Declaration of Conformity

Producer:	HeatWork AS
Address:	Skarvenesveien 6 Postboks 353 8505 Narvik NORGE
Model number:	**HW103HH, HW1800, HW3600, HW3600-40 Hybrid, HWX2, HW6000e,** **MY9, MY15, MY16, MY35, MY40**
Serial number:	
Description:	Defrosting and heating machine with boiler and pump system that circulates hot glycol liquid for various defrosting and heating purposes.

It is hereby declared that the machine complies with the following directives:

- Machinery Directive 2006/42/EC
- Low voltage directive 2014/35/EU

Complies with the following harmonized and national standards:

- Machine safety NEK EN 60204-1:2018
  - Machine safety - Electrical equipment in machines -- Part 1

Place: Narvik
Date: 02/2024

Reidar J. Schille,
CEO

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production manager

HeatWork®
industrial heating solutions

HeatWork®

USER MANUAL

HW MY35







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INFORMATION: **All users must familiarise themselves with the contents of this User Manual, particularly the chapters dealing with operation and safety.** Read the manual from cover to cover and keep it in an easily accessible location in the machine. When ordering parts or requesting service information, you will always be asked to state the machine number and model.

This manual contains information about safety, operation, technical specifications, transport, inspection, and maintenance. Read the manual carefully to familiarise yourself with all the switches and what they do.

WARNINGS: There is a number of different warning labels attached to this machine. Which parts are dangerous and the nature of those dangers are described in detail both in this manual and on the machine itself. Familiarise yourself with all warnings.

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1. Safety

HW machines use diesel as fuel to heat the heating hoses and generate electricity to operate the pump and control system. Diesel is flammable and therefore must be handled with care.

Under normal operating conditions, surfaces will get very hot. When starting the machine, the operator must take steps to ensure that the system has reached operating temperature. During start-up, the operator must inspect couplings, hoses, valves, etc. and ensure that the system is sealed and free of leaks, and that there are no other signs of abnormality around the machine.



DANGER
In order to avoid accidental contact with hot HTF fluid, it is ESSENTIAL that all components in the circulation system undergo regular maintenance and inspection.



WARNING
It is recommended that protective shoes, clothing, gloves, and helmets are worn whenever using HW machines, in addition to the PROTECTIVE GOGGLES required by Norwegian law.

This manual uses the following symbols:



DANGER
Risk of serious personal injury



NOTE
Danger of equipment damage



CRUSH HAZARD
May cause personal injury



HOT SURFACE
Risk of personal injury



NB
Instructions must be followed

Risk of explosion, pressure hazard, risk of crushing, battery acid/gas

1.1. Personal protective equipment

During operation, the HTF fluid will reach temperatures around 100°C. When working with fluids that reach such a high temperature it is important that the operator takes all appropriate precautions and uses personal protective equipment. Uncontrolled emissions of fluids may cause burn injuries/scalding. We recommend that operators always use work wear that has been approved for hot work, waterproof gloves, protective shoes, and a helmet when working with a HW machine, in addition to the protective goggles required by Norwegian law.



Protective goggles required



Hot fluids under pressure

Furthermore, we also recommend that the operator has access to a first aid kit that contains burn gel, fire extinguishing equipment, and eye rinse solution in the machine/vehicle, or other heated location close to the machine. For obvious reasons, this equipment must be kept in a frost-proof location that is easily accessible. Heated storage is particularly important in locations where water is not easily available. See appendix for HMS data sheet about HW HTF fluid.

Remember, hot surfaces constitute a burn injury hazard. This applies to hoses and surfaces inside the machine, as well as any ancillary equipment connected to the machine. Make sure that the machine and HTF fluid have cooled to at least 30 degrees before carrying out any connection and disconnection/rigging/adjustment/servicing. Personal protective equipment must be used at all times.

1.2. System description and example areas of use

The system consists of a mobile, fluid circulating heat power station, a diesel-powered generator, burner, motor, pumps and pipes/hoses. In addition, there is also a series of ancillary equipment such as CliWi heat exchangers, fans, hoses, insulation mats, trolleys, etc.

The system uses a burner to indirectly heat fluid, which circulates through a closed system by means of pumps.

It is important that the owner and users of the machine are adequately trained and that the instructions set out in the User Manual are followed in their entirety. Incorrect use of equipment, inadequate supervision/inspection, deviations from the stipulations of the User Manual, etc. may create hazardous situations and cause damage to property and objects, as well as personal injury.

1.3. Safety functions

HW machines are equipped with an automatic stop switch that cuts the circulation pump in the event of there being a break in one of the hoses or if the system develops another HTF fluid leak. The stop switch activates when the HTF fluid in the tank falls below a specified minimum level. The maximum amount of HTF fluid that is allowed to leak is around 30 litres. The fluid poses no danger to the environment. At maximum pump capacity, less than 1 litre of fluid is pumped per second.

The machine is also equipped with an overheating protector, which will cause the machine to stop if it is tripped. The switch must be reset manually if it is tripped.

During periods where the burner is in continual operation, it must be stopped for five minutes once every 24 hours.

It is impossible to completely eliminate individual risk factors, even if the recommended safety equipment is used and the machine's built-in safety functions are intact and working correctly.

These risk factors include:

- Burn injury as the result of accidental contact with components/hot fluid, as well as in the event of any leaks.
- Hazards linked to generator and/or burner operation: noise, exhaust gases, and heat.
- Fuel-related hazards, including fire and smoke/exhaust gases.
- Risk of electric shock in instances where the majority of components are powered by electricity. An earthing rod must be used when using the generator
- Risk of personal injury when hoisting, handling, moving, or incorrectly using equipment.
- Poor maintenance/servicing of burner/boiler may result in coking and fire

1.4. Emergency stop switches

The machine has two emergency stop switches, one on the machine itself and another on a remote control, which shall be used in the event a hazardous situation arises as the result of a hose break or in connection with the hoses becoming tangled.

2. Use of the system

All users must read the entire User Manual and be familiar with the ancillary equipment used. Before use, it is important that operators are familiar with the system's functions, control panel, and safety measures, etc. All operators must have completed the mandated basic training, and HeatWork must be contacted if any additional training is required. Safety may be compromised if the system is used by unqualified personnel.

The areas in which the system is to be located and the work site must be cordoned off using adequate barrier material for the marking of safety zones. The system also requires oxygen in order to enable operation of the burner and generator. Consequently, HW machines must never be located indoors without access to adequate exhaust ventilation or air supply. In all such circumstances, HeatWork should be contacted before you do anything so that you get the correct information and advice. Both the machine and generator produce exhaust gases that may pose a risk to life and health following direct exposure.

If you suspect there to be a deviation and/or fault in the system, component wear, or other circumstances that may impact safety, contact HeatWork and an expert should inspect the system in order to identify/rectify any such conditions. Individual components, such as hoses and quick-release couplings, have a limited lifespan and therefore must be inspected on a regular basis. In the event of wear, damage and/or leaks, such components must be replaced before the system is used. Therefore, it is particularly important that the correct start-up procedure is employed.

The system and its components and ancillary equipment must be kept free of dirt. Quick-release couplings that are covered or clogged with foreign matter will not seal correctly. Therefore, make sure that a rag or suchlike is accessible to wipe and clean components. Modifications or rebuilds carried out by anything other than a HeatWork approved workshop will invalidate the warranty and pose a risk of personal injury and damage to property. All servicing must be carried out by qualified personnel, and it is recommended that everything is serviced once a year. Use only original service/wear parts. Daily

maintenance is to be carried out by trained users. Adjustments to burners, etc. must be carried out by certified personnel.

Ancillary equipment from other manufacturers may not be used without the prior approval of HeatWork.

When filling the diesel tank, users must take steps to ensure that neither the machine nor the diesel itself are exposed to situations where there is a risk of ignition.

3. Safe transport of equipment

Transporting equipment always involves some degree of crushing risk. HW machines are of such a weight that they pose a serious risk of personal injury or damage to property. Always secure the system by correctly attaching trailer hooks, using chocks to secure wheels when parking, and taking extra care when adjusting support wheels/feet.

When transporting the machine, the user must ensure that all applicable laws/regulations are complied with and relevant safety measures taken. The user must also ensure that the requisite certification is in place, and that the vehicle used for transportation is compliant with these requirements. The machine must not be moved if there is damage to wheels, wheel suspension, or trailer hitch on the machine or vehicle.

HW machines are not supplied with a lifting device as standard, only upon special order by the customer. Users who choose to lift the machine must ensure compliance with applicable laws/regulations and that safety measures are followed, assuming responsibility for any injury/damage that occurs as the result of poor safety.

The machine must be transported using a vehicle that has a permitted trailer weight in excess of the specified maximum weight. The choice of trailer must be evaluated against the condition of the road over which the machine is to be transported. HW machines are equipped with all-season tyres as standard.

Check compliance with specific national regulations prior to transport.

4. Use of ancillary equipment, connection of hoses, etc.

Users must always follow the correct procedure when connecting and starting the system. Should you need to connect extra hoses, CliWi, distribution equipment, etc., all such components must be fully connected before the system is started. Then start the pump and check for any leaks in connected equipment. If there is no indication of any leaks, the system burner can be started. During start-up and shutdown, procedures must be followed, see Chapter 11.

In the event of there being a leak in hoses, couplings, or other connected equipment, the item in question must be disconnected and repaired before being used. Hoses, tarpaulins, and quick-release couplings are consumables that may be exposed to wear and damage during use, and must be inspected and maintained on a regular basis. Hoses are to be looked upon in the same way as you would fresh produce in that they have a limited life, with the quality of the rubber from which they are made deteriorating over time (ageing) and the huge variations in temperature to which they are exposed. HeatWork original hoses must be used when changing hoses.

All hoses and couplings are tested and approved before being handed over to the customer. Because the thickness of the rubber from which hoses are made can change after being heated/cooled a few times, HeatWork recommends re-pressing tarpaulins if any leaks are detected.

HeatWork cannot guarantee the lifespan of hoses and couplings due to the risk of them being exposed to external stresses and fouling whilst in use. Therefore, avoid subjecting hoses and couplings to unnecessary stress, run-overs, sharp edges, pulling over ground, etc. **Hoses must never be suspended after quick-release couplings, additional stress relief is required.** Fit dust covers on couplings under upper and lower rigging. If you have any questions or are unsure about anything, contact HeatWork.

When lifting/lowering hoses, the hoses must be secured using an approved attachment device. Lifting devices must be certified and approved in accordance with the rules/regulations applicable at the time in the geographical area in which the system is located. HeatWork accepts no liability for damage raising/lowering of HeatWork equipment causes to buildings, and recommends that all areas that are exposed to risk are adequately padded and secured. Users must ensure that they carry out and manage such operations with care.

5. Release of liability for damage to handled objects

HeatWork accepts no liability for damage caused as the result of the use of its equipment. Equipment users must ensure that the required temperature does not damage buildings, equipment, inventories, etc. In addition, HeatWork does not accept liability for damage to buildings, inventories, etc. in the event of any leaks. Users must secure the equipment in such a way that leaks do not present any risk, and conduct adequate inspection of the system. This takes the form of the implementation of leak-limiting measures and checks. This applies to both the machine and any ancillary equipment.

HeatWork systems generate a temperature of around 100 degrees Celsius. This means that the surfaces of hoses, couplings, exchangers, etc. become hot. This contact heat may cause discolouration and burn marks on some materials. In any case, it is recommended that HeatWork additional equipment is used to insulate and lift hoses, minimise leaks, and deal with other securing issues in order to avoid/minimise unwanted events.

HeatWork strongly recommends that users have adequate injury insurance against injuries caused by third parties.

