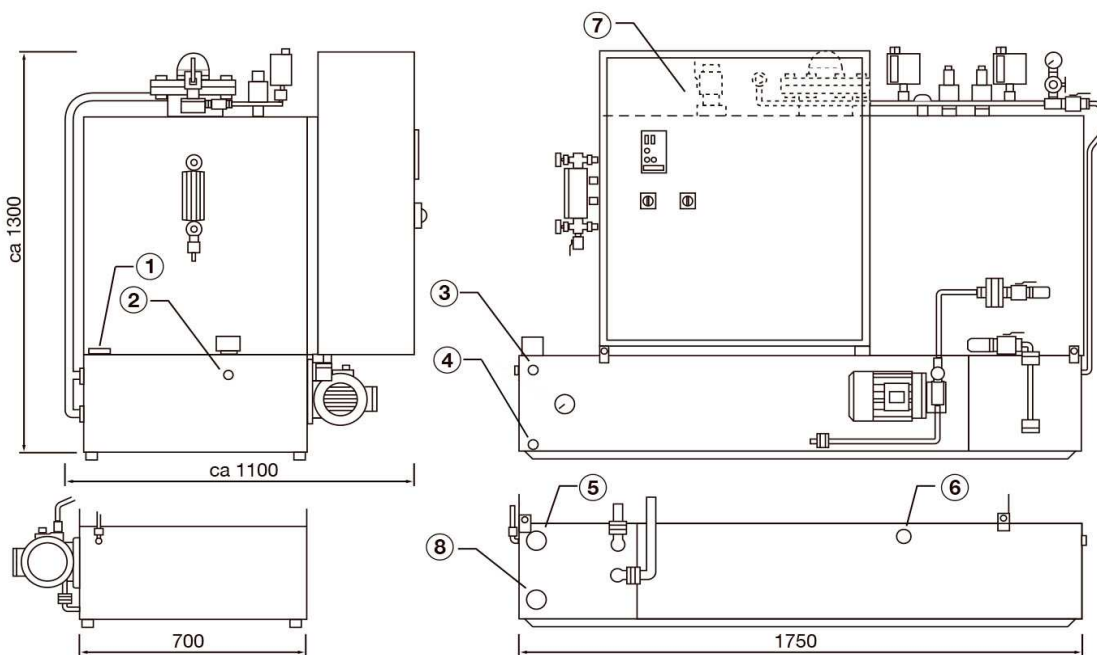
Inspection

After installation and prior to commissioning, the entire plant should be inspected and tested. The inspection should be carried out by authorised staff.

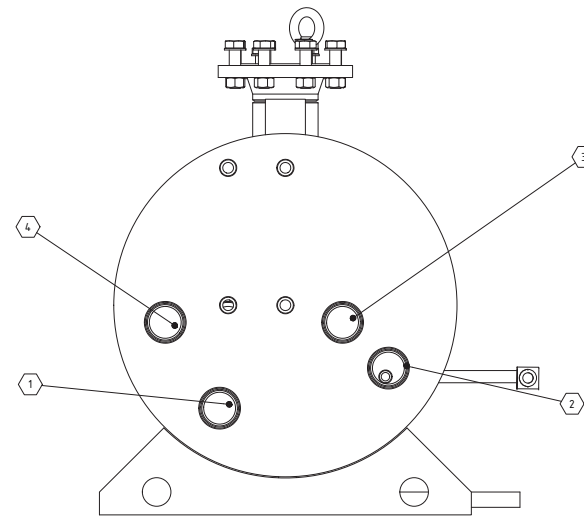
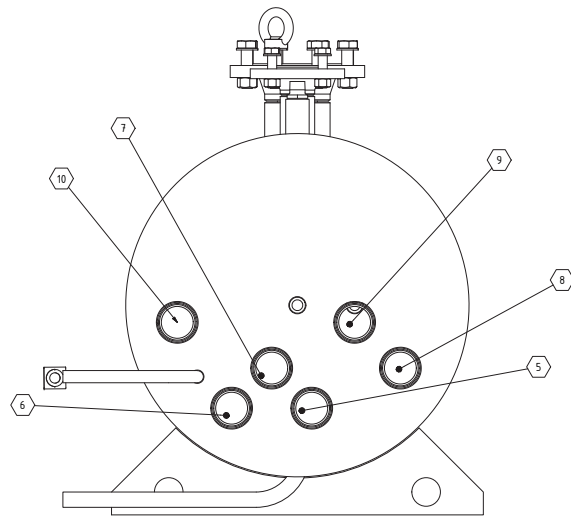
Recycling

- The packaging must be deposited at a recycling station or with the installation engineer for correct waste management.
- At the end of the product's life cycle, it must be recycled in a correct way and be transported to a waste station or reseller offering a service of that type. Disposing of the product as household waste is not permitted.
- It is of great importance that the product's electrical/electronic equipment and other material dangerous to the environment are properly disposed of.
- These instructions are of course also valid for any additional equipment.

Exterior drawing H-120 E



- | | |
|--------------------------------------|------------------------------------------|
| 1. Exhaust piping, feed water, DN 50 | 5. Exhaust piping, blow container, DN 50 |
| 2. Spillway, DN 15 | 6. Condensate return, DN 25 |
| 3. Dilution water, DN 15 | 7. Steam valve, DN 25 |
| 4. Drain, DN 20 | 8. Connection for blow down, DN 40 |



Patroneffekt: 12 kW/patron

Inkopplade elpatroner	Panneffekt (kW)	Ångkap. (kg/h)
1-4	48	62
1-5	60	78
1-6	72	94
1-7	84	109
1-8	96	125
1-9	108	140
1-10	120	156

Den här ritning är utestående Osby Parcas egendom och får ej obehörigen användas, kopieras, föredisas eller utlämnas till annan person.

Reviderad	Datum	Av	Reviderad		
2013-06-11		Tom			
Skala	Exteriörritning			55-550 2168_m	Blad
1:10	Elångpanna H-120-E 8 bar			55-550 13928_A	2 / 2
				R1009692	B

Boiler operation

The level controller monitors the water level, which also can be seen at the level stand.

The water pump fills water from the water feed tank. A nonreturn valve makes sure that the water doesn't get pressed back from the steam boiler.

If the water level gets too low the low level controller stops the power supply.

The steam leaves the steam boiler through the steam drain to the consumer where the steam is condensed at constant temperature and emits its energy. All condensate is returned to the water feed tank via a steam trap. Non-returned steam is replaced by **dilution water**.

If a reducing valve is used between the steam boiler and the consumer a more stable temperature is reached and there's also a spare capacity for larger or urgent needs.

Pressure switches start and stop the power supply to maintain the pressure of the boiler. If the pressure exceeds maximum, the power supply is stopped. If the pressure continues to rise the safety valves will open.

By the automatic blowdown the boiler is cleaned from sludge and impurities. The blow-down is commissioned via the de-tensioning container and should be performed daily.

Commissioning

Make sure that the pipe installations and the electrical installations have been carried out according to instructions and applicable requirements. Make sure that the steam regulation valve and the blowdown valve are shut.

Open the taps on the sightglass stand and the feed water supply.

Turn on the power, now the white button and the red lamp will light up. After this, depress the white button and maintain it depressed. The solenoid valve opens and fills the boiler to a level of 10–30 mm below the upper edge of the inspections glass. The solenoid valve closes when the emergency trip's correct level is achieved. Finally, release the white button and depress it once more in order to reset the safety circuit. When the safety circuit is resetted the boiler function is ready to be activated and the white lamp switches off.

Tune in the desired configuration with the two rotary couplers.

When the boiler pressure increases, make sure that the pressure gauges switch the power off before the safety valve opens. The pressure switches are factory set at approximately 0.1 bar below the safety valve opening pressure, which is 1.0 bar.

The operating pressure is adjusted with the adjusting knob on top of the operation pressure switch. The differential pressure (the difference in bar between activation and deactivation of the power) can also be adjusted. This is done by loosening the front of the operation pressure gauge and rotating the differential pressure knob. By rotating clockwise, the difference increases, and by rotating anticlockwise, the difference decreases. The factory default differential setting is 0.1 bar.

The steam regulation valve can now be opened carefully.

Configuration of automatic blow-down:

- Program period — The time that are to pass between the blow cycles.
- Program time — The duration of each blow-down.
- Valve closed — The time during which the blow-down valve is closed.
- Valve open — The time during which the blow-down valve is open.

Example

I want the steam boiler to be bottom-blown each 5th hour.

During two minutes every 5th hour one bottom-blow program should occur in 30 second impulses. During each interval the valve should be open 5 seconds.

Configure according to the following specifications:

- Program period 5 hours.
- Program time 2 minutes.
- Valve closed 25 seconds.
- Valve open 5 seconds.

This configuration now will open the valve in total 4 times every 5th hour during 2 minutes: 25 seconds closed and 5 seconds open. In order to not keeping the operator waiting when testing a new program configuration the program is executed each time that the attendance button is put to the "on" position.

Maintenance instructions

Daily:

- Close the steam-regulating valve
- Check the boiler water level
- Check that there are no leaks
- IF NOT USING AUTOMATIC BLOW-DOWN: Open the blow down valve for 5 seconds, wait 25. Repeat this cycle four times. (Total: 2 minutes). The blow-down cleaning need depends on the water quality.

Quarterly:

- Check the safety valves' function manually
- Open the cleaning tap below the level stand for approx. 5 sec
- Open the cleaning tap on the water pipe for approx. 5 sec

Annually:

- Check and secure all power cable connections
- Clean the level electrodes
- Check the pressure vessel and the electric immersion heaters
 - In case of scale deposits the boiler should be cleaned
 - The water quality should be checked
 - If there's caustic corrosion damage present, blow-down should be carried out more often, 2 or 4 times per operation pass
- Check the pressure gauge function

Troubleshooting

General

- Problem: Boiler overfilled.
- Reason: Vacuum occurred when the boiler was started.
- Solution: Control the vacuum valve and replace it if needed.

- Problem: The level regulation of the pump doesn't work.
- Solution: Check the electric connections on the electrode stand.
- Solution: Check the regulation unit.
- Solution: Control the electrode(s) and clean them if needed.

- Problem: The safety valves open even though the pressure gauge shows low pressure.
- Reason: The water pocket tube is tamped.
- Solution: Clean the water pocket tube.

Level controller ER-Ipsx

Device

The level controller is made for 11 terminal socket assembly. It contains of a power supply device with function delay, control relays, LEDs and test buttons. The maximum ambient temperature is 50° C.

Function

During commissioning the level controller monitors the low/high water level. The lamp is lit. If low/high level the pump stops. If low/high level the level controller is activated. The level controller also gives a signal when the pump starts or stops (or the solenoid valve opens/closes).

Mounting

For assembly, laws, standards and regulations must be observed. Mounting and operation instructions must be observed. (Should be handed over to operating personnel before commissioning).

