Instructions

S-Solo HWP
District heating substation for direct heating and connection pipes for domestic hot water cylinder

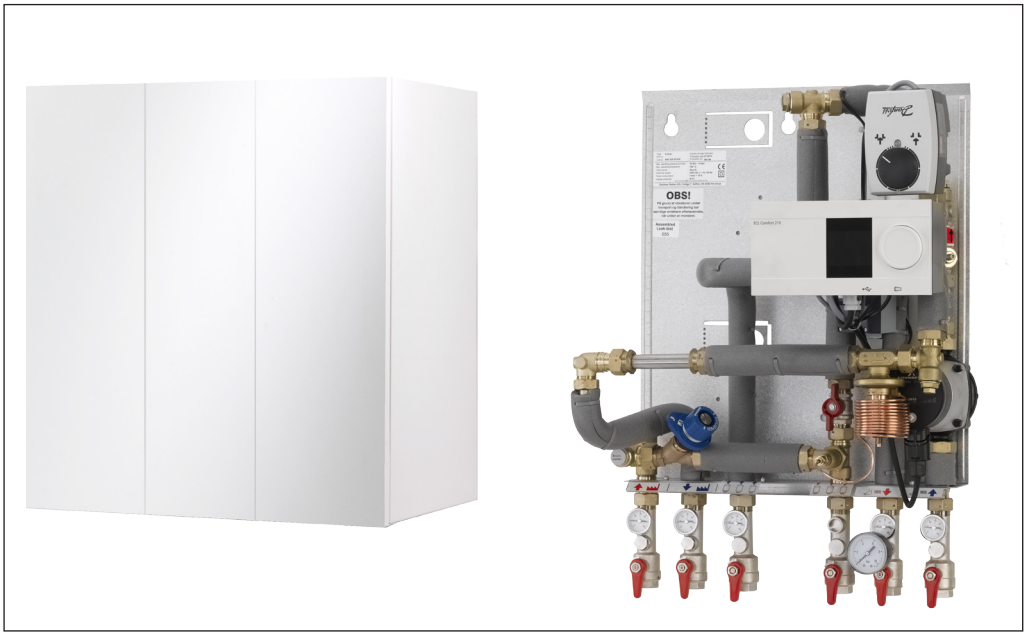


Table of contents

Safety notes

The following instructions refer to the standard design of the S-Solo HWP substation. Special versions are available on request.

To avoid injury of persons and damages to the device, it is absolutely necessary to read and observe these instructions carefully.

Necessary assembly, start-up and maintenance work must be performed by qualified and authorized personnel only.

Please comply with the instructions of the system manufacturer or system operator.

Unused connections and shut-off valves must be sealed with a plug. The plugs must be removed by an authorized service technician only.

Choice of materials
Choice of materials always in compliance with local legislation

Warning of high pressure and temperature
The maximum temperature of the flow medium in the S-Solo HWP substations is 90 °C.

The maximum operating pressure of the substation is 10 bar.

Be aware of the installation's permissible system pressure and temperature.

The risk of persons being injured and equipment damaged increases considerably if the recommended permissible operating parameters are exceeded.

The substation installation must be equipped with safety valves, however, always in accordance with local regulations.

Warning of hot surface
The substation has got hot surfaces, which can cause skin burns. Please be extremely cautious in close proximity to the substation.

Warning of electric shock risk
Before cleaning or servicing disconnect power supplies.

Warning of transport damage
Before substation installation, please make sure that the substation has not been damaged during transport.

Sound level
≤ 55 dB

Corrosion protection
All pipes and components are made of stainless steel and brass.

The maximum chloride compounds of the flow medium should not be higher than 300 mg/l.

The risk of equipment corrosion increases considerably if the recommended permissible chloride compounds are exceeded

Disposal

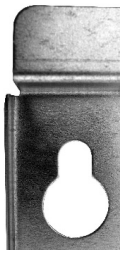
This product consists of materials which must not be disposed of together with domestic waste. Dismantle the product and sort the components in various groups before disposal. Observe the disposal rules of the local legislation.

Storage

If the substation is stored before installation, make sure that the place is dry and heated.

Produced by Danfoss Redan A/S · 03.2012

Mounting



The substation must be installed and connected by authorized service personnel only.

Installation must be in compliance with the local standards and regulations.

Allow for adequate space around the substation for mounting and maintenance purposes.

Prior to the substation installation all substation pipes and connections should be cleaned and rinsed.