6. Introduction

6.1. HW machines

The operational components of the machine are fitted to a galvanised machine frame that is attached to a galvanised bogie trailer or in a specially adapted container. The canopy is made from a single fibreglass sheet. Depending on the model, the HW machine is supplied with one or more controllable circulation pumps. The original heat reflective HW insulation mats ensure that the machine endures minimal heat loss.

The machines have been specially developed for large heating and thawing jobs, where external ancillary equipment can be connected in order to exploit the abilities of the machine even further, see *Chapter 8.*

Heating hoses, HW insulation mats, and HW Tarpaulins can be set out easily and quickly.

HW MY35 is the largest machine in our MiniHeater range. It has a pumping capacity of 2100 l/h, and a 35 kW boiler with fluid temperature adjustable up to 100ºC. The machine weighs 950 kg, which means that it can be transported in a variety of different ways, including car, ATV, tractor, helicopter, etc. HW MY35 is supplied with a 210 metre hose circuit. With the hoses set 30 cm apart, the machine will cover a thawing area of 66 m².

Examples of use:

Thawing and frost-proofing:

- Water and sewage plant
- Cable trenches
- Excavations, foundations, and floor areas
- Roofing and decking
- Removal of ice and snow
- Coating areas
- Sand masses
- Filling compounds

Heating:

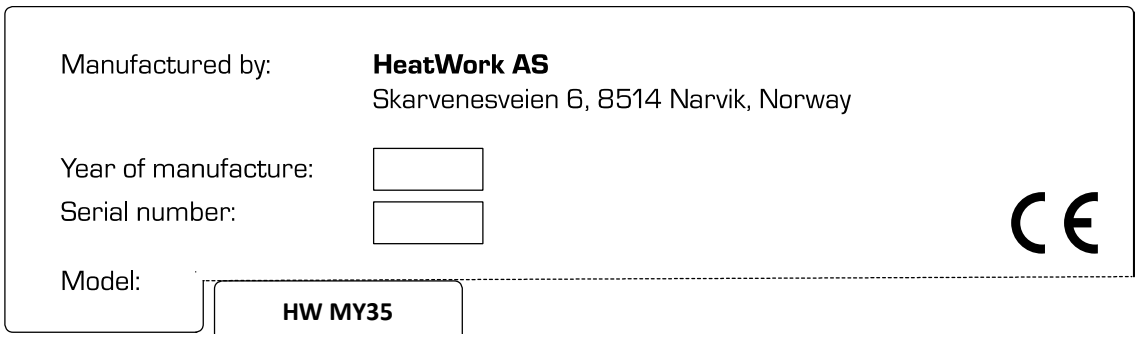
- Building under construction/renovation
- Warehouses, working tents, and halls
- Damage clean-up
- Moisture damage - dehumidifying buildings

Curing of concrete/initial heating:

- Heating of ground areas before stoppage
- Application of heat when curing concrete
- Formwork and concrete work
- Pothole repair elements
- Bedrock during anchoring work

6.2. Identification of machine

Labels showing the serial number of the machine are located on the left-hand sole bar on the trailer, and on the machine frame under the burner. To ensure more efficient support, have the 4-digit serial number handy when contacting the supplier.



6.3. CE marking

HeatWork machines are CE-marked. The CE symbol can be found on the machine plate and comes with a declaration of conformity issued by HeatWork AS.

For Norway: HW machines are defined as construction/production machinery and do not need to be registered with the Norwegian Public Roads Administration. Equipment may not be removed from the machine in order to enable the trailer to be used to transport other items as such use REQUIRES the trailer to be registered.

Other countries: Before transporting the machine, investigate which national regulations apply in respect of registration and speed limits. The HW machine is construction/production machinery and may be subject to nation speed limits in respect

of the shipping of an unregistered trailer. If such limits apply, it is recommended that you register the machine. It is the user's responsibility to take care of any necessary registration. HeatWork will be able to provide the necessary technical specification upon request.



NB:

ALL PERSONNEL INVOLVED IN THE USE OF THIS MACHINE MUST READ AND COMPLY WITH THE INSTRUCTIONS SET OUT IN THIS MANUAL.

7. Overview, HW MY35

7.1. Description of overview

The operational components of the machine are fitted to a machine frame that is attached to a galvanised bogie trailer. The canopy is made from a single fibreglass sheet.