Electrode length / Electrode

Level sensors are mounted directly in the boiler steam room, where the level variations are the lowest. The electrode length is measured from under the flange gasket and will be indicated on the order. Electrodes must be installed in accordance with applicable standards and regulations.

Electrodes are mounted in in the order shown in the assembly drawing.

When mounting use a socket wrench and make sure that the gasket is sealing. The threads should be lubricated with teflon grease or similar.

The cable from the electrode stand should be put in a loop to allow elevation of the stand.

Do not forget to check work pressure, working temperature and electrode length.

The distance between the electrode and the appliance is unlimited (Maximum of 50 m is recommended).

Commissioning

Before commissioning check that the equipment is fitted as instructed and applicable regulations.

Check the operating voltage and that the connection is in accordance with the schedule and current regulations.

Check if there is water in the system.

Vent the system.

In new installations, level disturbances may occur due to contaminants (caused by sludge, glow scale, rust flakes etc.) in the boiler water. Blowdown usually helps. If not contact Osby Parca service department.

Now you can switch on the electrical power.

Also check that the water level does not vary abnormally even in case of excessive vapor withdrawal.

Check that the boiling water salt and alkaline content comply with the boiler manufacturer recommendations and that no foam-containing substances are present in the water.

Testing during operation

Controller test

Vary the level so that the controller can start / stop the pump or open / close the valve.
Delay time start / open pulse is adjustable 2 - 30 s.
The device may also be tested with the test button, "reg. Test".

Low level alarm

Lower the level below the minimum allowed.
Alarm should alert, alarm LED lit, oil burner / pump stopped.
Alarm delay is adjustable 2 - 30 s.
The device may also be tested with test button, "larm"

Electrode test.

The electrodes and electrode cables may be checked during operation.
Measure with a voltmeter (0-60V AC) between electrode and level sensor
Electrode surrounded by water: Voltage 0 V.
"Dry" electrode: Voltage 3 V.

Device test.

The device is equipped with test button "reg test" to manually affect the pump / valve.

Sensitivity.

The sensitivity of the device can be set with a potentiometer on the front, following the sensitivity of the water.

Electric specification.

Voltage: 230VAC + 10%, 50 Hz +/- 1 Hz.
Amperage req: 6 A fuse.
Power consumed: 1,5 VA.
Working temperature: +5 to +50 °C, non condensing humidity.
Relay contact alarm: 1-term, switching contact, 6 A AC1 or 5 ADC at 30 VDC (galvanic separated).
Relay contact Regul: 1-term alt. closing or disconnecting contact, 6 A AC1, 5 ADC at 30 VDC (galvanic separated).
Adjustable delay: approx 2 to 30 s.
Adjustable sensitivity: Min 10 uS.

Periodic review.

The equipment should be checked regularly.
Function tests (Device tests) shall be performed every day.
Testing during operation shall take place once a week.
Inspection and cleaning the electrode should be done once per year.

Troubleshooting

The troubleshooting is done so that you can quickly find the errors that may occur. Read the instructions before the troubleshooting begins.

A voltmeter with a measuring range of 230 V and 30 V AC is required.

Start the test by checking the connections and that all terminal screws are tightened.

Check if operation disturbances are caused by voltage disturbances in the system or by contaminants (caused by sludge, glow scale, rust flakes etc.) in the boiler water.

Checking the equipment.

Low level alarm doesn't alert.

Check	Remarks
The level.	
Voltage 230V 50Hz.	Socket 2 - 10
Electrode cable.	Check the isolation.
Function.	Press the test button for 2 - 30 seconds Protection activated – check the electrode and the cable. Protection not activated – change the device cabinet.

Level control works incorrectly.

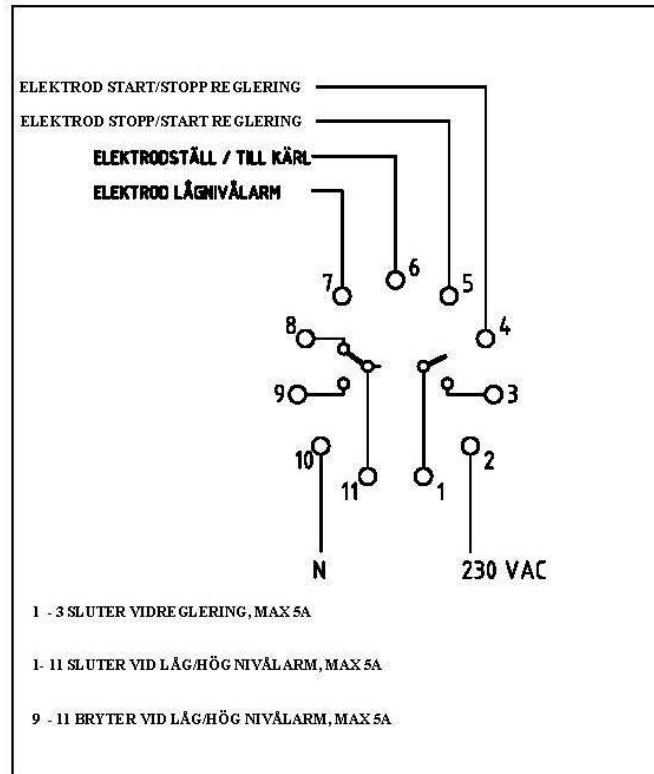
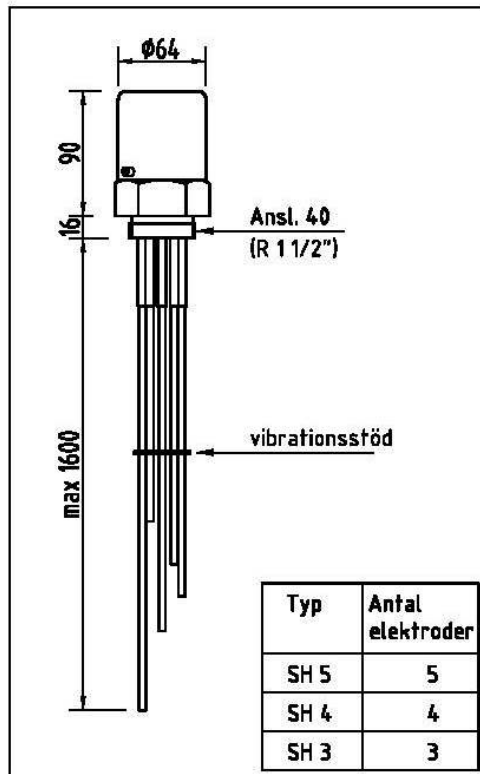
Check	Remarks
The level.	
Electrode cable.	Check if bad contact.
Voltage 230V 50Hz .	Check for malfunction.
Water.	Check the boiling water salt and alkaline content and any contaminants such as sludge, oil etc. (NOTE! Oil levels down to 10 ppm may cause level disturbances.)

The level regulation doesn't work.

Check	Remarks
Voltage 230V 50Hz.	Socket 2 - 10
Control impulses.	Socket 1 - 3

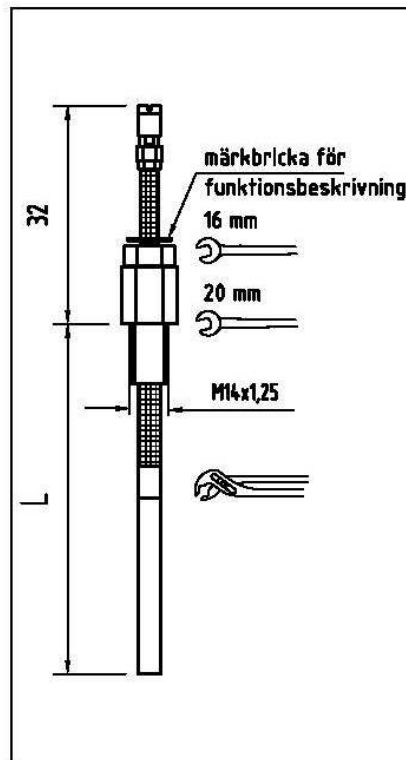
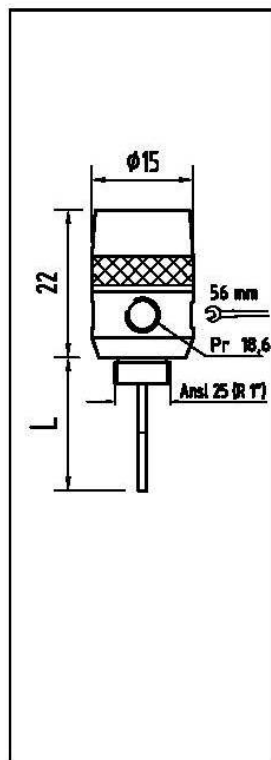
Elektrod SH 3, SH 4, SH 5.

Anslutningschema.



Elektrod SH 1.

Elektrod ENT 120, ENT 350.



Övriga elektroder se produkter/
elektrodställ, nivåelektroder eller
katalog.

Level controller type ER-8

Device Cabinet

The device cabinet has a plug-in performance, for wall or panel mounting (small rack). It consists of a power supply with function delay, control relay, lights and test buttons.

The maximum ambient temperature is 55 °C.

Function

During operation, the equipment monitors low level, high level and pump start - stop. Indicator lights illuminate for normal water level, pump indication and alarms for high and low level.

The pump starts and stops when high/low limit is reached.

A separate alarm will go off when the high/low limit has been reached. When the level is too low a safety measure will trigger the device.

Mounting

For assembly, laws, standards and regulations must be observed.

Mounting and instruction must be observed. (Should be handed over to operating personnel before commissioning).

Electrode length / Electrode

The electrode length is measured from under the flange gasket and will be indicated on the order. Electrodes must be installed in accordance with applicable standards and regulations. Electrodes are mounted in the electrode housing or electrode stand. On the boiler, the electrodes are mounted directly in the boiler.

Do not forget to check work pressure, working temperature and electrode length.

The distance between the electrode and the appliance is unlimited (Maximum of 50 m is recommended).

Commissioning

Before commissioning check that the equipment is fitted as instructed and applicable regulations. Check the operating voltage and that the connection is in accordance with the schedule and current regulations.

Check if there is water in the system.

In new installations, level disturbances may occur due to contaminants in the boiler water.

(Caused by sludge, glow scale, rust flakes etc.)

Vent the system.

Functional test during operation

High level alarm

To test the high level alarm raise the water level until the alarm goes off. (Ground the cable to high level electrode). Warning light shall be lit.

Outgoing relay will switch. NOTE! Alarm delay 10 seconds.

Normal level will turn off the alarm and warning light. No reset is required.

Low level alarm

Try the low-level alarm by lowering the water level until the alarm goes off. (Remove cable to low-level electrode. The alarm lamp shall light and the output relay switch.

NOTE! Alarm delay 10 seconds.