The substation should be wall-mounted. The mounting sheet on the back of the substation has got holes for screw installation.

A symbol for each of the different connections is placed on the substation.

Tightening of connections
Due to vibrations during transport all connections must be checked and tightened before the substation is installed.

After observing that the substations operates in accordance with the dimensioning basis, the connections must be tightened again and the substation can be taken into continuous use.

Heat meter assembly, fitting piece
The flat station is equipped with a fitting piece for insertion of a heat meter.

Assembly of heat meter
Loosen nuts from fitting piece, remove fitting piece and replace with heat meter.
Mount the heat meter according to the medium flow direction.
After mounting of heat meter remember to check all threaded connections

DCW meter (option)
The substation can be equipped with a fitting piece for insertion of DCW meter.

Assembly of DCW meter
Please refer to above assembly instructions for heat meter.

Electrical connection

Electrical connections must be made by an authorised electrician only.
Electrical connections must be made in accordance with current regulations and local standards.

Before making electrical connections, please note the following:
- Please read the relevant parts of safety notes.
- The substation must be connected to 230 VAC and earth.
- The substation must be connected via an external main switch, which can be disconnected by repairs.

Start-up

Prior to the S-Solo HWP installation all its pipes and connections should be cleaned and rinsed. After that the strainers should be cleaned.

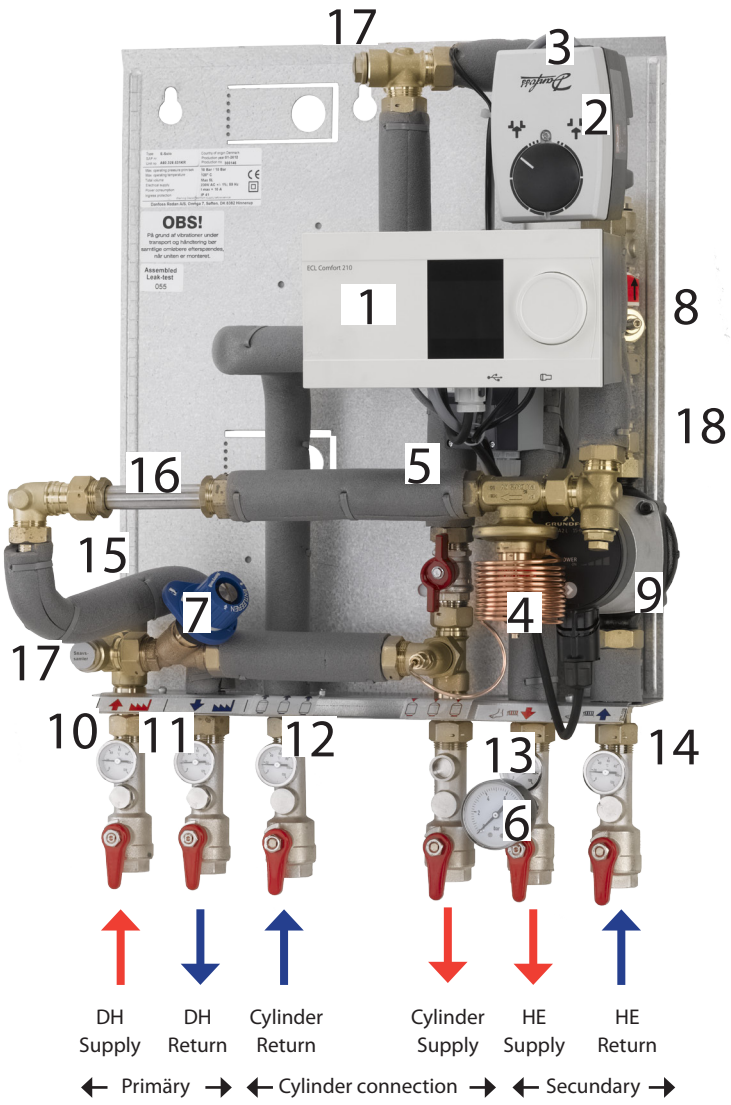
Before starting-up, check if:
- pipes are connected according to the circuit diagram,
- release valves are shut off,
- threaded and flanged connections are tightened.

All Danfoss substations have been pressure tested prior to delivery.