7.2. External overview

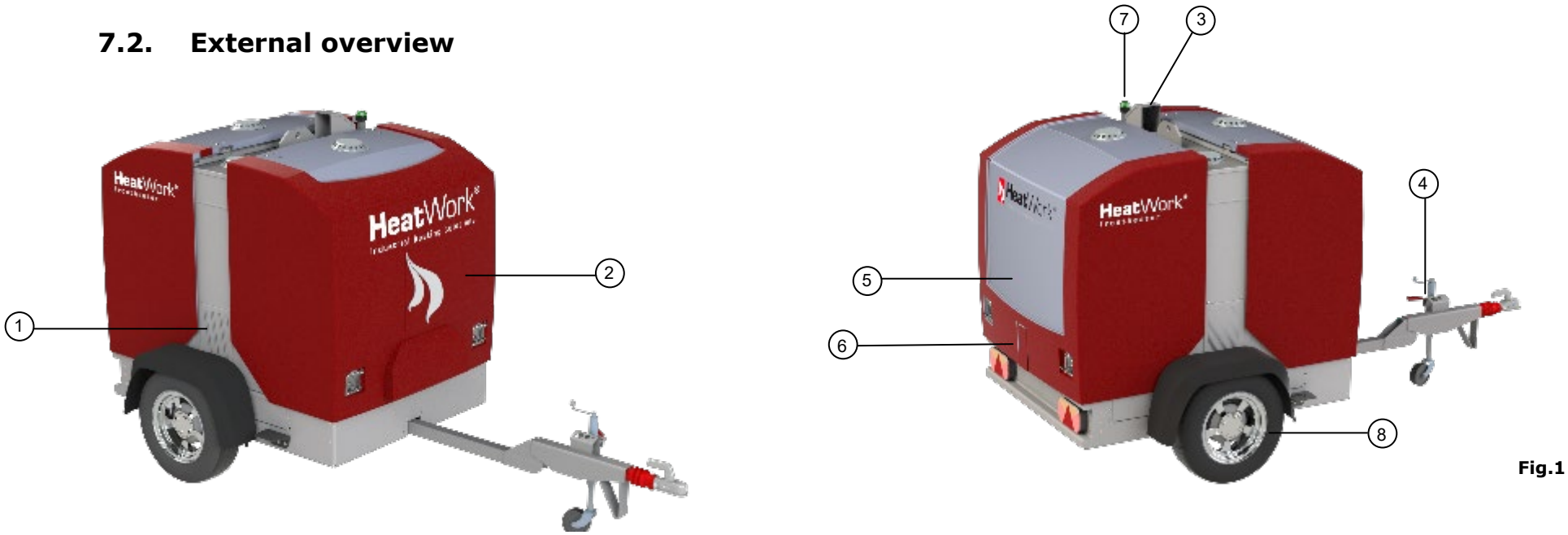


Fig.1

1 Service hatch

2 Front hatch

3 Exhaust pipe, boiler

4 Handbrake

5 Rear hatch

6 Hose cover

7 Operation status light

8 Tyre size 175/70R14

7.3. Internal overview

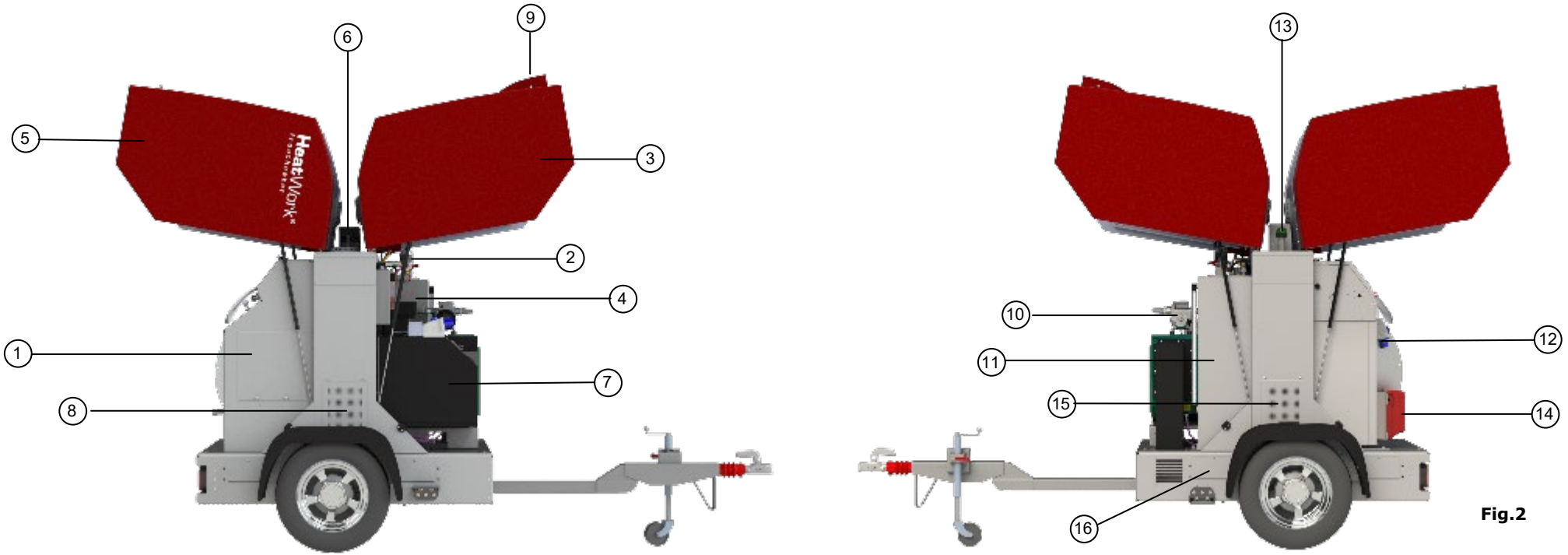


Fig.2

1 Service hatch, HTF filter

2 Filter, burner

3 Front hatch

4 HTF tank pressurised max. 6 bar

5 Rear hatch

6 Lifting bracket

7 Unit

8 Service hatch

9 Air intake, unit

10 Bunkering pump, diesel

11 Diesel tank 100 litres

12 Input current 230V 16A

13 Operating light, roof

14 Burner

15 Service hatch

16 Fork cover (optional equipment)



Fig.3

1 Electrical board

2 Control panel

3 Boiler

4 Burner

5 Instrument panel

6 Hose coupling (in/out)

7 Control lever, drum

8 Additional socket

9 Bunkering pump, HTF (optional equipment)

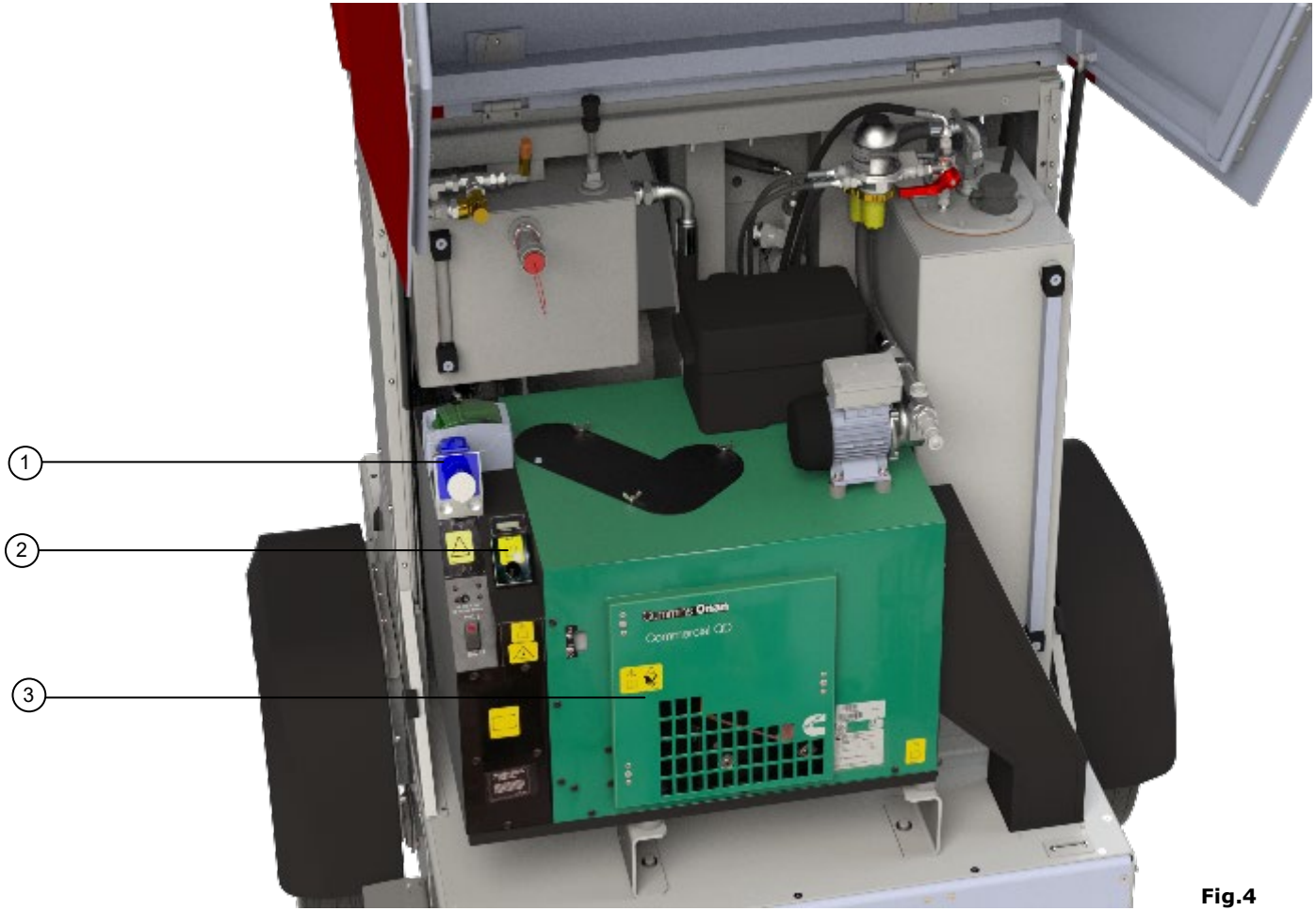


Fig.4

1 Input current 230V 16A

2 Oil dipstick

3 Inbound couplings

7.4. Control panel overview



1 Electrical cabinet

2 Emergency stop

3 Hour counter, pump

4 Thermostat, burner

5 Overheating protector

6 Autostart, control unit

7 Switch, tumbling/circulation

8 Control, burner

9 Temperature and pressure gauge

10 Circulation indicator

11 Control lever, drum

12 Power input 230V 16A

7.5. Electrical cabinet overview

1 Fuse, circulation pump

2 Fuse, burner

3 GSM



7.6. Cummins Onan overview

1 Oil top-up

2 Hour counter, unit

3 Oil meter

4 Circuit breaker

5 Start/stop switch

6 Start panel, unit

7 Coolant top-up

8 Coolant meter

9 Lever lid, oil top-up

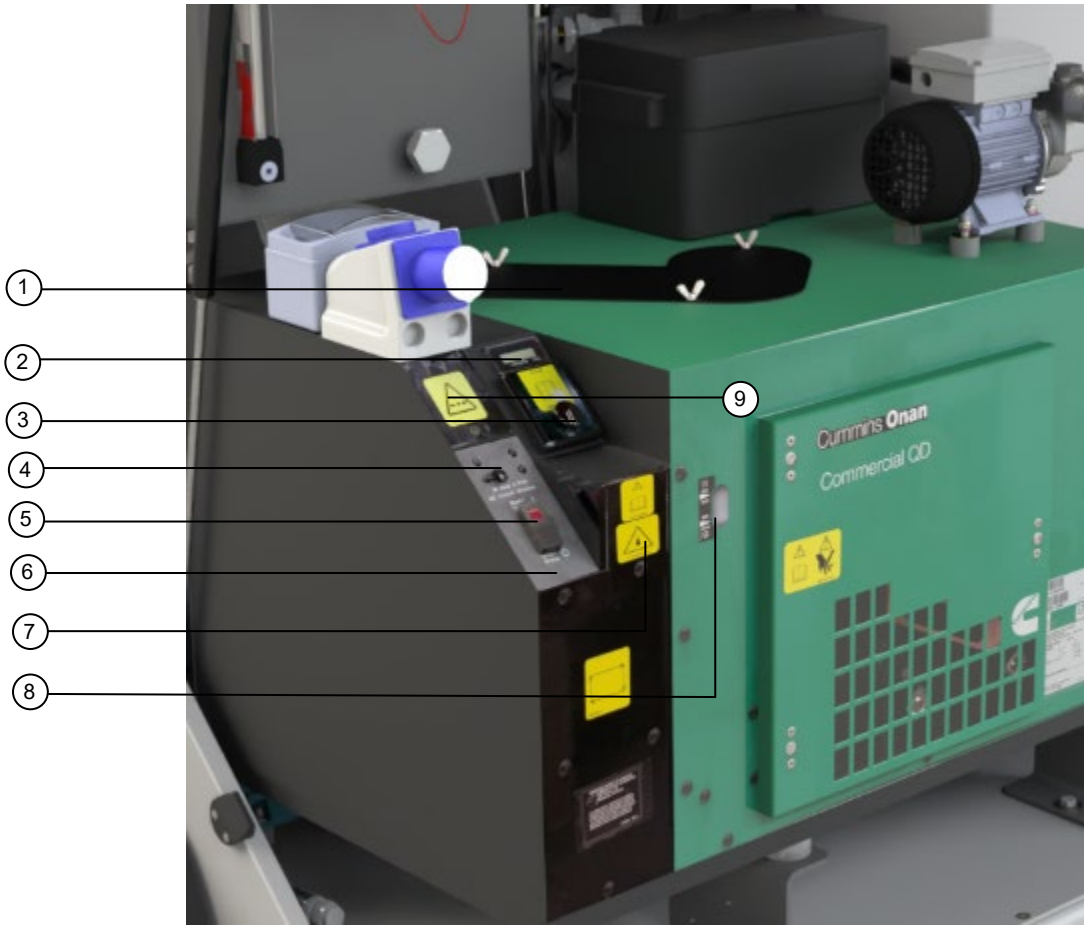


Fig.6

7.7. Diesel or biofuel

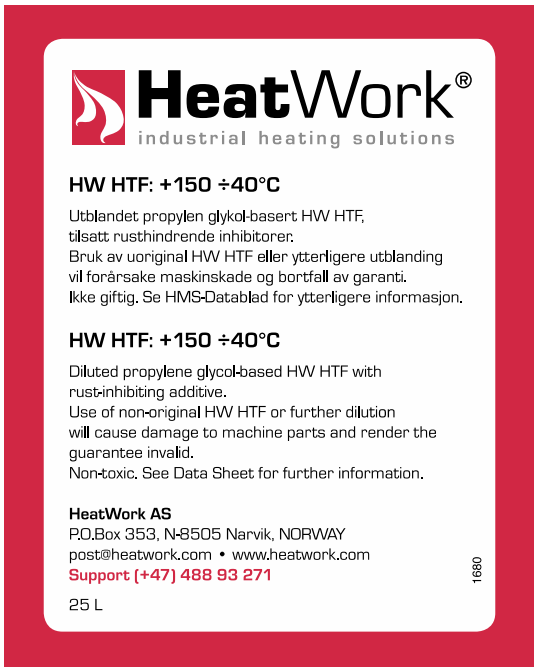
HW uses either diesel oil or 2nd generation biodiesel to heat the HTF fluid. We recommend using winter diesel, Arctic class 2, at temperatures below 0°C. At operating temperatures below -20°C, paraffin must be mixed with the diesel in a ratio of 3:1 winter diesel/paraffin. HeatWork accepts no liability for any problems that may arise as the result of using other types of fuel.

(Tax-exempt diesel will afford the most cost-effective operation of HW machine.)

7.8. HTF fluid in Glycol machines

HW HTF fluid has been adapted and tested for use in HW machines.
Therefore, HeatWork AS recommends HW HTF fluid. HeatWork accepts no liability for any problems that may arise as the result of using other types of HTF fluid in the circulation system. Diluting HTF fluid may result in operational stoppages/problems. The filter must be changed if necessary in order to maintain machine performance.

HW HTF fluid is the brand shown on the right.



NB:

ALWAYS USE HeatWork HTF fluid. Use of other types of HTF fluid may result in machine breakdown.

7.9. HW hoses

Always use original HW heating hoses. These hoses can be bought separately.



HeatWork accepts no liability for any problems that may arise as the result of using other types of hose.

DANGER
ALWAYS USE HW heating hoses.

HW hoses are pressure-tested and made from materials that are specifically designed for purpose. BREAKDOWNS as the result of using third-party hoses may result in serious burn injury.

8. Preparation and transport

8.1. Preparation

Before driving out, it is important to check to ensure that the equipment is in good condition before it is transported to the work site. The important points that should be checked before transporting the machine to the work site are set out below.

Tyre pressure, lights, brakes
Check the air pressure in the tyres on the trailer before transport. Make sure that lights and lamps work as they should. Make sure that the lights on the trailer come on when the power contact is connected to the hauling vehicle. Make sure that internal work lighting is operational. Make sure that the handbrake is sufficiently taut and in good condition. Any deviation must be rectified before the HW machine is transported.

Filling diesel and HTF fluid
Although the machine can be topped up with diesel and HTF fluid at the work site, it should be filled before it is actually transported there.

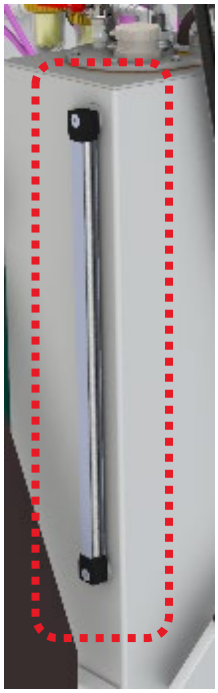


Fig. 7



Fig. 8

Always check the diesel level gauge **(Fig. 7)** and HTF fluid gauge **(Fig. 8)** before start-up.

MANUAL TOPPING UP OF DIESEL
Keep an eye on the fuel level gauge when manually filling the machine with diesel. Stop filling before that tank overflows.

Use winter diesel at operation temperatures below 0°C.

Filling diesel using bunkering pump
Connect bunkering hose to left-hand quick coupling **(Fig. 9)**.

Place the hose well down into the diesel tank.
Press and hold the bunkering pump button on the control panel (**Fig. 10**).

Release the button once the level has reached maximum. The pump stops.