After the normal level returns, the alarm light goes out and the relay switches back.

Pump* start and stop

Test the pump* start function by lowering the water level during the pump start electrode. After a 5 seconds delay the relay will switch and the pump starts.

The pump stops when the water in the boiler reaches the pump stop electrode.

Elektrode test

The electrode and the electrode cable can be controlled during operation.

Wet electrode = Electrode has electrical contact with the boiler body thru the boiler water.

“Vessel soil” If you want to test the low-level electrode you can disconnect it by removing the cable in the terminal block of the device or directly on the electrode. Low-level alarm will turn off if everything works. Corresponding for high-level alarm. Attach the cable to the vessel soil and the device will now alarm to high level. The same applies to pump start / pump stop if you want to start the pump, remove the cable to the pump start electrode = the pump should start, ground the pump stop electrode to “Vessel soil” and the pump should stop.

Device test

The device is equipped with a test button for manual test of high and low level alarm.

Test the function by pressing the button for high or low level. NOTE! Time delay, keep the button pressed for 5-10 seconds.

Periodic review

The equipment is checked regularly.

Function tests (Device tests) are performed every month.

Testing during operation shall take place once a year.

Inspection and cleaning the electrode should be done once per year.

Troubleshooting

The troubleshooting is done so that you can quickly find the errors that may occur. Read the instructions before the troubleshooting begins. A voltmeter with a measuring range of 230 V and 30 V AC is required. Start the test by checking the connection and that all terminal screws are tightened. Check if operation disturbances are caused by air in the system or by voltage disturbances.

Checking the equipment.

The level control does not alarm or the pump* doesn't starts / stops as it should.

Check	Remarks
Level.	
Voltage	230V 50Hz. Terminal 18
Function.	Press the test button for 10 seconds. Protection activated – check the electrode and the cable. Protection not activated – change the device cabinet.

Level control works incorrectly.

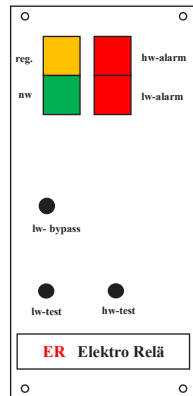
Check	Remarks
Level.	Vent the system.
Voltage 230V 50Hz.	Check for malfunction.
Elektrode cable.	Check that the correct cable is on the correct electrode
Make electrode test as above.	

**In this case the solenoid valve*

ER-8

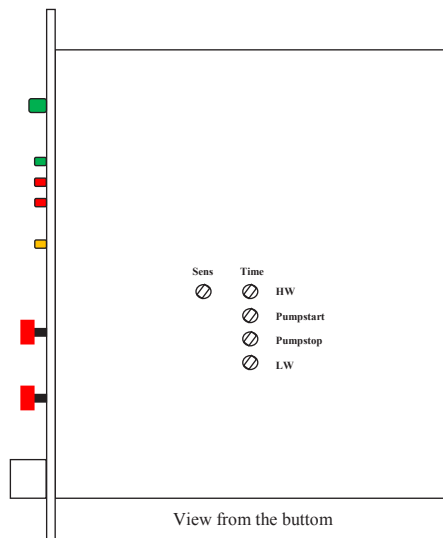
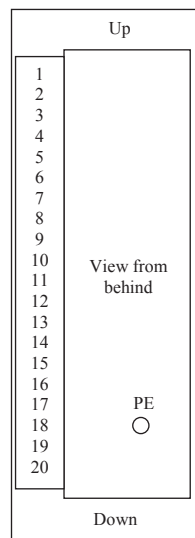
Function description

High-level and low-level alarm with pump automatic.



HW-alarm = High-level alarm.
LW-alarm = Low-level alarm.
Pump (reg.) = Pump activated.
NW=normal water.

HW-test = High-level test.
LW-test = Low level test.
LW- bypass = bypass of alarm during test

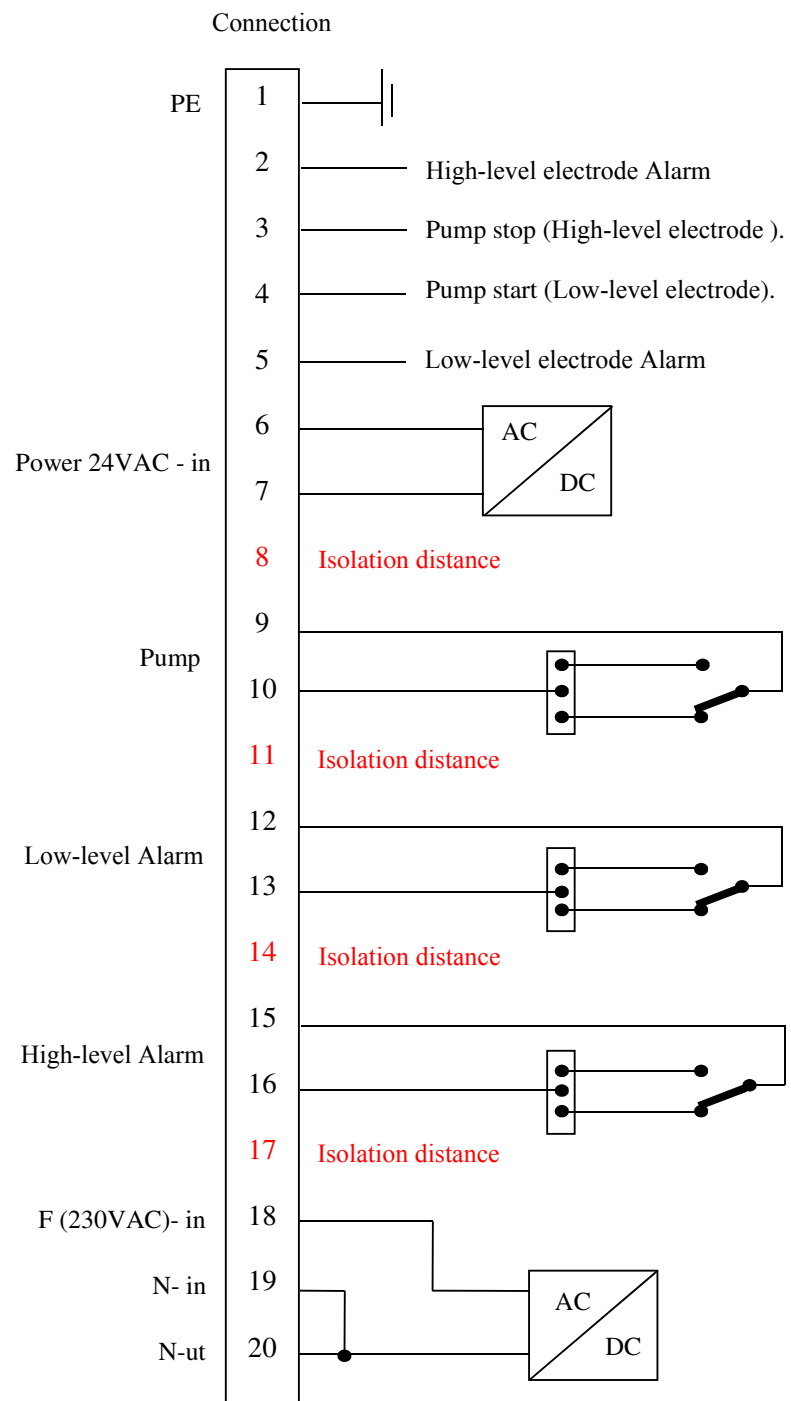


Connection instructions on card connector (1-20):

- 1: PE-in.
- 2: High-level electrode alarm.
- 3: Pump stop (High-level electrode).
- 4: Pump start (Low-level electrode).
- 5: Low-level electrode alarm.
- 6: 24VAC-in.
- 7: 24VAC-in.
- 8: Isolation distance.
- 9: Pump COM. Potential free and galvanically separated. 24VAC alt 230VAC.
- 10: Pump NC alt. NO. Potential free and galvanically separated. 24VAC alt 230VAC.
- 11: Isolation distance.
- 12: Low-level alarm. COM. Potential free and galvanically separated. 24VAC alt 230VAC.
- 13: Low-level alarm. NC alt. NO. Potential free and galvanically separated. 24VAC alt 230VAC.
- 14: Isolation distance.
- 15: High-level alarm. COM. Potential free and galvanically separated. 24VAC alt 230VAC.
- 16: High-level alarm. NO. Potential free and galvanically separated. 24VAC alt 230VAC.
- 17: Isolation distance.
- 18: Phase IN. 230VAC (supply voltage) Secured with 6 AT (Plug fuse or corresponding).
- 19: Zero IN (supply voltage).
- 20: Zero UT (supply voltage).

- HW-test:** Control of high-water alarm. Protection shall be activated. "Operation" will switch off "HW-alarm" shall be lit. Automatic reset occurs if the alarm condition is gone.
- LW-test:** Control of low-water alarm. Protection shall be activated. "Operation" will switch off "LW-alarm" shall be lit. Automatic reset occurs if the alarm condition is gone.
- LW-bypass:** Bypassing of lv-alarm during test of low-level controller etc.

ER-8



Pump automatic with low and high level alarm.

Connector 6 – 7: Alternative supply voltage 24VAC-in can be chosen insted of connector 18 och 19 (F & N).

The relay outputs at connectors 9 & 10, 12 & 13 and 15 & 16 can be supply with any otional voltage (24VAC alt. 230VAC) independent of each other. Galvanically separated relay outputs with selectable relay function, NC alt. NO.

Notes

A series of horizontal dotted lines for writing notes, spanning the width of the page.

Level switch (NRS 1-50)

The level switch is designed for different electrical conductivities of the boiler water and for connecting one or two level electrodes.

When the water level falls below the low level the level electrodes are exposed and a low level alarm is triggered in the level switch. This switchpoint is determined by the length of the electrode rod.

After the de-energizing delay has elapsed, the two output contacts of the level switch will open the safety circuit for the heating. The switching-off of the heating is interlocked in the external safety circuit and can only be deactivated when the level electrode enters the water again.

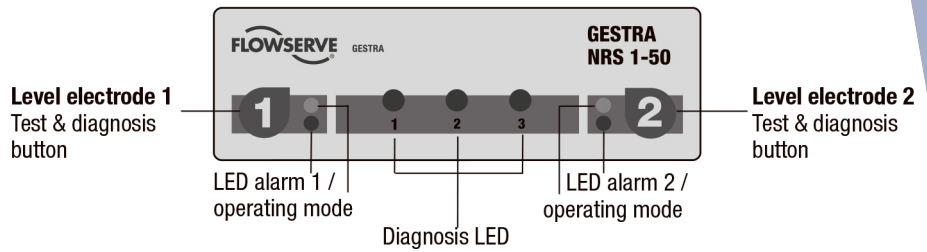
An alarm will also be raised if a malfunction occurs in the level electrode and/or the electrical connection.