Components

1 Danfoss controller
2 Actuator HE
3 2-way valve *
4 Differential pressure controller
5 Danfoss sensor *
6 Manometer
7 Balancing valve
8 Air valve *
9 Circulation pump
10 Thermometer, DH supply
11 Thermometer, DH return
12 Thermometer, cylinder return
13 Thermometer, HE supply
14 Thermometer, HE return
15 Sensor pocket for heat meter *
16 Fitting piece for heat meter
17 Strainer
18 Throttle valve

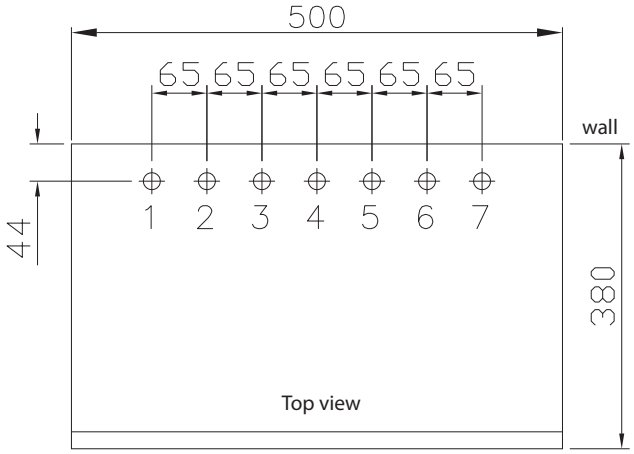
* not visible on photo



Please note:
Your substation may look different than the substation shown, as variants with other components may be supplied. The control function, however, is basically as stated in this instruction manual.

Instructions for the fitted components will be supplied together with the substation.

District heating (DH) - In the following DH is specified as the heat source for the substations. However, also other heat sources such as an oil or gas boiler or solar heating etc. could be used as the primary supply for the fitted substations, enabling the Danfoss Redan substations to be used in numerous schemes with different energy sources, depending on the local operating conditions. In order to simplify we have decided to use DH as designation for the primary supply.

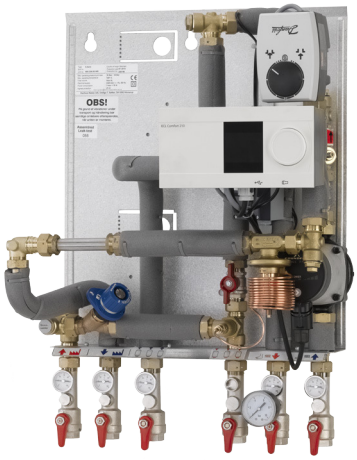


1 DH supply
2 DH return
3 Cylinder return
4 Cylinder supply
5 HE supply
6 HE return

Produced by Danfoss Redan A/S · 03.2012

General

PLEASE NOTE, that other variants may be supplied. The control function, however, is basically as described below, and the control of the substation should be done in accordance with the enclosed producer instructions for the mounted controller.



Description

District heating substation for direct heating with mixing loop for single-family, semi-detached and terraced houses as well as flats. With one heating circuit and with connection pipes for cylinder on primary side. Designed for wall-mounting.

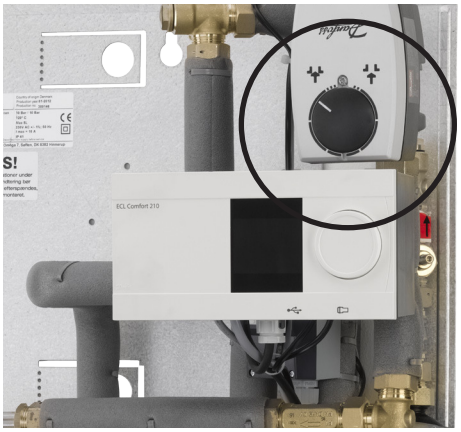
The heating temperature is controlled by an electronic temperature controller Danfoss ECL with an outdoor temperature sensor.

The substation is supplied with mixing ciruit and is thereby especially suitable for systems with floor heating. The task of the mixing circuit is to ensure a correct supply temperature for the heating circuit (to protect the heating circuit against too high temperatures) and to ensure, that the return water is cooled down to the required temperature, before it flows back to the district heating plant. The mixing circuit temperature is controlled by an electronic temperature controller Danfoss ECL.

Heating circuit

Temperature control

The temperature for the heating circuit is controlled electronically by the Danfoss ECL controller. The supply temperature ist calculated by the controller on basis of the outdoor temperature.
The ECL Comfort 210 controller is loaded with a selected application by means of an ECL Application Key (Plug-&-Play). The Application Key contains information about application, languages and factory settings.
From factory the VX Solo II H2WP is loaded with Application 1d. Other applications can, however, be loaded by means of the ECL Application Key, and it is possible to update the controller with new application software.