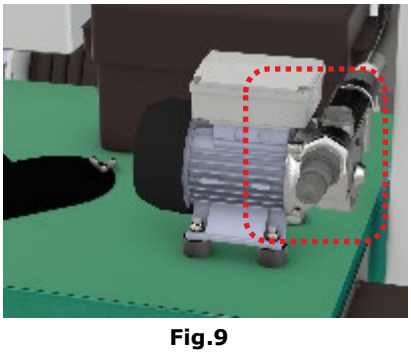


Fig.9

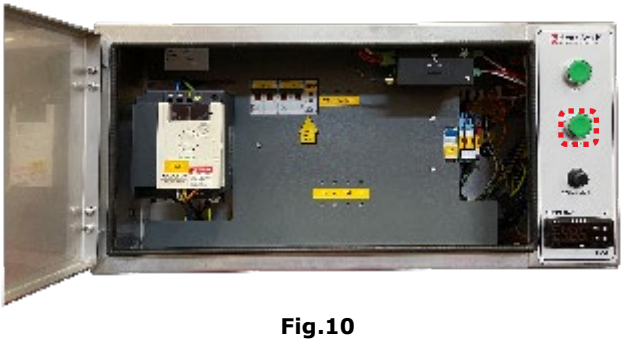


Fig.10

Connection to external diesel tank
All HW machines can be connected to an external diesel tank in order to extend the length of time they can be operated without supervision. Turn the tap on the inspection hatch to the vertical position (**Fig. 11**). Connect one end of the accompanying suction hose (5 metres) to the right-hand quick release coupling on the machine (**Fig. 12**), and the other end to the external tank. Wipe off any fouling on the hose nipple before connecting.

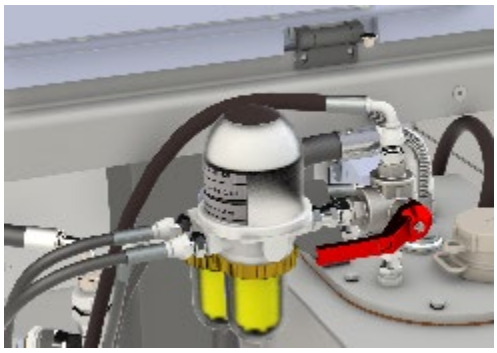


Fig.11



Fig.12

8.2. Topping up HTF fluid

HTF fluid must only be added with the circulation pump turned off and fluid temperature is below 45°C. Only HW HTF fluid may be used. Use of other types of fluid or mixing ratios will result in operational disruption/problems. Doing this shall render the warranty invalid. The machine is equipped with a bunkering pump hose, which is located at the front of the unit reel.

Connect the bunkering pump hose to the quick release coupling on the right-hand side of the drum. (**Fig.13**)
Lower the hose down into the HTF reservoir. Open the tap as shown in the illustration (**Fig. 14**). The tap is located inside the service hatch. Press and hold the bunkering pump button on the electrical cabinet (**Fig. 15**). Once the level has reached maximum, release the button. The pump will stop.

Close the tap (**Fig.14**) once filling is complete and disconnect the hose

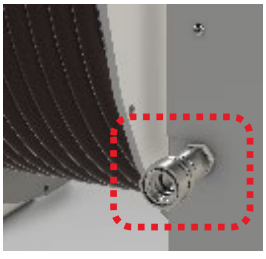


Fig.13

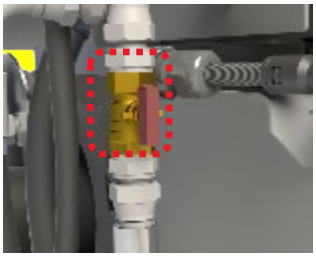


Fig.14

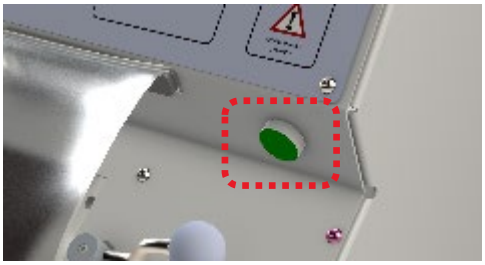


Fig.15

8.3. Transporting the HW machine

The machine may only be transported using a vehicle that has a permitted trailer weight above the specified maximum weight for the machine. The choice of trailer must be evaluated against the condition of the road over which the machine is to be transported. HW machines are supplied with all-season tyres as standard. Make sure that your set up is compliant with national regulations before transporting the machine

9. Procedure

This section gives a step by step description of the correct operation of HW machines. The procedure goes through everything that should happen from when the machine is parked, to when a heating job has been completed and the machine is rigged down.



NB
The machine must never be placed indoors or under a roof due to the possibility of choking and/or fire.

9.1. Installation and start-up

Before laying out heating hoses and mats, the area in question must be secured using barrier tape to ensure that plant machinery or other vehicles do not damage equipment set out on the ground.

Operation light for local monitoring
The machines are supplied with an operation light on the roof to enable local monitoring and to indicate that the machine is in operation. The light flashes green during normal operation. If the light is not on, it is an indication that the machine has stopped operating or is switched off.

Mains/power connection - Generator autostart
If mains power is selected, plug the accompanying extension cord into the mains power supply (230 V) and the apparatus socket on the side of the reel (**Fig. 16**). When using a long extension cord, the conductive area must be 2.5mm^2. The machine is equipped with an undervoltage protector that stops the machine in the event that connected voltage becomes too low. When the autostart switch (**Fig.17**) is turned to the (ON) position, the power unit (extra equipment/option) will automatically start in the event of a power outage. Once mains power returns, this will be detected by the machine and the unit will stop after a few minutes. The machine will then switch over to mains power. When the machine is stopped, the autostart switch must be turned to (0) to prevent the power unit starting automatically.



Fig.16



Fig.17



It is particularly important that the earth rod is inserted in the ground to earth the machine

NB
An earth rod must be used when activating the autostart switch

PROCEDURE FOR STARTING HW MACHINE!

1. Secure the area around the HeatWork machine.
2. Open roof hatches.
3. Connect all hoses, both flow and return
4. Check that none of the hoses are touching any materials that may be damaged by high temperatures.
5. Turn on the pump by turning the switch to the ON position.
6. Check all couplings and hoses for any leaks.
7. Check circulation in hose circuits
8. Turn the burner switch to the ON position.





DANGER
The machine unit must never be placed indoors or under a roof due to the possibility of choking or chimney fire

Connection to external fuel tank
The machines can be connected to an external fuel tank in order to extend the length of time they can be run without supervision.

Connect hoses
Wipe off any fouling around the hose couplings before connecting. Check that the couplings are attached so that they do not come off when the pump starts. The circulation pump must be turned off when connecting and disconnecting hoses.

Hoses running from the machine to the distribution centre should be insulated in order to ensure maximum output to CliWi. Also check that there are no leaks at couplings, hoses, or at couplings on the machine. This is to be done before the hoses are insulated.

Starting the circulation pump
The circulation pump must always be started before the burner. To start the pump, turn the circulation switch to position 2, "operation".

Check for leaks in hoses and at couplings.

NB:

The circulation pump must always be started before the BURNER. Otherwise, the BURNER will not start.

NB:

AVOID getting internal parts of hose couplings in contact with earth and sand as this may enable contaminants/dirt to enter the HTF system.

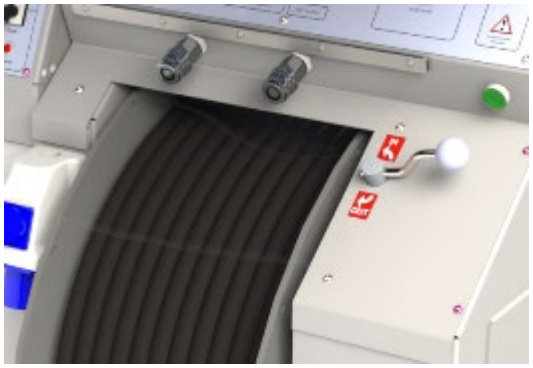
9.2. Tumbling setting

In instances where there is only one operator, it is recommended that heating hoses are manually pull out of the reel in order to avoid slackness and "stowage". Set the regulation tap to the neutral position (horizontal).

Motorised Extraction
In instances where there are 2 operators, the circulation pump can be used to power the reel.

The speed is controlled by one of the operators, whilst the other lays the heating hoses on the thawing area. The following procedure must be followed:

- Set the pump switch to position 1 "hose reel operation"
- The speed of the reel is regulated using the control lever.



HW MY35

Extraction of hoses
Heating hoses should be extracted/run out one at a time. The hoses are to be connected to the machine once the desired number of circuits have been withdrawn. Remember to not mix up the ends of circuits when connecting to the machine.

Laying out hoses on ground
Make sure that the heating hoses have the best possible contact with inclines and avoid laying hoses against sharp objects. Hose spacing is to be selected based on the desired thawing speed and thawing area. See Chapters 10.5 - 10.8 for more detailed information about thawing speed, area coverage, and hose spacing.

9.3. Connection of hoses via distribution centre

Each main circuit is to be connected to a distribution centre.

CliWi is connected to the distribution centre using ½" non-drip quick release couplings.

All connection/disconnection must be done whilst the system is depressurised (pump stopped) with fluid temperatures below 30 degrees.

HW MY35 has an external outlet for the connection of additional equipment. Place the hose couplings against each other and press until you hear a click. To disconnect the hoses, pull the outer ring back.

Hoses should be insulated up to the distribution centre in order to avoid any heat loss.

Setting fluid temperature and starting the burner
HW machines are supplied with a thermostat to regulate fluid temperature.

Before starting the burner, set the fluid temperature to the desired level using the control on the boiler panel. On HW MY35, fluid temperature can be set to a maximum of 100ºC.

Starting the burner
To start the burner, turn the burner switch on the control panel to position 1. The burner will start after a few seconds. NB; The circulation pump must be started before the burner.

Check of circulation and pressure
Each circulation circuit in the system has a separate flow indicator. Check that these rotate in each circulation circuit in use. Also check that there are no leaks at couplings, hoses, or at couplings on the machine. This is to be done before insulation mats are laid out so that you have an overview of the hoses.

Always check system pressure during start-up and regularly during the thawing process. Normally, this is high at the beginning and drops as fluid temperature rises and the number of connected hose circuits increases.

Check the speed on the flow indicators to determine whether circulation is happening in all connected hose circuits. If the flow indicator shows a stop, there may be a kink in the relevant hose circuit.

The temperature on return hoses will rise if there is circulation.
Also check each individual return hose for increases in temperature.

Normal operational pressure is 2-6 bar. Maximum pump pressure 6.5 bar



9.4. Laying insulation mats

Once circulation has started, HW insulation mats are to be laid over the hoses that have been set out. These mats shall have a minimum overlap of 30 cm. It is recommended that the mats are laid out 50 cm outside the hoses around the thawing area.

The heat reflecting aluminium side must always be turned down facing the hoses. Avoid pulling the insulation mats along the ground with the aluminium side facing down. This will reduce the insulating effect over time.

The insulation mats can be secured against the effect of wind using HW Tarpaulins.
To avoid damaging the mats, keep them away from sharp objects.

9.5. Monitoring of machine during operation

This section deals with monitoring the system whilst it is in operation. The instructions below assume that the system has reached operating temperature.

Local monitoring
Once the HW machine is in operation, the process can be monitored from the control panel inside the rear hatch. HW MY35 (**Fig. 18**) has a circulation circuit with flow indicators.



Fig.18

The return temperature will always show as a lower temperature than the input temperature. Normal return temperature is 50 – 100°C depending on the number of hoses connected, thawing speed, ambient temperature, ground conditions, and insulation. The return temperature will be at its lowest during start-up as the temperature difference between the ground and hose is at its greatest.

System pressure in the machine will be in the range of 2-6 bar during normal operation. System pressure will vary depending on the number of circuits, fluid temperature, and hose outlay pattern. HW machine operators will therefore gradually gain experience of different parameters.

In some instances, the three circulation circuits will have different return temperatures and flow speeds. Assuming that the loops have the same flow speed, a low temperature in one of them is an indicator that the circuit is giving off a particularly large amount of heat. Check that the hoses are adequately covered with insulation mats.