If the level electrode is installed in an isolatable level pot outside the boiler, make sure that the connecting lines are rinsed regularly. During the rinsing process the water level cannot be measured in the level pot for 5 minutes. The level switch therefore bypasses the level electrode and monitors the rinsing and bypass time (standby input, controlled by the logic unit SRL 6-50).

If the connecting lines for steam ≥ 40 mm and water ≥ 1800 mm, the installation is considered to be internal. In this case the rinsing processes do not have to be monitored.

An automatic self-testing routine monitors the safety functions in the level switch and the level electrodes. In the event of a malfunction the safety circuit opens instantaneously and switches the heating off.

Alarm and error messages are indicated by LEDs and a signal output for each level electrode is energized without delay. An alarm can be simulated by pressing the test button.



Operation		
Activity	Indication	Function
Level electrode(s) submerged.	Green LEDs for level electrode 1 / 2 illuminated.	Output contacts are closed. Signal outputs 1 / 2 open.

Alarm		
Level electrode(s) exposed, level below low water level (LW).	Red LEDs for level electrode 1 / 2 are flashing.	De-energizing delay is running. Signal outputs 1 / 2 are closed instantaneously.
	Red LEDs for level electrode 1 / 2 illuminated.	Delay time has elapsed, output contacts open. Signal outputs 1 / 2 are closed.

Test channel 1 and 2		
During operation: Press key 1 or 2 and hold it down until the end of the test, level switch must react as if there was an alarm.	Red LEDs for level electrode 1 / 2 are flashing.	Alarm simulated in channel 1 or 2. De-energizing delay is running. Signal outputs 1 / 2 are closed instantaneously.
	Red LEDs for level electrode 1 / 2 illuminated.	Delay time has elapsed, output contacts open. Signal outputs 1 / 2 are closed. Test finished.

Troubleshooting

Attention. Before carrying out the fault diagnosis please check:

- Mains supply: Is the level switch supplied with the mains voltage specified on the name plate?
- Wiring: Is the wiring in accordance with the wiring diagram and the relevant schematic representation?
- Configuration: Are the code switch settings 4 and 5 correct for the number of level electrodes used?

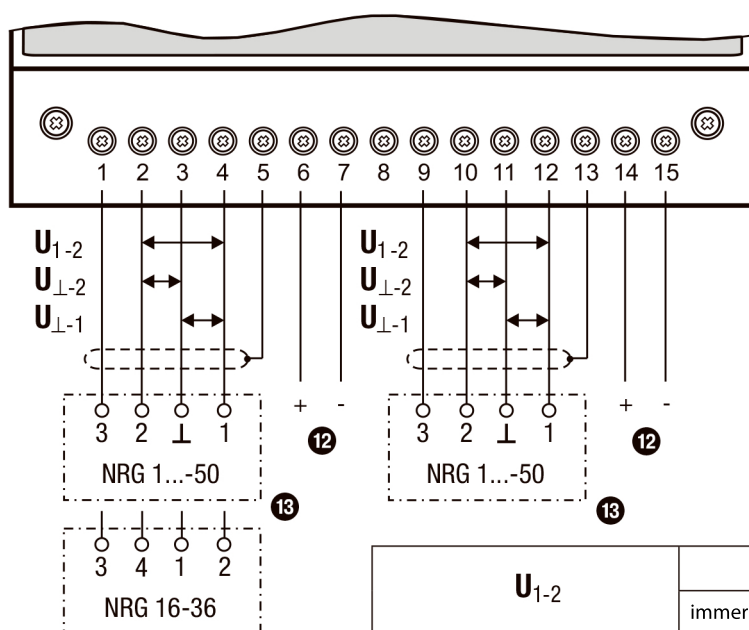
Fault indication			
Status	Diagnosis	Function	Next activity
Faulty evaluation of level electrode 1, channel 1	Diagnosis LED 1 and LED alarm 1 illuminated.	Output contacts are opened instantaneously. Signal output 1 closes instantaneously.	Next: Press key 1.
Faulty evaluation of level electrode 2, channel 2	Diagnosis LED 2 and LED alarm 2 illuminated.	Output contacts are opened instantaneously. Signal output 2 closes instantaneously.	Next: Press key 2.
Malfunction in level switch detected.	Diagnosis LED 3 and LED alarm 1 and 2 illuminated.	Output contacts are opened instantaneously. Signal outputs 1 and 2 are closed instantaneously.	Next: Press key 1 or key 2.

Diagnosis			
Display 1 and activity	Display 2	Fault	Remedy
LED alarm 1 and diagnosis LED 1 illuminated. Press and hold down key 1.	Diagnosis LED 1 flashing.	Malfunction in level electrode 1, malfunction in level switch, faulty wiring, faulty measuring voltage.	- check wiring, - measure electrode voltages, - clean and, if necessary, exchange level electrode,
	Diagnosis LED 2 flashing.	Malfunction in level electrode 1, malfunction in level switch, faulty wiring.	- exchange level switch.
	Diagnosis LED 3 flashing.	Interference voltage causing malfunction, boiler earth without PE	Provide screen and earthing, connect boiler with PE.
LED alarm 2 and Diagnosis LED 2 illuminated. Press and hold down key 2.	Diagnosis LED 1 flashing.	Malfunction in level electrode 2, malfunction in level switch, faulty wiring, faulty measuring voltage.	- check wiring, - measure electrode voltages, - clean and, if necessary, exchange level electrode,
	Diagnosis LED 2 flashing.	Malfunction in level electrode 2, malfunction in level switch, faulty wiring.	- exchange level switch.
	Diagnosis LED 3 flashing.	Interference voltage causing malfunction, boiler earth without PE	Provide screen and earthing, connect boiler with PE.
LED alarm 1 and 2 and Diagnosis LED 3 illuminated. Press and hold down key 1 or 2.	Diagnosis LED 1 flashing.	Malfunction in processor, stand- by fault.	Observe operating instructions for the logic unit SRL. Replace level switch.
	Diagnosis LED 2 flashing.	Internal voltage fault.	Replace level switch.
	Diagnosis LED 3 flashing.	Malfunction in relay.	

Once the fault is eliminated, the level switch returns to normal operation. After elimination of the fault switch off the mains voltage and switch it on again after approx. 5 sec.

Checking level electrodes

Measure the electrode voltage in order to check whether the level electrode is immersed or if there is a malfunction. Please observe the figure below.



Key

12 Stand-by input 1 / 2, 24 V DC, for connecting the logic unit SRL

13 Level electrode NRG 1...-50, NRG 1...-11, NRG 16-36

U_{1-2}	U_{1-1}		U_{2-1}
	immersed	exposed	malfunction (immersed/alarm)
$\approx 0.7 \text{ V}$ 85 Hz !	$< \frac{U_{1-2}}{2}$	$\geq \frac{U_{1-2}}{2}$	$\leq U_{1-1}$

Component list

Pos.	Qty.	Denomination	Item No.	Material	Dimension	Comment
1	1	Pressure vessel	R1004029			
2	1	Insulation	4155-0005			
3	1	Steam drain				
		1 Bushing	3685-0650		2" - 1 R	
		1 Six edge nipple	3683-0625		1"R	
		1 Valve	3123-0125		1"R	
4	1	Level stand, complete				
		1 Level stand	3184-2201		1/2"R	Come in pairs
		1 Sightglass	3189-2224		Ø 11 X 210	
		1 Protection casing in acrylic glass	3184-2210		L=0.5 m	
		1 Blow-off valve	3123-0108		1/4" R	A3
		2 Gasket	3411- 7186			
		1 Clamp	3941-9084		1/2" R	
		1 Six edge nipple	3683-0608		1/4" R	
		2 Plug	3674-0615		1/2" R	
5	1	Water pocket tube with equipment				
		1 Nipple pipe	3682-0715	SS 1330	1/2" R	
		1 Angle	3656-0715	SS 1330	1/2" R	
		1 Six edge nipple	3683-0615		1/2" R	
		1 Valve	3123-0115		1/2" R	
		1 Water pocket tube	4155-0030			A3
		2 Maximum pressure switch	3352-0331		1/2" R, 1-10 bar	BCP4H, with reset function
		1 Enlargement	3182-0904		3/8"-1/4"	
		1 Operation pressure switch	3352-0338		1/2" R, 1-10 bar	BCP4
		1 Pressure gauge check valve	3164-0610		1/4" R	
		1 Six edge nipple	3681-0610		1/4" - 3/8"	
		1 Manometer	3182-2241		1/4" R	1/4", Ø60, 0 - 16 bar
		1 Valve	3123-0108		1/4" R	
		2 Secure Clutch, angle	3696-2610		3/8" x Ø10	
		1 Pipe	14710-103	Copper	Ø10 x L= 750	
		8 Copper washer	3411-0600			
		1 Copper washer	3411-0601			
		3 Adapter	3352-0905			
6	1	1 Vacuum valve	3125-2320		1/2" R	
7	1	Safety valve system				
		2 Safety valve	3118-2014		DN20 3/4"R	Opening press. 8 bar
		2 Nipple	3684-0632		1 1/4" - 1"R	
		2 Bushing	3685-0625		1" - 3/4" R	
		2 Connection	3696-1625		1" int - Ø28	
		2 Pipe	14720-105	Copper	Ø28 x L= 350	
		2 Angle	3656-0828	Copper	Ø28 int x 90°	
		2 Pipe	14720-105	Copper	Ø28 x L= 1000	
		1 Pipe	14720-105	Copper	Ø28 x L= 100	
		2 Connection	3696-0825	Copper	1" ext -Ø28	
		1 Supporting casing	3699-0101		Ø28	