The controller is factory preset to turn off the heating automatically in the summer period.
The controller settings can be changed in accordance with the enclosed producer instructions for the mounted controller.

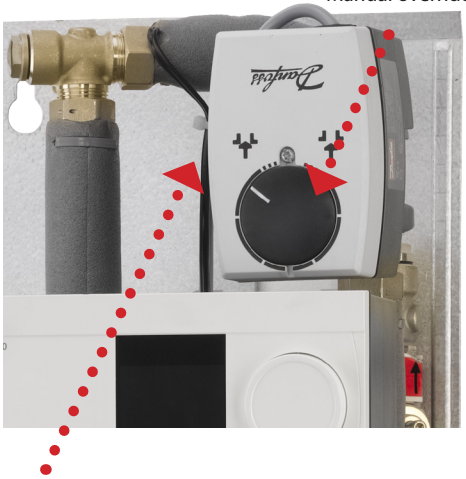
See ECL Application Key Box with ECL Comfort 210/310 user guide and mounting guide, for further information.
Please see enclosed user guide,

2-way valve + electrical actuator.

The S-Solo HWP is supplied with a 2-way valve VS 2, which in combination with an electrical actuator Danfoss AMV 150 controls the heating circuit. The electrical actuator is preset from factory. In case of operating disturbances the actuator can be closed manually.
Please see enclosed instructions,
Electrical actuator AMV 150
2-way valve VS 2

Close actuator by turning the manual override knob on top of actuator counterclockwise.

Manual override

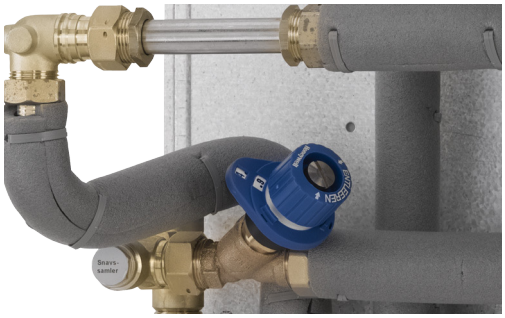


Note: Press and hold the button on the bottom side of the actuator during manual override.

Balancing valve

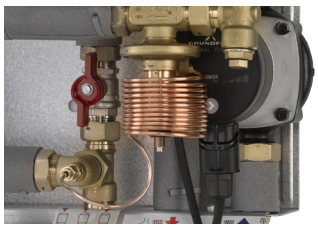
For regulation of the flow through the system the S-Solo HWP can be supplied with a balancing valve.

For information about pre-regulation etc. please refer to the enclosed instructions for use:
Kombi-3-Plus
Instruction for use



Differential pressure controller **AVPL**

AVPL is a self-acting differential pressure controller for PN 16 with adjustable differential pressure setting. Der AVPL keeps a constant differential pressure even with a variable system resistance.
The AVPL can be set at any differential pressure between 0,05 bar and 0,25 bar. The preset factory setting of the controller is 0,1 bar.
To alter the differential pressure, use an Allen Key NV 3. 1 full turn is equivalent to approx. 0.01 bar. The arrow on the controller top shows that the setting of the differential pressure is increased when it is turned clockwise and reduced when turned counter-clockwise. The controller settings can be changed in accordance with the enclosed producer instructions.



Circulation pump

Grundfos Pumpe ALPHA2 L

Substation start-up /pump
Do not start up the pump untill the system has been filled with the flow media and vented. See Grundfos instructions for the pump.

The pump is self-venting. It need not be vented before start-up.
Air in the pump may cause noise, This noise ceases after a few minu-tes running.

Please note, that the system cannot be vented through the pump
Please note, that the pump must not run dry.

Pumpeneinstellung
GRUNDFOS ALPHA2 L has seven optional settings which can be
selected with the push-button.

Enclosed photo shows the recommended and alternative pump settings for system types.

The pump is set at the factory to the "Higest proportional-pressure curve" (PP2). In this control mode, the pump performance and consequently the power consumption are adjusted according to the heat demand in the system.
If the recommended pump setting does not give the desired distribution of heat in the rooms of the house, change the pump setting to the shown alternative.
For further infomation about pump settings please refer to the enclosed Grundfos instructions.