DANGER
Use of equipment other than that which is supplied with the machine may result in unforeseen operation issues and personal injury

9.6. Down rigging

Cooling prior to reeling in

COOLING PROCEDURE

1. Turn off the burner, set the burner switch to the OFF position. Allow the circulation pump to run until the temperature has fallen to 30°C
2. Turn the pump switch to the OFF position
3. Disconnect all hoses

Once a heating job has been completed, the HTF fluid must be cooled prior to reeling in. This is done by turning off the burner and allowing the circulation pump to run until the input fluid has reached 30°C. Colder fluid produces a stronger reeling torque on the reel motor.

Reeling in

Once the fluid temperature has dropped below 30°C, the hoses may start to be reeled in. Turn off the circulation pump and disconnect hoses. Immediately put protective caps on the hose ends. Connect one hose end to one of the reel hooks with the end turned upwards. Reel in only one hose at a time.



The hose end must turn upwards once the hose is attached to the hose hook. It is important that hoses are kept TAUT during reeling in AND that the greatest amount of earth and sand is pulled out of the hose during reeling.

Set the pump switch to position 1,”reel operation”. Reel speed is regulated using the regulation valve. The operator must hold the hose during the reeling in process and move the hose by hand so that it is packed in the reel in the best way possible so that there is the smallest possible amount of slack on the hose. Gloves or a damp cloth should be used to remove dirt from the hoses during reeling in. The operator takes control of the control lever when the end of the hose approaches the reel so that the last phase of reeling in takes place slowly and in a controlled manner.

Finally, fit the original fasteners to the hose ends and the holes in the reel ends. Attach the hook so that the hook end does not protrude into a section without hoses. This eliminates the chance of the hook getting tangled up during when the next section is reeled in.



DANGER
Exercise caution when reeling in. There is a risk of crushing between the reel and the beds. Never try to stop the reel by hand. Keep a distance from the reel during reeling so that your hands or gloves do not get caught between the hoses or on the reel cords.

9.7. Switching off

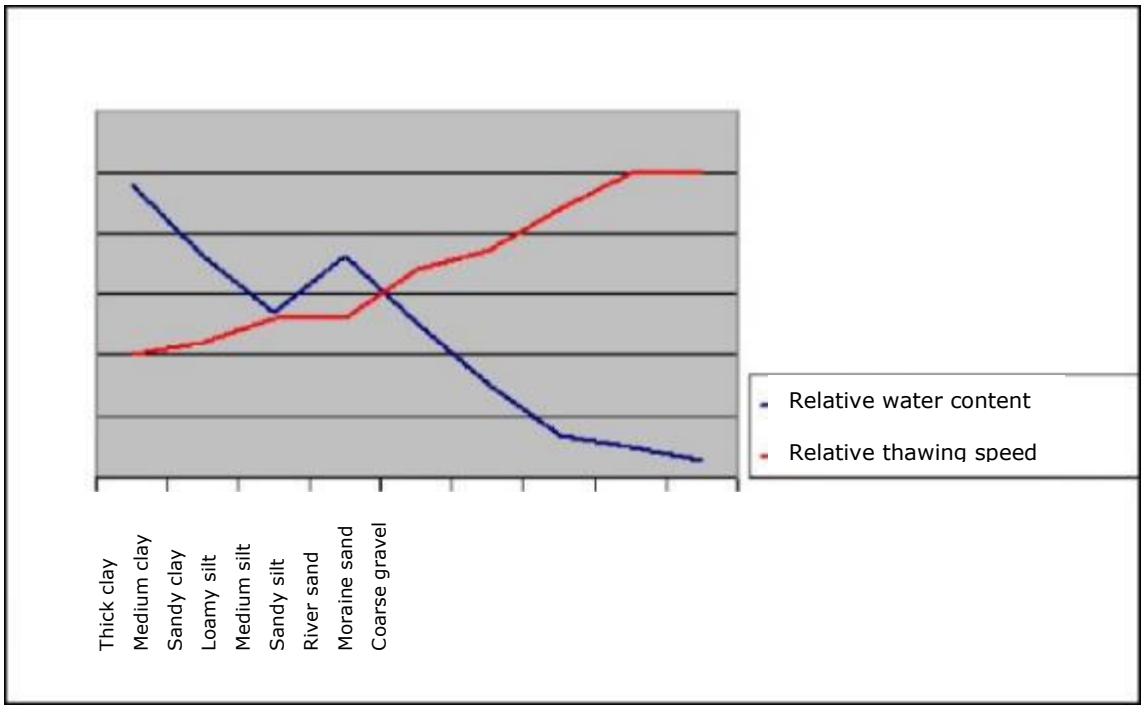
Once the hoses are attached to the reel, the circulation pump is switched off. Mains cable disconnected. Follow the stop procedure for units with unit operation. Close and lock doors and hatches. The HW machine is now ready for transport.

NB!
Always check that hoses are not pinched or that there is a kink in the hose that is preventing circulation.

10. Thawing different types of material

10.1. General about thawing

HW machines have a thawing capacity of 20-80 cm per 24 hours. For normal material, the thawing speed is approx. 50 cm per 24 hours, but this will vary greatly depending on the type of ground conditions, water content, hose spacing, outside temperature and insulation. The graph shows the relative thawing speed for 9 different ground types. The most important machine parameters that affect thawing speed are fluid temperature and hose spacing. From a user perspective, the way the hoses are laid out and the insulation is done is critical to ensuring good thawing.



10.2. Hose spacing

A smaller distance between heating hoses produces an increased thawing effect (W/m^2). Although hose spacing of 10-30 cm is usually sufficient, the hoses should always be laid as close as possible if you want fast thawing and have sufficient hose available in a small thawing area.

If an area of over 300 m^2 is to be thawed simultaneously, the hose spacing will be approx. 50 cm. In this case, after thawing, there may still be frost zones on the surface between the hoses. Further down, the ground will probably be completely thawed. Such frost zones in the surface are easily broken by excavators during excavation. Allow plenty of time for the thawing job when hose spacing is as large as this.

10.3. Special types of ground

Clay and Earth

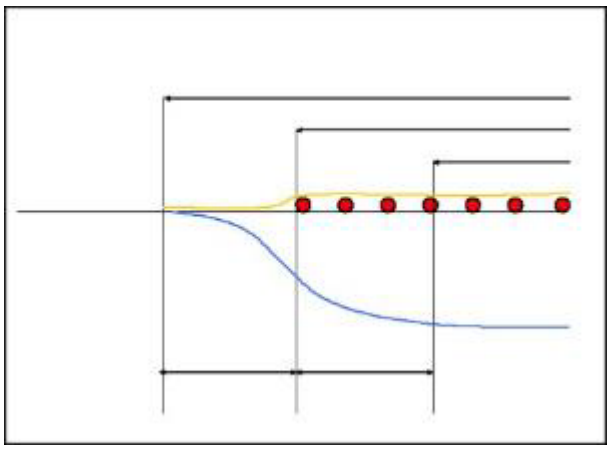
Clay and earth typically have a water content of 27-50%. Boggy ground will have an even greater water content. Lay the hoses as close together as possible when thawing such ground. Thawing speed for this type of ground is typically slower than for other ground types.

Coarse gravel and crushed stone
High drainage soils such as coarse gravel and crushed stone are difficult to thaw as there is only a very small contact surface between the particles. Therefore, it is recommended to remove the insulation and add water after the entire thawing area has undergone 24 hours of thawing. Then cover the hoses again and continue thawing. This will significantly increase thawing speed. For this reason, snow and ice lying on the area before thawing begins should not be removed. The thawed water from the ice will ensure a fast thawing speed due to increased heat conduction in the material.

Ice and snow on the ground
Pure ice takes a lot of energy to thaw. For example, it takes the same amount of energy to thaw 10 cm of pure ice as it does to thaw 30-40 cm of sandy silt with 15% water content. Therefore, reckon on an extra day of thawing if the thawing area has 10cm of surface ice that cannot be removed before thawing

10.4. Laying out hoses and insulation

Incorrectly laying out hoses and missing/incorrect insulation is a typical user error that results in a significantly reduced thawing effect.



When heat is channelled directly from hoses and down into the ground, it is very important that the hoses are laid so that they have good contact with the ground. The heated air under insulation mats mainly results in more heat being lost to the atmosphere.

HW insulation mats are to be laid with an overlap of 30 cm, minimising heat loss to the atmosphere. Secure the mats with HW tarpaulin and materials or similar that prevent the mats from blowing away in the wind.

The heating hoses should always be laid 0.5-1 m outside the desired excavation area on all sides. Insulate up to one additional metre outside the hose area. See illustration.

In the case of narrow thaw areas, a lot of heat energy is transported out to the sides and therefore results in a reduced thawing depth. Therefore, lay heating hoses further outside the excavation area itself. Use of non-original insulation mats results in increased heat loss to the atmosphere and reduced thawing effect. Correct insulation affords better fuel economy.

10.5. Thawing speed and areas

Calculation of hose spacing, thawing areas, and hose length

Thawing area capacity
Maximum thawing area is calculated using specified hose length and desired hose spacing:
Thawing area = Total hose length x Hose spacing

Necessary hose outlay
Necessary total hose length to thaw a specified area with a specified hose spacing:
Total hose length = Thawing area / Hose spacing

Necessary hose spacing
Hose spacing is calculated on the basis of the specified area and the total hose length:
Hose spacing = Thawing area / Total hose length

Example
You want to cover an area of approx. 75 m^2 with a total hose length of 210 m. What hose spacing should be used to cover the desired area?:

Total hose length = 75 / 210 = 0.0357 m

Hose spacing cannot exceed 35 cm.

NB! The coverage area must always be slightly larger than the excavation area.

If you want faster thawing, you should expect to thaw the area in 2 rounds - thawing last area whilst you excavate the first.

10.6. Check of thawing depth

Check the ground to determine how deep it can be thawed most easily using an excavator or by hammering in a spike. Exercise caution if excavation is to be done near the heating hoses so that the hoses are not damaged.

Thawing speed and thawing area using 210 m hose		
Hose spacing (cm)	**Area coverage (m^2)**	**Thawing speed**
5	11	Fast thawing
10	21	
15	32	Normal thawing
20	43	
25	54	
30	65	
35	75	Slow thawing/ frost-proofing
40	86	
45	97	

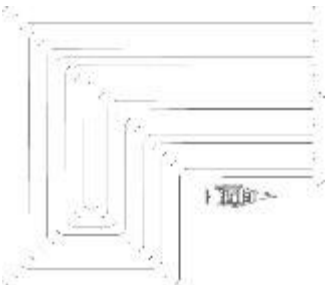
DANGER
When checking thawing depth, the area must be adequately illuminated in order to prevent hoses being accidentally cut. A lot of HTF fluid will leak out if hoses are cut during operation and may result in personal injury.

10.7. Laying out patterns and area coverage

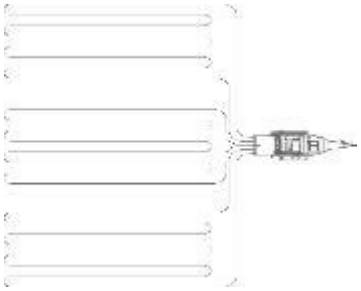
The examples below show how hoses can be laid out in a loop pattern.
The patterns can vary from job to job. It is important that you plan each job and position the trailer optimally so that hose laying is made as easy as possible and that you can lay enough hose to cover the desired area.

In the case of small thaw areas, a circular pattern, where you place the hoses right next to each other, is the optimal choice, and this is shown in *example 3* below.