Pos.	Qty.	Denomination	Item No.	Material	Dimension	Comment
8	1	Blow-down				
		1 Angle	3656-0720		3/4"R	
		1 Nipple pipe	3682-0720		3/4"R	
		2 Six edge nipple	3684-0620		3/4"R	
		1 Valve	3123-0120		3/4"R	
		1 Pipe	14720-104	Copper	Φ22 x L= 350	
		1 Connection, angle	3696-0820		3/4" ext /Φ22	
		2 Angle	3656-0822	Copper	Φ22	
		1 Blow-down valve	3167-0501		3/4"R	N.B. Only when needed
		1 Connection	3694-0620		3/4" ext Φ22	N.B. Only when needed
		1 Sleeve	652-1520	SS 2343	3/4"R	N.B. Only when needed
9	1	Boiler feed water refill				
		2 Connection, angle	3696-0820	Copper	3/4" ext - Φ22	
		1 Pipe	14720-104	Copper	Φ22 x L= 550	
		1 Angle	3656-0822	Copper	Φ22 int x 90°	
		1 Pipe	14720-104	Copper	Φ22 x L= 250	
		1 Pipe	14720-104	Copper	Φ22 x L= 200	
		1 Pump	3173-4001		TP80E	
		1 Bushing	3685-0620		3/4" - 1/2"	
		2 Connection	3696-0615		312" ext Φ15	
		1 Pipe	14720-103	Copper	Φ15 x L= 500	
		3 Six edge nipple	3683-0615		1/2" R	
		1 Nonreturn valve	3121-2283		1/2" R	
		1 Valve	3123-0115		1/2" R	
		1 Angle	3656-0715		1/2" R	
		3 Supporting casing	3699-0100		Φ22	
		1 Angle	3656-0815		1/2" R	
		1 Supporting casing	3699-0104		Φ15	
10	1	Emergency trip, complete	1011822		DN 100	
		1 Level electrode, Gestra	3366-8000		3/4"G ext PN40	NRG16-50, self-monitoring. Cut to 370 mm.
		1 Flench	3366-8005		DN 50 PN 40	Gestra
		1 Flench gasket	3411-0115		DN 50	
		1 Gasket	3411-0118		DN 100	
		7 Scew	3921-0165	8.8	M20x70	
		1 Stud screw	3934-0127	8.8	M20	
		1 Lifting eye bolt nut	3941-5023		M20	
11	1	Immersion heaters complete				
		? Immersion heater	3311-8010		2" R	12 kW, 3x400V (4-10 pcs depending on size)
		? Immersion heater plug	1113900-61		2" R	Immersion heater + plug =10 pcs (0-6 plugs)
		10 Gasket	3411-7171			
12	1	Tank water feed	4155-0018			
13	1	Intake to feed water tank				
		1 Bushing	3685-0620		3/4" / 1/2" R	
		1 Six edge nipple	3684-0620		3/4" / 1/2" R	
		1 Solenoid valve	3352-0327		1/2" R	
		1 Coil	3352-0902			
		1 Cable plug	3352-0904			



Box 93
283 22 Osby
Sweden
Tel. +46 (0) 479-17700

Företag/Company
Beskrivning/Description H-120E 48-120KW 400V

Ritnings nr./Drawing nr. R1003226

Revision REV C

Fält/Field
Fabrikat/Product L-120-E

Typ/Type 48-120kW

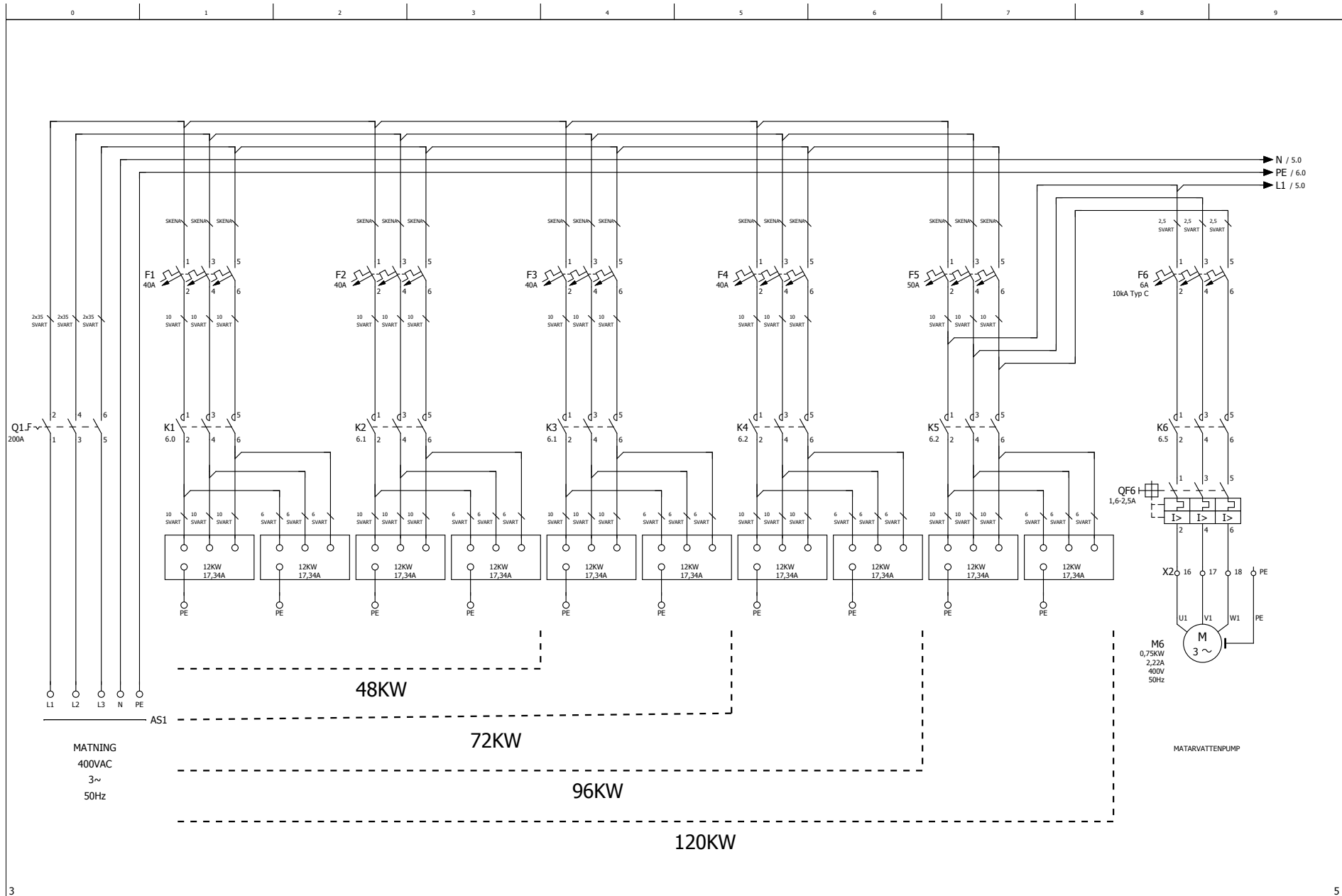
Installation
Projektansvarig/Project manager
Delegenskap/Other Om inget annat är skrivet/If nothing else is written:
230 VAC - 1,5mm²
24/12 VDC - 0,75mm²
Skapad/Created 2016-04-06

Redigerad/Edited 2018-04-04

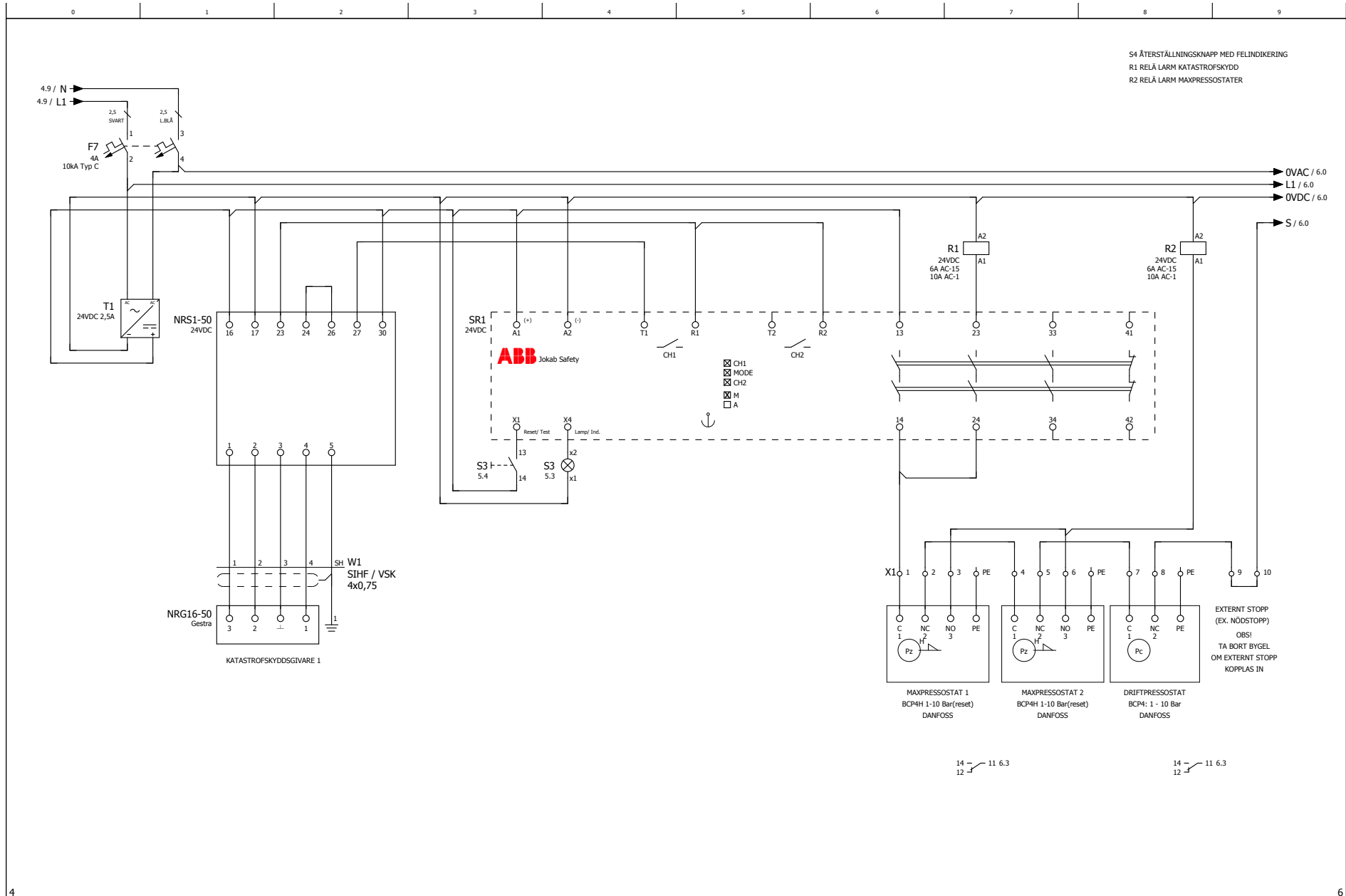
Av/By DAL

Antal sidor 9

		Datum	2018-03-28	REV C		Titel- / försätsblad	=	R1003226	Blad 1		
		Redigerare.	DAL	H-120E 48-120KW 400V						+	Blad 9
Ändring	Datum	Namn	Ursprung	Ersättning för							



Datum		2018-04-04		REV C		KRETSSCHEMA KRAFT		=	
Redigerare		DAL		H-120E 48-120KW 400V		OSBY PARCA		+	
Kontrollerad				Ersättning för		Ersatt av		R1003226	
Ändring	Datum	Namn	Ursprung					Blad 4	
								Blad 9	



				Datum	2018-04-04	REV C								
				Redigerare.	DAL	H-120E 48-120KW 400V	SÄKERHET							
				Kontrollerad			OSBY PARCA				R1003226		Blad	5
Ändring	Datum	Namn	Ursprung	Ersättning för	Ersatt av							Blad	9	