ALPHA2 L,
Installation and operating instructions

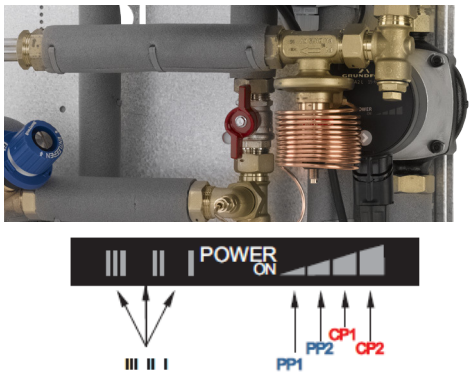
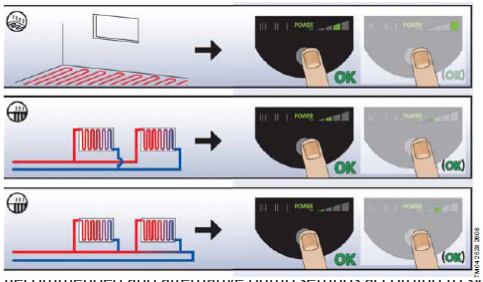


Fig. 8 Seven light fields

Button presses	Light field	Description
0	PP2 (factory setting)	Highest proportional-pressure curve
1	CP1	Lowest constant-pressure curve
2	CP2	Highest constant-pressure curve
3	III	Constant curve, speed III
4	II	Constant curve, speed II
5	I	Constant curve, speed I
6	PP1	Lowest proportional-pressure curve
7	PP2	Highest proportional-pressure curve



recommended and alternative pump settings according to system type.

Pos.	System type	Pump setting	
		Recommended	Alternative
A	Underfloor heating	Lowest constant-pressure curve (CP1)*	Highest constant-pressure curve (CP2)*
B	Two-pipe systems	Highest proportional-pressure curve (PP2)*	Lowest proportional-pressure curve (PP1)*
C	One-pipe systems	Lowest proportional-pressure curve (PP1)*	Highest proportional-pressure curve (PP2)*

Summer operation

Stationen with Danfoss T°C Thermostat

In the summer, you can stop the pump by switching it off at the mains. However, remember to start the pump (briefly) at least once a month during the summer.

Systems with Danfoss ECL:

Outside the heating period, the pump will be disconnected automatically from the heating system. During the summer period, the controller will start the pump for a minute at least once very three days to prevent the pump from blocking.

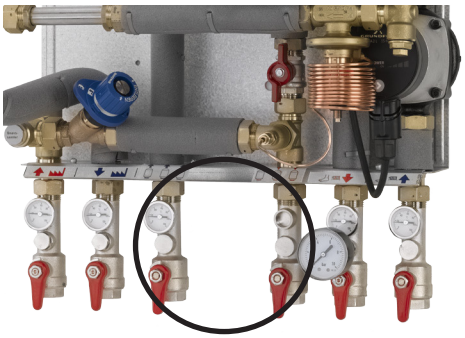
Start-up after summer operation - venting

Please note that it may be necessary to vent the system again. To vent the system, use the air vent, if any, in the substation, or the radiators or, if appropriate, the air valve at the highest point of the system.

Push-button for selection of pump setting

Domestic hot water

The S-Solo HWP is supplied with connection pipes for cylinder on the primary side.



Troubleshooting Heating

If operating disturbances occur, the following basic features should be checked before carrying out actual troubleshooting:

- the substation is connected to electricity
- the strainer on the district heating supply is clean,
- the district heating flow temperature is at the normal level (summer, at least 60 °C, winter at least 70 °C),
- the differential pressure is higher than or equal to the normal (local) differential pressure in the district heating network. - if in doubt, ask the district heating plant,
- there is pressure on the system.