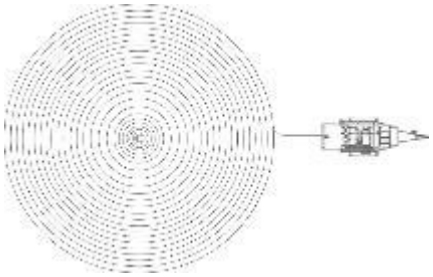
The deeper down the ground is frozen, the further outside the excavation area the hoses must be placed.



Example 1



Example 2



Example 3

10.8. Regulation of fluid temperature after thawing

After a thawing process has been completed, fluid temperature may be reduced to maintenance heat in order to prevent further frost penetration. This reduces heating costs to a minimum. The set maintenance temperature is dependent on the ambient temperature and the heating area.

11. HW Winter insulation

The unique insulation mats are shaped with reinforced surfaces in order to be durable and, at the same time, flexible. With 3 or 7 layers of insulating material and a reflective aluminium coating, they help achieve a level heat of reflection that is second to none. These mats are the ideal choice for thawing and curing processes, as well as for providing frost-proofing where necessary.

Winter insulation mats last a long time and can be used again and again, even if they have been perforated. They are lightweight and waterproof.

Supplied in 7-layer thickness:

2 x 6 metres (12 m^2)
1.2 x 3 metres (3.6 m^2)
1.2 x 6 metres (7.2 m^2)

Supplied in 3-layer thickness:

2 x 12 metres (24 m^2)
2 x 6 metres (12 m^2)
1.2 x 6 metres (7.2 m^2)

Example areas of use

- Telethawing
- Insulation of water and sewage pipes
- Insulation of conduits
- Frostproofing of excavated areas
- Frostproofing of aggregates
- Covering of concrete work



HeatWork also has its own range of narrow form-fitting products with Velcro, which enable quick and secure hose/pipe insulation. Target is 45 cm wide and 3 m long.

12. GSM user guide

To use GSM, you need to insert a SIM card. With a SIM card installed, the user of the machine will receive error messages sent by SMS and have the option to monitor fluid temperature and stop the burner. The notification unit is installed inside the control cabinet.

NOTE! To use SMS notifications from the GSM unit, Nano SIM cards must be used. The SIM card PIN must be deactivated using a standard mobile phone before it is inserted in the GSM unit.

12.1. Inserting SIM card

Procedure for inserting or changing a SIM card:

1. Open the electrical cabinet, unscrew the screw securing the SIM cover on the GSM unit
2. Insert the SIM card so that it matches that shown in the diagram on the cover
3. Fit the SIM cover and screw it back into position. Close the cabinet.

12.2. Indicator lights

When the machine is in operation, an LED on the GSM unit will flash different colour codes:

- **Mobile network:** The uppermost light will flash when the unit is connected to a mobile network
- **Power:** This light comes on when the unit is turned on and is receiving current
- **Alarm:** This light flashed when the machine detects a fault

12.3. Notifications

SMS notifications are issued in the event of the following faults:

- Low diesel level
- Burner fault
- Loss of power supply
- Overheating of burner
- Low glycol level

The SMS contains a link to a document that describes the error message you have received in more detail and proposes possible corrective measures. These messages are sent to all telephone numbers added as notification numbers for the unit. See paragraph 12.6.

12.4. Commands (SMS)



All letters in the command shall be capital letters. Examples of commands in this manual are shown with the password "1234". In order to make it easy to distinguish between the letter O and the number 0, the number 0 is written as follows: 0

12.5. Changing password

The unit comes with a default password. This is changed by sending the following SMS to the telephone number of the unit:

1234P[new four-digit code]

Example - change password from default to "1111"

1234P1111

12.6. Notification numbers

The notification unit can store up to 10 notification numbers. These are numbered 0-9. All numbers receive a message in the event of an alarm/fault.

Add notification number:
Send command: 1234A [sequence number 0-9]T[telephone number]

Example – 1234A0T004781549300

This adds the telephone number 004781549300 as notification number 0

The unit responds with a numbered list containing active notification numbers

NOTE! If the telephone number added is an already active notification number, this will be overwritten

Check notification number:
Send command: 1234A

The unit responds with a list of registered telephone numbers numbered 0-9

Delete notification number:
Send command: 1234A[sequence number to be deleted]

Example: 1234A0

This deletes the telephone number listed as notification number 0

The unit responds with a numbered list containing active warning codes

12.7. Temperature reading

Send command: 1234AINE0

The unit responds with measured input temperature in °C

12.8. Stop burner

You can stop the burner on the HW machine by following the instructions below

Stop burner:
Sent command: 1234DOC0

The unit responds with "burner:close"

The burner will, if active, stop.

Delete burner stop signal:
To restart the burner, the message below must be sent, if not, the burner will be blocked from starting.

Send command 1234ADOO0

The unit responds with: "burner: Open"

13. Status lights and fault messages

13.1. Indicators on the control panel

Burner fault
In the event of a burner fault, an LED light under the burner switch on the control panel will light up red.

The cause of the red light may be a fuel supply fault. Fill with diesel if empty, clean the diesel filter, and check the burner.

The burner may have switched off because the photoresistor relay has tripped. Reset the photoresistor relay on the burner by pressing the red switch.

Unit
The red light in the switch on the unit will flash in the event of a fault during unit operation. Here you can read the fault code when the unit stops working. See appendix Unit.

13.2. HTF level

Before the HTF level reaches the minimum, it must be topped up with HTF fluid. The circulation pump will stop if the fluid level is too low. Minimum level is indicated on the sight glass down on the HTF tank. See section 8.1, **Fig. 8**.

13.3. Troubleshooting, HW machines

Fault	Possible causes	Correction
"Pump fault" indicator comes on.	Frequency transformer in electrical cabinet. Fault with pump motor/electric motor	Checks fault code on transformer and read manual Contact service personnel
Pump and burner stop/will not start. Notification light not on.	Low fluid level in HTF tank	Top up HTF fluid
Burner does not start	Circulation pump not blocked first Overheating fuse tripped	Start pump first. Reset overheating fuse
"Burner fault" indicator comes on	Burner extinguished due to impact in the exhaust pipe Fuel supply fault Burner fault	Reset photoresistor relay on burner (see manual) Fill with diesel, clean diesel filter. Check burner Contact service personnel
Burner stops, warning light not on.	Overheating fuse may have tripped due to high fluid temperature and low circulation	Reduce fluid temperature, increase circulation and reset fuse on boiler after 3 mins
Black exhaust gas from boiler	Incorrect burner parameter setting (air, fuel, nozzle, and pressure) due to height above sea level or wear	Contact service personnel
High input pressure	Heating hose clamped flat	Turn off the pump, check the hoses

13.4. Troubleshooting, unit

Fault	Possible causes	Correction
Starter motor works, but the motor does not fire up	No fuel Seal diesel filter Ambient temperature below -18°C	Fill fuel and follow the bleeding procedure set out in the attached generator user manual Change diesel filter Make sure start temperature increases
Low input figures	Excessive flow load Clogged air filter Seal diesel filter	Remove external consumers Change air filter Change diesel filter
Black exhaust	Clogged air filter	Change air filter
Starter motor does not run/runs slowly	Battery is discharged Generator main fuse Electrical fault or starter motor fault	Charge battery Change fuse Contact service personnel

14. Storage

Before the machine is put into storage, it is recommended that the entire machine is given a general clean. We recommend that the machine is covered by a HeatWork machine cover. Item no. 3299.

The HTF system must be filled with HTF fluid, both in the tank and the hoses. Any new hoses must also be filled with HTF fluid. HTF fluid prevents the formation of corrosion in the system.

Service the boiler and burner in accordance with the appendix in this manual. Servicing must be carried out by certified personnel/a certified company.
The diesel tank must be filled prior to storage in order to avoid condensation.
The power unit and all pumps on the machine should be started every 2 months to prevent them from seizing.

The power unit battery must be disconnected and stored in a dry location. Alternatively, the machine can be connected to mains power every 2 months to charge the battery using the built-in electric charger.

The machine must ALWAYS be kept in a locked location.
It is important to adhere to the servicing schedule in order to ensure efficient and safe use of the machine in the future. This is also important in respect of the warranty on new machines.

Our service technicians change the filter, nozzle, clean the burner/boiler, gauges, and can, if necessary, adjust exhaust gases from the burner. They check hoses, couplings, safety valves, and perform functional checks of the entire machine.



DANGER
It is particularly important to keep hoses and couplings in good condition. A breakdown in a hose circuit may result in serious personal injury at operating temperature. Change or repair damaged components to eliminate this danger.

IMPORTANT!

Never purge the circulation system of HHTF fluid. This will impair corrosion protection. Thinning HTF fluid will impair corrosion protection. Using other HTF fluids will require all equipment and the machine to be purged of fluid and washed clean before refilling with fresh HTF fluid!

15. Warranty

15.1. Conditions

HW machines are supplied with a warranty. Upon purchase, the warranty terms and conditions are included with the machine, in a document entitled "HeatWork AS Terms and Conditions of Sale".

The warranty applies for 1500 hours of operation/1 year, whichever comes first.

The machine's operating time, which is referred to in the TERMS AND CONDITIONS OF SALE, is the machine's circulation time; this is indicated by the hour counter on the control panel.

Warranty coverage assumes that the machine has been used in accordance with the User Manual. Use of third-party parts or components will void the warranty. Should the customer make a warranty claim, the part(s) in question must be sent to HeatWork.

The use of other types of fuel or types of heating fluid other than HW HTF fluid will void the warranty.

HeatWork AS reserves the right to require the customer to provide documentary evidence confirming that the machine has been maintained in accordance with the service booklet in order for the warranty to be valid. In addition, the owner/user must be able to demonstrate that all boiler and burner servicing has been carried out by a certified company/certified personnel. The service booklet must be used and filled in correctly.

Using the trailer for a purpose other than that originally intended will void the warranty.

In the event that the warranty is voided, the cost of parts and/or labour must be covered by the customer.

16. Servicing and maintenance

Regular inspection and maintenance is vitally important in order to ensure that the machine enjoys trouble-free operation and a long service life. The various different servicing points are described below. A service sheet is included with User Manual to log and describe operation and service intervals for the machine. Failure to maintain service intervals and documentation will void the warranty.

If both operating time and time interval are specified, the first occurring interval must be used.



DANGER
During ALL maintenance operations, the system must be FULLY COOLED and the POWER SUPPLY DISCONNECTED.

ALL DAMAGED or FAULTY components must ALWAYS be replaced with new, original parts.

16.1. Daily inspection

Check the lamps on the control panel.

Check fuel level and top up if necessary. Dry running the system will result in an operational stoppage.

Check that the HTF level is almost at maximum.
If the fluid level is almost at minimum, there is likely to be a leak in some hoses, CliWi®, or a pump. Check hoses and replace any that are damaged. The pump will automatically stop when fluid level falls below minimum. Top up HTF fluid as instructed.

Some HTF fluid will evaporate during operation. Top up HTF fluid as necessary.

16.2. Change filter on HTF systems

The closed fluid system is equipped with a circulation filter on the suction side of the pump. This filter protects the pump from potentially damaging particles. The filter must be changed regularly in order to ensure that the machine enjoys a long service life.

Procedure for changing an HTF filter:

- Close the tap on the side of the filter housing
- Disconnect return hoses.
- Place a collection vessel under the filter as approx. 1 litre of fluid will run out when the filter is removed.
- Change the filter.
- Turn the tap back to its original position.
- Connect hoses.