Apparatlista

F01_001

Postbeteckning	Mängd	Benämning	Typnummer	Leverantör	Artikelnummer
AS1	1	Apparatskåp 760x760x300mm		RITTAL	3364-3007
AS1	2	Jordskena	E2394674		1118852-01
AS1	1	Nollplint 120mm2			3342-0102
AS1	1	Jordplint till 3342-0102			3342-0103
AS1	1	Märketikett "BLIXT"			3912-0560
AS1	1	Beröringsskydd			3375-0008
AS1	1	Vinkelfläns 21			3364-3054
AS1	1	Mellanfläns FLM 2170			3364-3059
AS1	2	Kabelslanghållare 29mm		RITTAL	3339-0100
AS1	1	Kabelslang		RITTAL	3335-0100
AS1	1	Slyt "EFTERDRAGNING"			7617263-01
AS1	1	Anslutningsadapter (3-polig) 250 A			1118655-02
AS1	2	Kabelkanan 25x40		RITTAL	3330-3043
AS1	2	Beröringsskydd för 3343-0105		RITTAL	3337-0100
AS1	2	Samlingsskenhållare		RITTAL	3343-0105
AS1	2	Montageskena 35x15		RITTAL	3399-3073
AS1	1	Montageram 2L			3366-0402
AS1	1	Täckplåt för monteraram, litet rack		Erab	3366-0415
ER-8	1	Nivåkontroll ER 8		Elektrorel	3366-0027
ER-LPSX	1	Nivåkontrollrelä ER-lpsx		Elektrorel	3366-0100
ER-LPSX	1	11-polig reläsocket			1118880-01
F1	2	Samlingsskenhållare		RITTAL	3343-0105
F1	2	Beröringsskydd för 3343-0105		RITTAL	3337-0100
F1	1	Cu-skena 15x5			1118655-80
F1	1	Knivsäkringshållare		RITTAL	3365-0101
F1	3	Knivsäkring 40A strl 000			3368-3184
F1	3	Kablage 10mm² L= 180mm svart			3334-0120
F2	1	Knivsäkringshållare		RITTAL	3365-0101
F2	3	Knivsäkring 40A strl 000			3368-3184
F2	3	Kablage 10mm² L= 180mm svart			3334-0120
F3	1	Knivsäkringshållare		RITTAL	3365-0101
F3	3	Knivsäkring 40A strl 000			3368-3184
F3	3	Kablage 10mm² L= 180mm svart			3334-0120
F4	1	Knivsäkringshållare		RITTAL	3365-0101
F4	3	Knivsäkring 40A strl 000			3368-3184
F4	3	Kablage 10mm² L= 180mm svart			3334-0120
F5	1	Knivsäkringshållare		RITTAL	3365-0101
F5	3	Knivsäkring 50A strl 000			1118317-07
F5	3	Kablage 10mm² L= 180mm svart			3334-0120
F6	1	Automatsäkring 3-pol 6A		ABB	3368-3214
F7	1	Automatsäkring 1-polig 4A		ABB	3368-3200
K1	1	Kontaktor AF38-30-00 24-60V		ABB	3398-3240
K2	1	Kontaktor AF38-30-00 24-60V		ABB	3398-3240
K2	1	Tidsfördröjningsrelä TEF4-ON		ABB	3398-3243
K3	1	Kontaktor AF38-30-00 24-60V		ABB	3398-3240
K3	1	Tidsfördröjningsrelä TEF4-ON		ABB	3398-3243
K4	1	Kontaktor AF38-30-00 24-60V		ABB	3398-3240
K4	1	Tidsfördröjningsrelä TEF4-ON		ABB	3398-3243
K5	1	Kontaktor AF38-30-00 24-60V		ABB	3398-3240
K5	1	Tidsfördröjningsrelä TEF4-ON		ABB	3398-3243
K6	1	Kontaktor AS09-30-10-26M 230V		ABB	3398-3262
NRS1-50	1	Katastrofskydd Gestra NRS1-50			3366-8006
Q1	1	Lastbrytare 200A		ABB	3354-0105
QF6	1	Motorskydd 1,6-2,5A 0,75kW		ABB	3363-3269
QF6	1	Hjälpkontaktblock HKF1-11		ABB	3363-3275
R1	1	Relämodul PLC-RPT- 24DC/21HC		PXC	3370-0118

6

7.a

		Datum	2018-04-04	REV C				=
		Redigerare.	DAL	H-120E 48-120KW 400V				+
		Kontrollerad						
Ändring	Datum	Namn	Ursprung	Ersättning för	Ersatt av			
						R1003226	Blad	7
							Blad	9



Apparatlista

F01_001

Postbeteckning	Mängd	Benämning	Typnummer	Leverantör	Artikelnummer
R2	1	Relämodul PLC-RPT- 24DC/21HC		PXC	3370-0118
R3	1	Relämodul PLC-RPT-230UC/21-21		PXC	3370-0131
S1	1	Strömställare 0-1-2		Krauss & Naimer	3350-3265
S2	1	Strömställare 0-5		Krauss & Naimer	3350-3263
S3	1	Tryckknapp vit med LED 24VDC			3354-0149
S3	1	Skythållare för XB4 622mm 30x50mm		Schneider	3354-0169
S3	1	Skyttämne XB4 18x27mm vit		Schneider	3354-0179
SR1	1	Säkerhetsrelä Sentry SSR10 24V		ABB	3356-0103
T1	1	Nätaggregat 24VDC 2,5A		ABB	3390-0108
X1	10	Genomgångsplint - PTS 2,5		PXC	3342-4190
X1	1	Skythållare KLM 2		PXC	3342-4301
X1	1	Skyt 20x9 vit UC-EM X01-->X20		PXC	3342-4304
X1	1	Plintmärkning UC-TM 5/1->96		PXC	3342-4310
X1	1	Ändplatta D-STS 2,5		PXC	3342-4191
X1	3	Ändstöd CLIPFIX 35		PXC	3342-4203
X2	20	Genomgångsplint - PTS 2,5		PXC	3342-4190
X2	1	Skythållare KLM 2		PXC	3342-4301
X2	1	Plintmärkning UC-TM 5/1->96		PXC	3342-4310
X2	1	Ändplatta D-STS 2,5		PXC	3342-4191
X2	1	Ändstöd CLIPFIX 35		PXC	3342-4203
X3	6	Genomgångsplint - PTS 2,5		PXC	3342-4190
X3	1	Skythållare KLM 2		PXC	3342-4301
X3	1	Plintmärkning UC-TM 5/1->96		PXC	3342-4310
X3	1	Ändplatta D-STS 2,5		PXC	3342-4191
X3	2	Ändstöd CLIPFIX 35		PXC	3342-4203

7		8	
Datum	2018-04-04	REV C	=
Redigerare	DAL	H-120E 48-120KW 400V	+
Kontrollerad			R1003226
Ändring	Datum	Namn	Ursprung
		Ersättning för	Ersatt av
			Blad 7.a
			Blad 9



Box 93
283 22 Osby
Sweden
Tel. +46 (0) 479-17700

Företag / kund
Projektbeskrivning Bottenblåsning Elångpanna
Ritningsnummer R1003068
Kommission REV A

Fält
Fabrikat
Typ
Installationsplats
Projektansvarig
Delegenskap

Skapad den 2016-03-31
Redigerad den 2016-04-04 från (förkortning) jas Antal sidor 5

		Datum	2016-03-31	REV A
		Redigerare	jas	
		Kontrollerad		Bottenblåsning Elångpanna
Ändring	Datum	Namn	Ursprung	Ersättning för Ersatt av

OSBY PARCA Titel- / försättsblad
partner för proffs
Enertech Group

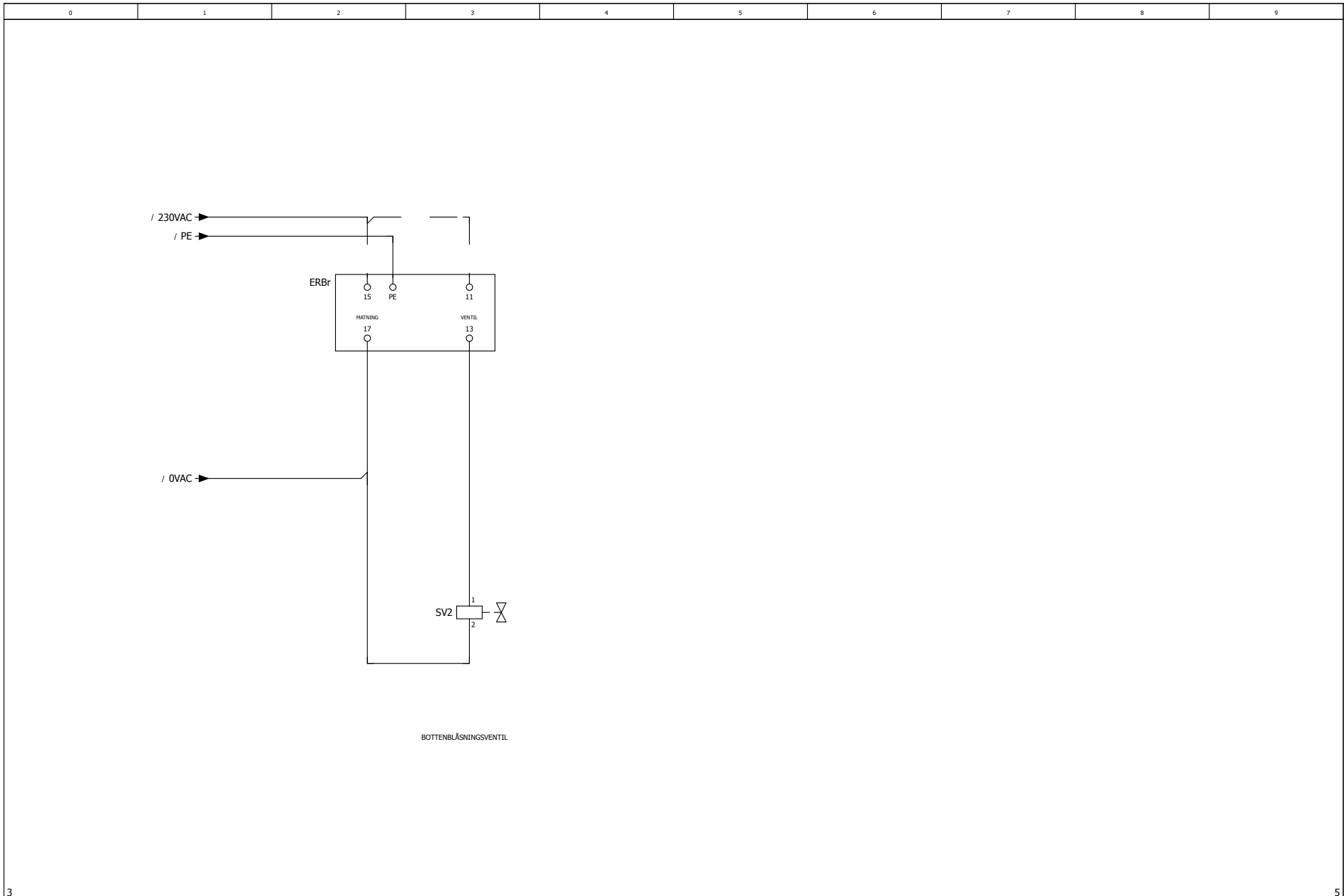
R1003068

Blad	1
Blad	5

Färgkoder/Colourcode för/for Osbyparca skåp/cabinet enligt/according SS-EN 60204-1