Problem		Possible cause		Solution
No heat	▶	Strainer clogges on DH or HE side (radiator circuit)	▶	Clean strainer.
		Filter in district heating meter clogged	▶	Clean the filter (after consulting the district heating plant).
		Defective differential pressure controller	▶	Check the functioning of the differential pressure controller - clean valve seat if required.
		Defective actuator	▶	Check the functioning of the actuator.
		2-vay valve defective - or possibly dirt in the valve housing	▶	Check the functioning of valve - clean valve seat if required.
		Automatic controls wrongly set or defective - possibly power failure	▶	Check if the setting of the controller is correct - see separate instructions. Check the power supply.
		Pump out of operation	▶	Check if the pump is receiving power and that it runs. Check if there is air trapped in the pump housing - see pump manual.
		The pump is set at too low speed of rotation	▶	Set the pump at higher speed of rotation.
		Air pockets in the system	▶	Vent the installation thoroughly.
Uneven heat distribution	▷	Air pockets in the system	▷	Vent the installation thoroughly
Supply temperature too high	▶	Wrong setting of automatic controls	▶	Adjust automatic controls, see instructions for automatic controls.
		Defective controller. The controller does not react as it should in accordance with the instructions	▶	Call in automatic controls manufacturer or replace controller.

Troubleshooting Heating

Problem	Possible cause	Solution
Supply temperature too low ▷	Wrong setting of automatic controls ▷	Adjust automatic controls - see instructions for automatic controls
	Defective controller. The controller does not react as it should in accordance with the instructions ▷	Call in automatic controls manufacturer or replace controller.
	Wrong placement / fitting of outdoor temperature sensor ▷	Place / fit outdoor temperature sensor correctly.
	Strainer clogges. ▷	Clean strainer.
Poor cooling ▶	Too small heating surface/ too small radiators compared to the total heating requirement of the building. ▶	Increase total heating surface
	Poor utilization of existing heating surface. ▶	Make sure that the heat is distributed evenly across the full heating surface - open all radiators and keep the radiator in the system from heating up at the bottom.
	The system is single-pipe ▶	It is extremely important to keep the supply temperature to the radiators as low as ever possible, while maintaining a reasonable level of comfort.

Maintenance

The substation requires little monitoring, apart from routine checks and cleaning of strainers. To ensure the best operating conditions regular inspection of the substation and a check of all relevant operating parameters are recommended, for example in connection with meter reading.

Meter reading

Meter reading
We recommend that you read your meter regularly and that you write down the meter read.

Cooling

Cooling / Return temperature reading
The cooling, i.e. the temperature difference between district heating supply and district heating return is of great importance for the total heat economy. It is therefore very important to observe the supply and return temperatures.

Cleaning

Cleaning
All strainers should be checked and cleaned at least once every year, typically in connection with start-up of the heating system.

Tightening

Tightening of connections
All threaded and flanged connections should be checked and tightened in connection with meter reading. All threaded and flanged connections should be tightened regularly and especially in connection with start-up after the summer period.

Venting

Venting of system
Always vent the radiators and the substation before the heating season.

Strainer

Strainer
Strainers should frequently be cleaned from sediments by authorized personnel, according to producer's instructions and dependent on the substation's operating conditions.

Danfoss Redan A/S
District Energy
Omega 7, Søften
DK-8382 Hinnerup
Telephone +45 87 43 89 43

EC-DECLARATION OF CONFORMITY

For CE marking in EU (European Union)

Danfoss Redan A/S District Energy

DK-8382 Hinnerup

Declares under our sole responsibility that below products including all available power and control options:

S-Solo HWP

Main components: See Instruction Manual

Covered by this declaration is in conformity with the following directive(s), standard(s) or other normative document(s), provided that the products are used in accordance with our instructions.

EU Directives:

EMC Directive 2004/108/EEC

EN 61000-6-1 2007 Electromagnetic compatibility- Generic standard: Immunity for residential, commercial and light industry.

EN 61000-6-2 2005 Electromagnetic compatibility- Generic standard: Immunity industry.

EN 61000-6-3 2007 Electromagnetic compatibility- Generic standard: Emission for residential, commercial and light industry.

EN 61000-6-4 2007 Electromagnetic compatibility- Generic standard: Emission industry.

Machinery Directive 2006/42/EEC

EN ISO 14121-1 Safety of machinery -- Risk assessment

EN 60204-1-Safety of machinery - Electrical equipment of machines — Part 1: General requirements

PED Directive 97/23/EEC

Conformity assessment procedure followed: Module A - Internal control of production

All substations that falls under Article 3 §3 and category 1 shall not be CE-marked according to this directive

CE marked affixed year 2010

Approved by:

Place and date of issue: Hinnerup, Aug. 24th, 2010

Name: Thavarupan Perinpam

Title: Quality and Lean Manager

Danfoss Redan A/S

Omega 7, Søften
DK-8382 Hinnerup
Telefon: +45 87438943
Telefax: +45 87438944
redan@danfoss.com
www.redan.danfoss.dk