1 Filter

2 Tap

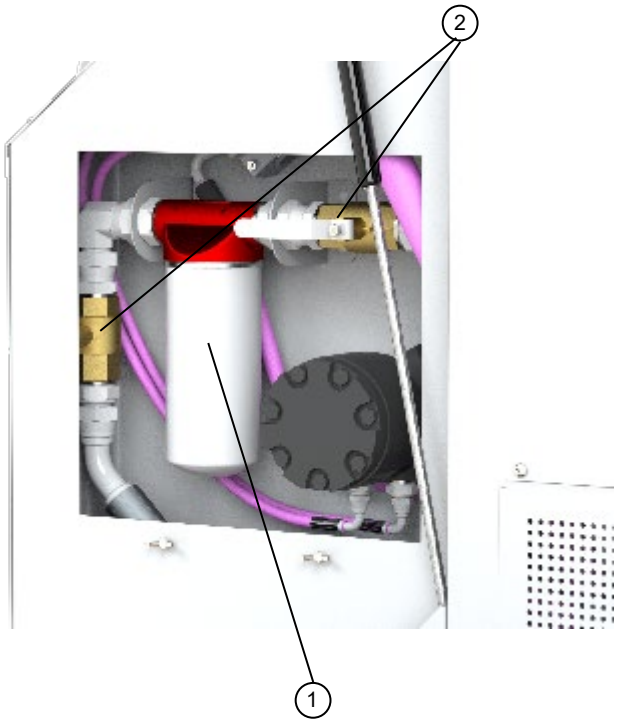


Fig.20

16.3. Change of burner diesel filter

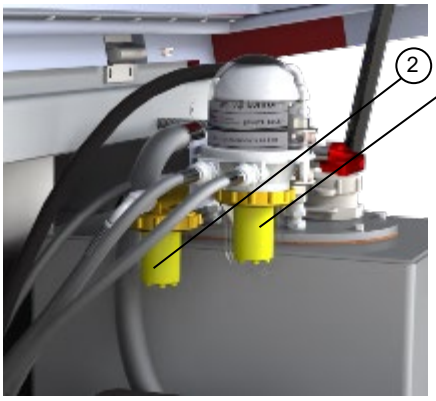
The diesel filter is located above the inspection hatch on the diesel tank. It filters fuel going into the burner. Dedicated diesel filter for generator. (see separate generator operation manual)

When changing filter, unscrew the filter glass, check the O-ring, and fit a new filter element. The diesel system must be manually vented after a filter change.

16.4. Change of unit diesel filter

The diesel filter is located in front of the diesel tank. The filter cleans fuel going into the unit. (See unit user manual.)

To replace the filter: unscrew the filter glass, check the O-ring, and insert a new filter.



1 Filter, unit

2 Filter, burner

Fig.21

16.5. Unit maintenance

Liquid-cooled generator: First oil change after 50 hours. Then every 250 hours.

Servicing interval of 250 hours requires use of special oil.

For other maintenance/servicing, see operations manual for service guidance. Use HeatWork's servicing pamphlet to document servicing. Poor servicing and documentation in accordance with the servicing pamphlet will void the warranty.

16.6. Purge diesel tank

Use a dedicate pump to purge the diesel tank.

16.7. Changing HTF fluid

The HTF fluid has four main functions:

1. Prevent frost in the system
2. Increase boiling point
3. Lubricate pump
4. Prevent corrosion

The quality of the HTF fluid deteriorates over time, which means that the fluid must be checked regularly and replaced if necessary in order to avoid machine breakdown. Only use original HW HTF fluid. Using other types of fluid or other mixes/concentrations may lead to problems. The warranty does not cover problems caused by the use of the wrong type of fluid.

See section 8.2 for more information about how to change HTF fluid.

HTF fluid must be disposed of in accordance with nations laws and regulations.

16.8. Burner

The burner must be serviced after 1500 operation hours (indicated by the hour counter on the instrument panel) or once a year. Black exhaust gas is one sign of a problem with the burner, and may result in a fire. Stop the machine and call service personnel.

We recommend that the burner is serviced once a year. Servicing must be carried out by certified personnel and in accordance with the burner user manual. See appendix.

The burner should be adjusted for height above sea level if the machine is used in locations that are higher than 1200 metres above sea level.



WARNING
Servicing of the boiler and burner MUST be carried out by AUTHORISED personnel.



WARNING
Black exhaust gas is one sign of a problem with the burner, and may result in a fire.

16.9. Boiler

The boiler must be serviced at the same time as the burner. Servicing must be carried out in accordance with the boiler user manual. See appendix.

Maintenance of the boiler must be carried out by authorised professionals.

16.10. Hoses

HW heating hoses should be cleaned with a damp cloth when reeled in after completion of a job. Work gloves must be used when reeling in. We recommend that the outside of HW hoses is regularly cleaned by flushing them with hot water.

HeatWork strongly recommends that, for reasons of safety, hoses are replaced at least once every three years as they have to contain hot fluids under pressure. Worn hoses constitute a serious risk of burn injury in the event of a hose breach.

In the event of a leak or break in a hose, the circulation pump will stop immediately. Replace the hose. Top up HTF fluid as instructed.

Always check the hoses for any damage during reeling in.



DANGER
Damaged hoses must ALWAYS be replaced or repaired immediately.

17. Technical specifications HW MY35

Technical specifications	HW MY35
Weight, suspended	From 850 kg
Pump capacity	2100 l/h
No. of pumps	1 x 2100
System pressure during normal operation	At start-up: 2-6 bar. During operation: 2-6 bar
Max. heat output	35 KW
Burner type	1 step
Furnace efficiency	94% - documented to be the highest in the industry
Fluid temperature	Adjustable 0-100°C (Flow temperature)
Fuel consumption	Max. 3.0 litres/hour with burner in constant operation
Diesel	Winter diesel, Arctic class 2. Biodiesel BFO2G / EN 15940
Diesel tank capacity	100 litres
HTF fluid	HeatWork HTF fluid
HTF tank volume	approx. 30 litres
Industrial HeatWork hose	Reinforced heating hose. Temperature max. 110°C Pressure max. 30 bar.
Fluid volume, heating hoses	0.2 litres/metre
Heating hose length, total	210 m
Single hose length per circuit	210 m
No. of hose circuits	1
Thaw capacity	70-140 m^2
Electrical connection/energy consumption	230V – 1100W
External diesel tank connection	Included
Service doors	2 doors for easier service access
ANCILLARY EQUIPMENT for installation	
GSM Control monitoring	Notifications via SMS in the event of irregularities
GPS positioning	GPS positioning and operation history (subscription)
Plant, noise insulated	Cummins 4.8 kW, liquid-cooled, two-cylinder motor
Autostart unit	Unit starts automatically in the event of a loss of mains power
Extra current draw	16A draw on power plant
LED lighting mast	LED spotlight/practical and robust spotlight. Attached to machine

Technical specifications	HW MY35
Axle load	
Trailer hook load	
Wheel rim size	
Tyre size	
Weight class, tyre	
Air pressure, tyre	

18. Appendices

18.1. HMS data sheet, HTF fluid

HMS data sheet, HTF fluid, English

18.2. Troubleshooting, frequency transformer

18.3. User Manual, boiler: Atlas 95

User Manual, boiler: Atlas 95, English

18.4. User Manual, generator: Cummins Onan

User Manual, generator: Cummins Onan HDKBB, English

18.1. User Manual, burner: Riello RG1

User Manual, burner: Riello RG1, English

18.2. Connection diagram

HW Autostart System
HW Boiler System
HW Fluid System

SAFETY DATA SHEET

In compliance with Regulation (EU) no. 1907/2006 (REACH) Article 31, supplement II with amendments.

SECTION 1: Identification of substance/substance mix and company/business

1.1. Product identifier **Product name:** HW HTF

1.2. Relevant identified areas of use for the substance or mixture and non-recommended uses

Identified use: frost liquid/cooling liquid
Non-recommended use: No non-recommended uses have been identified.

1.3. NATIONAL MANUFACTURER/IMPORTER
HeatWork AS, Postboks 353, NO-8505 NARVIK, Tel. +47 76 96 58 90
E-mail: post@heatwork.com

1.4. Emergency numbers
In an emergency situation, contact the Norwegian Poisons Information Centre: +47 22 59 13 00; Emergency medical help (within Norway): tel. 113; Fire (within Norway): 110; Police (within Norway): 112
Non-emergency poisons information: https://www.helsenorge.no/en/poison-information

SECTION 2: HAZARD IDENTIFICATION

2.1. Classification of substance/mixture
The product is not classified as hazardous in accordance with Regulation (EC) no. 1272/2008 (CLP) and is not required to be marked.

Hazard summary
Physical hazards: Data not available.

2.2. Label elements not usable

2.3. Other hazards
Provided the standard precautionary measures and instructions for handling (para. 7) and for personal protective equipment (para. 8) are followed when using mineral oil products and chemical products, no particular hazards are known.

SECTION 3: COMPOSITION/INFORMATION ABOUT INGREDIENTS

3.2. Mixture
General information:
No hazardous ingredients. Preparation of the substances specified below, with additional non-hazardous components. The ingredients are not hazardous to health, or are at levels below the requirements stipulated in the documentation.

SECTION 4: FIRST AID

General: Remove clothing that is contaminated with the product.

4.1. Description of first aid measures

Inhalation: Ensure a fresh air supply, seek medical attention if the patient is having trouble breathing.
Eye contact: Immediately rinse the eyes with lots of water with the eyelids open.

Skin contact: Wash with soap and water.
Ingestion/swallowing: Rinse the mouth thoroughly.

4.2. Important symptoms and side effects, both acute and delayed
May cause irritation to skin and eyes.

4.3. Indication that immediate medical attention or special treatment is required
Contact a doctor in the event of signs of sickness.

SECTION 5: FIRE EXTINGUISHING

5.1. Fire extinguishing agents
Appropriate fire extinguishing agent
CO2, powder extinguisher, or mist water jet. Larger fires must be tackled using an alcohol-resistant foam or a water jet that is mixed with an appropriate tenside additive.

Unsuitable fire extinguishing agents:
Full jet water

5.2. Particular hazards associated with the substance or mixture:
Fires can generate gases that are hazardous to health

5.3. Advice to firefighters - special fire extinguishing measures:
Move containers from the site of the fire if possible to do so without risk. Fire residues and contaminated extinguishing water must be destroyed in accordance with official regulations. Collect contaminated extinguishing water separately. It must not be allowed to enter the drainage system.

Special protective equipment for firefighters:
When tackling a fire, use portable breathing apparatus and full coverage protective equipment.

SECTION 6: MEASURES IN THE EVENT OF AN UNINTENTIONAL EMSSION

6.1. Personal precautions, protective equipment, and emergency procedures
In the event of an emission: Take care on slippery floors and surfaces.

6.2 Environmental measures:
Prevent surface spread (e.g. using containment or oil barrier). Avoid emissions to the environment. Notify the municipal engineer/environmental manager in the event of a major emission. Prevent further leaks or spills if possible. Must not be emptied into sewer/watercourse/ground water.

6.3. Methods and materials for limiting and decontaminating emissions:
Absorb using liquid-binding material such as sand, diatomaceous earth, acid binder, universal binder, or sawdust. Used absorbents must be disposed of in accordance with the regulations. Stop the flow of the material provided that doing so poses no risk.

6.4. Reference to other sections
For information about personal protective equipment, see section 8. For information about safe handling procedures, see section 7.
For information about disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Rules for safe handling:
Avoid formation of spray mist. Do not eat, drink, or smoke whilst working. When dealing with mineral oil products or chemicals, normal precautions must be observed. Follow industrial hygiene practice. Ensure that there is adequate ventilation.

7.2. Conditions for safe storage, including any inconsistencies:
Local regulations for the handling and storage of water contaminated products must be observed.