Kraft/Power	Svart/Black
Manöver/Control 230VAC	Röd/Red
Neutral	Ljusblå/Light blue
ELV/ Extra low voltage +	Mörkblå/Dark blue
ELV/ Extra low voltage -	Vit/White
Digital signal	Grå/Grey
Analog signal	Violett/Violet
Främmande spänning/External voltage	Orange
Säkerhetskretsar/Safety circuit	Brun/Brown
Skärm/Shield	Transparent slang/tube





		Datum	2016-03-31	REV A
		Redigerare.	jas	
		Kontrollerad		Bottenblåsning Elångpanna
Ändring	Datum	Namn	Ursprung	Ersättning för Ersatt av

OSBY PARCA partner för profita
Enertech Group

		=	
		+	
	R1003068	Blad	4
		Blad	5

Appendix 2: Certificate of conformity (PED)

OSBYPARCA™
pannor för proffs

Enertech Group

**FÖRSÄKRAN OM ÖVERENSSTÄMMELSE FRÅN TILLVERKARE AV TRYCK-
BÄRANDE ANORDNING ENLIGT:
TRYCKUTRUSTNINGSDIREKTIV 97/23/EG, AFS 1999:4 (PED)
DECLARATION OF CONFORMITY FROM THE MANUFACTURER OF THE PRESSURE
EQUIPMENT ACCORDING TO:
PRESSURE EQUIPMENT DIRECTIVE 97/23/EC, AFS 1999:4**

Tryckbärande anordning är CE-märkt enligt AFS 1999:4.
Därigenom är de grundläggande säkerhetskraven i bilaga 1 uppfyllda.
The pressure equipment are CE-marked according to 97/23/EC, AFS 1999:4
The essential safety requirements in annexe 1 are hereby fulfilled.

1. Data för tryckbärande anordning / Data for pressure equipment

2. Produkt / Descript : Ångpanna / Steamboiler L/H-120E

Tillv.nr. / Manufact.nr:

Ritn nr / Draw No: **R1004029/E**

Beräkningstryck / Design pressure PS: **Enligt dataskylt / According to dataplate**

Beräkningstemperatur / Design temperature TS: **Enligt dataskylt / According to dataplate**

Kategori / Category: Modul / Module: **B + D**

Standarder / Standards: **97/23/EC Bilaga 1 / 97/23/EC Annex 1**

3. Tillverkare / Manufacturer

Namn / Name: **Enertech AB Osby Parca Div.**

Adress / Address: Box 93
283 22 Osby

Telefon / Phone: 0479-177 00

Referens / Referece: Martin Lundkvist

4. Anmält organ / Notified Body

Namn / Name: **DEKRA Industrial AB Nr 0640**

Adress / Address: N.Kungsgatan 5,
SE-803 20 Gävle

5. EG-Typkontrollintyg nr / EC-Type-examination No : K 1360567

6. Grundläggande säkerhetskrav / Essential safety requirements

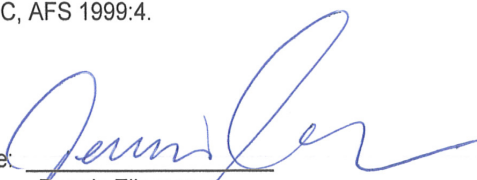
De grundläggande säkerhetskraven är uppfyllda enligt 97/23/EC, AFS 1999:4.
The essential safety requirements are fulfilled according to 97/23/EC, AFS 1999:4.

CE-märkes härmed.

The product is hereby CE-marked

Datum / Date: *den 5 juli 2013*

Ansvaret / Responsible:


Dennis Eliasson

FÖRSÄKRAN OM ÖVERENSSTÄMMELSE® (CE-intyg)

Enligt LVD 2006/95/EEG
och EMC 2004/108/EEG

för

Produkt: El-ångpanna

Fullständigt produktnamn/nummer: _____

Modell/ Typ: L120E/H120E

Ordernr: _____

Övrig information: _____

Ett urval av produkten har bedömts och funnits vara i överensstämmelse med med kraven enligt LVD 2006/95/EEG samt EMC 2004/108/EEG.

Använda standarder: SS-EN 60204-1

Tillverkare: Enertech AB Osby Parca Div.
Adress: Box 93
283 22 Osby
Telefon: 0479-177 00

Datum: *den 29 Okt 2013*



Dennis Eliasson
General Manager

Appendix 4:

GRANSKNINGSRAPPORT IKKE-MEKANISKT SÄKERHETSSYSTEM REVIEW OF NON-MECHANICAL SAFETY SYSTEM



		Uppdragsgivare/ Customer Osby Parca Box 93 283 22 Osby	
Handläggare/ Reference Tord Björklund	Uppdragsnr/ Comm no 572229-02	Uppdragsgivarens referens/ Customer reference Dan-Ola Liljenberg	Ordernr/ Order no R1003226

Anläggning/ Plant	Tillverkningsår/ Manufacturing year
Benämning/ Name of component Elångpanna Typ H120-E 48-120kW 400VAC	Volym eller effekt/ Volume or effect: 120 kW
Tillverkningsnr/ Serial no	Högsta/lägsta tryck/ Highest/lowest pressure Enligt tillverknings skylt bar(e)
Energikälla/ Energy source El	Högsta/lägsta temperatur/ Highest/lowest temperature Enligt tillverknings skylt °C

Föreskrift/ Ordinance AFS 2017:5

Tillämpad standard/anvisning/ Applied standard/code SS-EN 12953 Eldrörspannor (shell Boilers) -Del 6:2011 Krav på pannans utrustning.

Granskad dokumentation/ Reviewed documentation Kretsschema inklusive komponentlista R1003226 rev. C, daterat 2018-04-04, blad 4-8 Dokumentation över tryckvakt Danfoss BCP4H 1-10 bar Dokumentation över nivåvakt GESTRA NRS1-50 med nivåelektrod NRG16-50

Bilagor/ Appendix

Anmärkningar/ Remarks

Säkerhetssystemet uppfyller ställda krav:

Ja/ Yes Nej/ No

In compliance with the requirements:

.....
Namnförtydligande: Tony Björklund

DEKRA Industrial AB			Stämpel/ Stamp
Tegelvägen 22	Datum/ Date	Arkiveringsnr./ Certificate no.	
SE-853 50 Sundsvall	2018-04-09	SK18-124	

Vid granskningen har ej hänsyn tagits till komponenternas livslängd

Appendix 5: Steam flow velocity in pipe systems

Pres. Bar	Veloc. m/s	15 mm	20 mm	25 mm	32 mm	40 mm	50 mm	65 mm	80 mm	100 mm	125 mm	150 mm	200 mm	250 mm	300 mm
0.4	15	7	14	24	37	52	99	145	213	394	648	917	1606	2590	3678
	25	10	25	40	62	92	162	265	384	675	972	1457	2806	4101	5936
	40	17	35	64	102	142	265	403	576	1037	1670	2303	4318	6909	9500
0.7	15	7	16	25	40	59	109	166	250	431	680	1006	1708	2791	3852
	25	12	25	45	72	100	182	287	430	716	1145	1575	2816	4629	6204
	40	18	37	68	106	167	298	428	630	1108	1712	2417	4532	7251	10323
1	15	8	17	29	43	65	112	182	260	470	694	1020	1864	2814	4045
	25	12	26	48	72	100	193	300	445	730	1160	1660	3099	4869	6751
	40	19	39	71	112	172	311	465	640	1150	1800	2500	4815	7333	10370
2	15	12	25	45	70	100	182	280	410	715	1125	1580	2814	4545	6277
	25	19	43	70	112	162	195	428	656	1215	1755	2520	4815	7425	10575
	40	30	64	115	178	275	475	745	1010	1895	2925	4175	7678	11997	16796
3	15	16	37	60	93	127	245	385	535	925	1505	2040	3983	6217	8743
	25	26	56	100	152	225	425	632	910	1580	2480	3440	6779	10269	14316
	40	41	87	157	250	357	595	1025	1460	2540	4050	5940	10476	16470	22950
4	15	19	42	70	108	156	281	432	635	1166	1685	2460	4618	7121	10358
	25	30	63	115	180	270	450	742	1080	1980	2925	4225	7866	12225	17304
	40	49	116	197	295	456	796	1247	1825	3120	4940	7050	12661	19663	27816
5	15	22	49	87	128	187	352	526	770	1295	2105	2835	5548	8586	11947
	25	26	59	105	153	225	425	632	925	1555	2525	3400	6654	10297	14328
	40	59	131	225	338	495	855	1350	1890	3510	5400	7870	13761	23205	32244
6	15	26	59	105	153	225	425	632	925	1555	2525	3400	6654	10297	14328
	25	43	97	162	253	370	658	1065	1520	2530	4250	6175	10629	17108	24042
	40	71	157	270	405	595	1025	1620	2270	4210	6475	9445	16515	27849	38697
7	15	29	63	110	165	260	445	705	952	1815	2763	3990	7390	12015	16096
	25	49	114	190	288	450	785	1205	1750	3025	4813	6900	12288	19377	27080
	40	76	177	303	455	690	1210	1865	2520	4585	7560	10880	19141	30978	43470
8	15	32	70	126	190	285	475	800	1125	1990	3025	4540	8042	12625	17728
	25	54	122	205	320	465	810	1260	1870	3240	5220	7120	13140	21600	33210
	40	84	192	327	510	730	1370	2065	3120	5135	8395	12470	21247	33669	46858
9	15	41	95	155	250	372	626	1012	1465	2495	3995	5860	9994	16172	22713
	25	66	145	257	405	562	990	1530	2205	3825	6295	8995	15966	25860	35890
	40	104	216	408	615	910	1635	2545	3600	6230	9880	14390	26621	41011	57560
10	15	50	121	205	310	465	810	1270	1870	3220	5215	7390	12921	20538	29016
	25	66	145	257	405	562	990	1530	2205	3825	6295	8995	15966	25860	35890
	40	104	216	408	615	910	1635	2545	3600	6230	9880	14390	26621	41011	57560
14	15	50	121	205	310	465	810	1270	1870	3220	5215	7390	12921	20538	29016
	25	85	195	331	520	740	1375	2080	3120	5200	8500	12560	21720	34139	47128
	40	126	305	555	825	1210	2195	3425	4735	8510	13050	18630	35548	54883	76534

The capacity is stated in kg/h.

Example:

Steam pressure 10 bar, 1530 kg/h. The estimated steam velocity is 25 m/s, i.e. DN65.

N.B! When long steam pipes are used, one also has to regard the pressure decay.

Appendix 6: Saturation data for water and steam

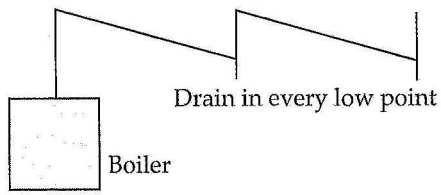
Temp. °C	Pressure bar	Entalphy water kJ / kg	Entalphy steam kJ / kg	Spec. vol. water m3 / kg	Spec. vol. steam m3 / kg
1	0.0066	4.2	2503.4	1.00E-03	1.93E+02
2	0.0087	21	2510.7	1.00E-03	1.47E+02
10	0.0123	42	2519.9	1.00E-03	1.06E+02
15	0.017	62.9	2529.1	1.00E-03	7.80E+01
20	0.0234	83.9	2538.2	1.00E-03	5.78E+01
25	0.0317	104.8	2547.3	1.00E-03	4.34E+01
30	0.0424	125.7	2556.4	1.00E-03	3.29E+01
35	0.0562	146.6	2565.4	1.01E-03	2.52E+01
40	0.0738	167.5	2574.4	1.01E-03	1.96E+01
45	0.0958	188.4	2583.3	1.01E-03	1.53E+01
50	0.1234	209.3	2592.2	1.01E-03	1.21E+01
55	0.1574	230.2	2601	1.02E-03	9.58E+00
60	0.1992	251.1	2609.7	1.02E-03	7.68E+00
65	0.2501	272	2618.4	1.02E-03	6.20E+00
70	0.3115	293	2626.9	1.02E-03	5.05E+00
75	0.3855	313.9	2635.4	1.03E-03	4.13E+00
80	0.4736	334.9	2643.8	1.03E-03	3.41E+00
85	0.578	355.9	2652	1.03E-03	2.83E+00
90	0.7011	376.9	2660.1	1.04E-03	2.36E+00
95	0.8453	398	2668.2	1.04E-03	1.98E+00
100	1.0133	419.1	2676	1.04E-03	1.67E+00
105	1.208	440.2	2683.7	1.05E-03	1.42E+00
110	1.4327	461.3	2691.3	1.05E-03	1.21E+00
115	1.6906	482.5	2698.7	1.06E-03	1.04E+00
120	1.9854	503.7	2706	1.06E-03	8.92E-01
125	2.231	525	2713	1.07E-03	7.70E-01
130	2.7013	546.3	2719.9	1.07E-03	6.68E-01
135	3.1307	567.7	2726.6	1.08E-03	5.82E-01
140	3.6138	589.1	2733.1	1.08E-03	5.09E-01
145	4.1552	610.6	2739.3	1.09E-03	4.46E-01
150	4.76	632.2	2745.4	1.09E-03	3.92E-01
155	5.4333	653.8	2751.2	1.10E-03	3.46E-01
160	6.1806	675.5	2756.7	1.10E-03	3.07E-01
165	7.0077	697.3	2762	1.11E-03	2.72E-01
170	7.9202	719.1	2767.1	1.11E-03	2.43E-01
175	8.9244	741.1	2771.8	1.12E-03	2.17E-01
180	10.027	763.1	2776.3	1.13E-03	1.94E-01
185	11.233	785.3	2780.4	1.13E-03	1.74E-01
190	12.551	807.5	2784.3	1.14E-03	1.53E-01
195	13.987	829.9	2787.8	1.15E-03	1.41E-01
200	15.549	852.4	2794	1.16E-03	1.27E-01
205	17.243	875.0	2793.8	1.16E-03	1.150E-01

Appendix 7: Steam table

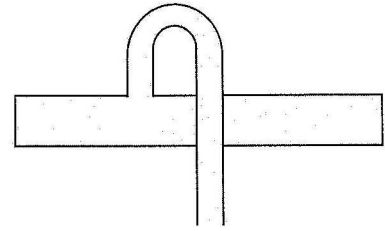
Manometer press. Bar	Absolute press. Bar	Temperature °C	Liquid heat kJ / kg	Steam heat kJ / kg	Spec. vol. steam m ³ / kg
0.1	1.113	102.66	430.2	2680.4	1.533
0.2	1.213	105.1	440.8	2684.2	1.414
0.3	1.313	107.39	450.4	2687.6	1.312
0.4	1.413	109.55	459.7	2691	1.255
0.5	1.513	111.61	468.3	2693.9	1.149
0.6	1.613	113.56	476.4	2696.8	1.083
0.7	1.713	115.4	484.1	2699.5	1.024
0.8	1.813	117.14	491.6	2702.1	0.971
0.9	1.913	118.8	498.9	2704.5	0.923
1	2.013	120.42	505.6	2706.7	0.881
1.1	2.113	121.96	512.2	2709.2	0.841
1.2	2.213	123.46	518.7	2711.5	0.806
1.3	2.313	124.9	524.6	2713.3	0.773
1.4	2.413	126.28	530.5	2715.3	0.743
1.5	2.513	127.62	536.1	2717.1	0.714
1.6	2.613	128.89	541.6	2718.9	0.689
1.7	2.713	130.13	547.1	2720.8	0.655
1.8	2.813	131.37	552.3	2722.4	0.643
1.9	2.913	132.54	557.3	2724	0.622
2	3.013	133.69	562.2	2725.5	0.603
2.5	3.513	139.02	585	2732.6	0.522
3	4.013	143.75	605.3	2738.7	0.461
4	5.013	151.96	640.7	2748.8	0.374
5	6.013	158.92	670.9	2756.9	0.315
6	7.013	165.04	697.5	2763.5	0.272
7	8.013	170.5	721.4	2796.1	0.24
8	9.013	175.43	743.1	2774	0.215
9	10.013	179.97	763	2778.1	0.194
10	11.013	184.13	781.6	2781.7	0.177
11	12.013	188.02	798.8	2784.8	0.163
12	13.013	191.68	815.1	2787.6	0.151
13	14.013	195.1	830.4	2790	0.141
14	15.013	198.35	845.1	2792.2	0.132
15	16.013	201.45	859	2794	0.124
16	17.013	204.38	872.3	2795.7	0.117
17	18.013	207.17	885	2797.1	0.11
18	19.013	209.9	897.2	2708.5	0.105
19	20.013	212.47	909	2799.5	0.1
20	21.013	214.96	920.3	2800.5	0.0949
21	22.013	217.35	931.3	2801.4	0.0906
22	23.013	219.65	941.9	2802	0.0868
23	24.013	221.85	952.2	2802.6	0.0832
24	25.013	224.02	962.2	2803.1	0.0797
25	26.013	226.12	972.1	2803.5	0.0768
26	27.013	228.15	981.6	2802.2*	0.074
27	28.013	230.14	990.7	2804.4	0.0714
28	29.013	232.05	999.7	2804.1	0.0689
29	30.013	233.93	1008.6	2804.1	0.0666
30	31.013	235.78	1017	2804.1	0.0645
31	32.013	237.55	1025.6	2804.1	0.0625
32	33.013	239.28	1033.9	2803.9	0.0605
33	34.013	240.97	1041.9	2803.7	0.0587
34	35.013	246.63	1049.7	2803.5	0.0571
35	36.013	244.26	1057.7	2803.2	0.0554
36	37.013	245.86	1065.7	2802.9	0.0539

Appendix 8: Steam installation examples

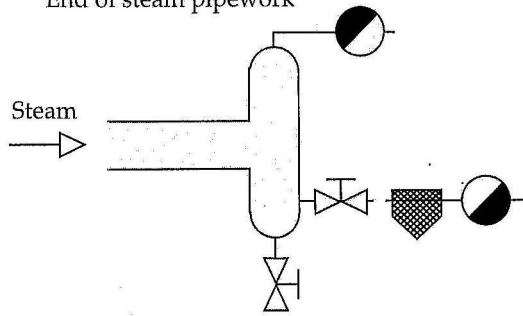
Steam pipe leans forward 3-5mm/M



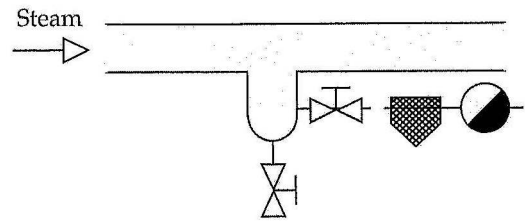
Steam diversion on top of the pipe



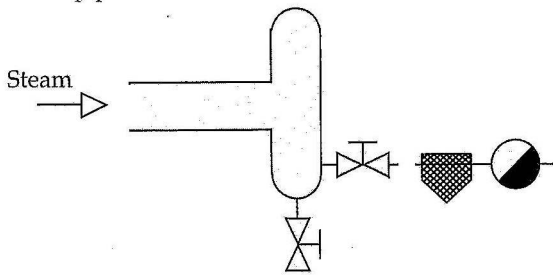
End of steam pipework



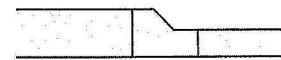
Steam pipe drain



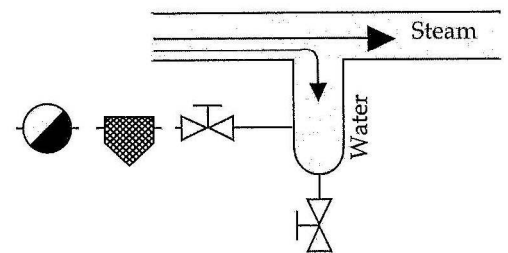
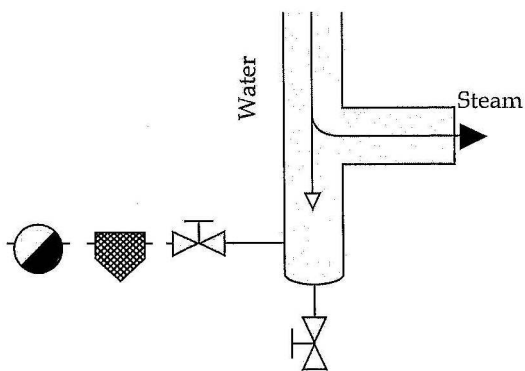
Steam pipe drain



Use eccentric cones



Steam pipe drain before machine or regulating valve



Shutoff tap

Dirt filter

Steam trap

Air vent





Subject to any errors in writing and subject to change