7.3 Specific end use:
Data not available.

SECTION 8: EXPOSURE CHECK/PERSONAL PROTECTIVE EQUIPMENT

8.1. Check parameter
Professional exposure limits

Chemical designation	Type	Exposure limits		Source
Propylene glycol	STANDARD	25 ppm	79 mg/m³	Norway. Administrative standards for contamination in the workplace (12.2011)

8.2 Preventive measures

Appropriate design check measures:
Ensure that there is adequate ventilation. The level of ventilation should be adapted to the prevailing conditions. If applicable, process fume hoods, local exhaust ventilation, or other design measures should be used to reduce airborne levels below recommended exposure limits. If no exposure limits have been established, airborne levels must be maintained at an acceptable level.

Individual protective measures, e.g. personal protective equipment

General information:
Wash hands before breaks and at the end of the working day. Use the requisite personal protective equipment. Personal protective equipment should be chosen in accordance with CEN standard and in consultation with the personal protective equipment supplier. Standard safety measures applicable to the handling of mineral oil products or chemicals must be observed at all times.

Eye/face protection:
It is recommended that protective goggles (EN 166) are worn during filling.

Skin protection
Hand protection:
Material: Nitrile butadiene rubber (NBR).
Minimum penetration time: >= 480 min
Recommended material thickness: >= 0.38 mm

Avoid prolonged and repeated skin contact. Appropriate glove types may be recommended by the glove supplier. Apply preventive skin protection ointment. Use protective gloves in instances where doing so is permitted from a safety technical perspective. The exact breakthrough time is stipulated by the protective glove manufacturer and must be observed, as this is not only dependent on the glove material, but also on workplace-specific factors.

Other:
Do not carry product-soaked cloths in your pockets. Use appropriate protective clothing.

Respiration protection:
Ensure that the workplace is well ventilated. Avoid inhaling moisture/spray.

Temperature hazards:
None known.

Hygiene measures:
Always maintain a good level of personal hygiene, e.g. washing after handling materials and before eating, drinking, or smoking. Regularly wash work clothing to remove contamination. Discard contaminated footwear that cannot be cleaned.

Environmental checks:
Data not available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information about basic physical and chemical properties

Appearance	
Physical state:	Liquid
Colour:	Colourless
Odour:	Characteristic
Odour threshold:	Not used for mixtures.
pH value:	6.7 - 8.2
Freezing point:	Not used for mixtures.
Boiling point:	Value not relevant for classification.
Flashpoint:	> 120 °C (ASTM D93)
Evaporating speed:	Not used for mixtures.
Inflammability (solid matter, gas):	Value not relevant for classification.
Explosion limit, upper (%):	Not used for mixtures.
Explosion limit, lower (%):	Not used for mixtures.
Vapour pressure:	Not used for mixtures.
Vapour density (air=1):	Not used for mixtures.
Density:	1.05 g/cm3 (20 °C) (DIN EN ISO 12185)
Solubility (solubilities)	
Solubility in water:	Soluble
Solubility (other):	Data not available.
Distribution coefficient n-octanol/water:	Not used for mixtures.
Ignition point:	Value not relevant for classification.
Decomposition temperature:	Value not relevant for classification.
Kinetic viscosity:	70 mm2/s (20 °C, DIN EN ISO 3104)
Explosion properties:	Value not relevant for classification.
Oxidisation properties:	Value not relevant for classification.

9.2 OTHER INFORMATION Data not available.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity:
Stable when used in accordance with provisions.

10.2. Chemical stability:
Stable when used in accordance with provisions.

10.3. Potential for dangerous reactions:
Stable when used in accordance with provisions.

10.4. Conditions that must be avoided:
Stable when used in accordance with provisions.

10.5. Materials that must be avoided:
Fast oxidising substances. Strong acids. Strong alkalis.

10.6. Hazardous fission products:
Thermal degradation or combustion may release carbon oxides and other toxic gases or vapours.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Toxicological information:
Acute toxicity

Ingestion:
Product: Not classified for acute toxicity, based on available data

Skin contact:
Product: Not classified for acute toxicity, based on available data.

Inhalation:
Product: Not classified for acute toxicity, based on available data.

Etching/skin irritation:
Product: On the basis of all available data, the classification criteria are not satisfied.

Serious eye damage/irritation:
Product: On the basis of all available data, the classification criteria are not satisfied.

Respiratory or Skin Sensitisation:
Product: Allergenic substance for the skin: On the basis of all available data, the classification criteria are not satisfied.
Respiratory allergen: On the basis of all available data, the classification criteria are not satisfied.

Mutagenicity to Germ cells
Product: On the basis of all available data, the classification criteria are not satisfied.

Carcinogenic
Product: On the basis of all available data, the classification criteria are not satisfied.

Reproductive toxicity
Product: On the basis of all available data, the classification criteria are not satisfied.

Toxicity to specific target organs - single exposure
Product: On the basis of all available data, the classification criteria are not satisfied.

Toxicity to specific target organs - repeated exposure
Product: On the basis of all available data, the classification criteria are not satisfied.

Aspiration hazard
Product: On the basis of all available data, the classification criteria are not satisfied.

Other hazardous effects: Data not available.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity
Acute toxicity
Product: On the basis of all available data, the classification criteria are not satisfied.

Chronic toxicity
Product: On the basis of all available data, the classification criteria are not satisfied.

12.2. Stability and decomposition
Biological decomposition
Product: Not used for mixtures.

12.3 Potential for bioaccumulation
Product: Not used for mixtures.

Mobility in soil:
Product: Not used for mixtures.

12.5 Results of PBT and vPvB assessments:
The product contains no substances that satisfy the PBT/vPvB criteria.

12. 6 Other hazardous effects: Data not available

SECTION 13: DISPOSAL INSTRUCTIONS

13.1. Waste handling methods

General information:
Waste and residual substances shall be disposed of in accordance with the requirements stipulated by the local authority.

Removal methods:
Must not be emptied into the public sewer system, the product and its packaging must be rendered harmless in a safe manner. When storing used products, observe the mixing prohibition.

European waste codes
Used materials: 16 01 15: antifreeze fluids other than those mentioned in 16 01 14

SECTION 14: TRANSPORT INFORMATION

This product is only expected to be transported by road or train and therefore is only assess in accordance with ADR/RID regulations. In the event that a different method of transportation is to be used, please contact the issuer of this safety data sheet.

ADR/RID

14.1 UN number:	–
14.2 Correct Transport Name, UN:	–
14.3 Transport hazard class(es)	
Class:	Non-hazardous goods
Label(s):	–
ADR hazard no.:	–
Tunnel restriction code:	–
14.4 Packaging group:	–
14.5 Environmental hazards:	–
14.6 Special instructions for the user:	–

ADN

14.1 UN number:	–
14.2 Correct Transport Name, UN:	–
14.3 Transport hazard class(es)	
Class:	Non-hazardous goods
Label(s):	–
14.3 Packaging group:	–
14.5 Environmental hazards:	–
14.6 Special instructions for the user:	–

IMDG

14.1 UN number:	–
14.2 Correct Transport Name, UN:	–
14.3 Transport hazard class(es)	
Class:	Non-hazardous goods
Label(s):	–
EmS no.:	–
14.3 Packaging group:	–
14.5 Environmental hazards:	–
14.6 Special instructions for the user:	–

IATA

14.1 UN number:	–
14.2 Correct technical name:	–
14.3 Transport hazard class(es):	
Class:	Non-hazardous goods
Label(s):	–
14.4 Packaging group:	–
14.5 Environmental hazards:	–
14.6 Special instructions for the user:	–

14.7 Transport in bulk, in accordance with Appendix II in MARPOL 73/78 and IBC code: not used

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health, and environmental regulations/statutory framework that specifically apply/applies to the substance or mixture:

EU regulations
Regulation (EU) no. 2037/2000, Substances that deplete the ozone layer: none
Regulation (EU) no. 850/2004, Persistent organic pollutants: none

15.2 Assessment of chemical safety:
No chemical safety assessment has been carried out.

SECTION 16: OTHER INFORMATION

Audit information: Amendments are marked with a double dash on the page.

Content of the H-phrases in sections 2 and 3
none

OTHER INFORMATION:
The classification corresponds to the current EF list, but is supplemented with information from technical literature and the company's own information. This comes from the use of the “conventional method” in accordance with EF 1272/2008 (CLP).

Audit date:
07.10.2016

Disclaimer of liability:
To the best of our knowledge, the information presented in this safety data sheet corresponds to the relevant level of our knowledge and experience and only serves to describe the product in terms of handling, transport, and waste disposal from a safety technical perspective. The information does not in any way constitute a (technical) description of the characteristics of the product (a product specification). The suitability of the product for a particular purpose cannot be inferred on the basis of the statements we make in this safety data sheet. Amendments to this document are not permitted. The statements made cannot be transferred to other products. To the extent that the product is combined with, mixed, or treated with other materials, or a treatment is not carried out, the information in this safety data sheet cannot be transferred to the new material produced. The recipient of the product is responsible for ensuring compliance with laws on national, regional, and local level when conducting its activities. Contact us if you require up to date safety data sheets. This data sheet is a safety data sheet compliant with Section 5 of the German Hazardous Substances Ordinance (GefStoffV). It was drawn up electronically in accordance with announcement 220 and bears no signature.

Troubleshooting, frequency transformer

Drive does not start, no error code displayed

- If the display does not light up, check the power supply to the drive (ground and input phases connection, see page 19).
- The assignment of the "Fast stop" or "Freewheel" functions will prevent the drive starting if the corresponding logic inputs are not powered up. The ATV12 then displays nSt in freewheel stop and FSt in fast stop, it will display rdY en freewhell stop. This is normal since these functions are active at zero so that the drive will be stopped safely if there is a wire break. Assignment of LI to be checked in CONF/FULL/FUn-/Stt- menu.
- Make sure that the run command input(s) is activated in accordance with the selected control mode (parameters Type of control tCC page 47 and 2 wire type control tCt page 50, in CONF/FULL/ I_O- menu).
- If the reference channel or command channel is assigned to Modbus, when the power supply is connected, the drive displays "nSt" freewheel and remain in stop mode until the communication bus sends a command.
- In factory setting "RUN" button is inactive. Adjust parameters Reference channel 1 Fr I page 60 and Command channel 1 Cd I page 61 to control the drive locally (CONF/FULL/CtL- menu). See How to control the drive locally page 45.

Fault detection codes that cannot be reset automatically

The cause of the fault must be removed before resetting by turning off and then on.

SOF and tnF faults can also be reset remotely by means of a logic input (parameter Detected fault reset assignment rSF page 77 in CONF/FULL/FLt- menu).

InFb, SOF and tnF faults can be inhibited and cleared remotely by means of a logic input (parameter Detected fault inhibition assignment InH page 81).

Code	Name	Possible causes	Remedy
CrF1	Precharge	• Charging relay control fault or charging resistor damaged	• Turn the drive off and then back on again • Check the connections • Check the stability of the main supply • Contact your local Schneider Electric representative
InF1	Unknown drive rating	• The power card is different from the card stored	• Contact your local Schneider Electric representative
InF2	Unknown or incompatible power board	• The power card is incompatible with the control card	• Contact your local Schneider Electric representative
InF3	Internal serial link	• Communication fault between the internal cards	• Contact your local Schneider Electric representative
InF4	Invalid industrialization zone	• Inconsistent internal data	• Contact your local Schneider Electric representative
InF9	Current measurement circuit failure	• Current measurement is not correct due to hardware circuit	• Contact your local Schneider Electric representative
----	Problem of application Firmware	• Bad application firmware update using the Multi-Loader tool	• Flash again the application firmware of the product
InFb	Internal thermal sensor failure	• The drive temperature sensor is not operating correctly • The drive is in short circuit or open	• Contact your local Schneider Electric representative
InFE	Internal CPU	• Internal microprocessor fault	• Turn the drive off and then back on again • Contact local Schneider Electric representative

Diagnostics and Troubleshooting

Fault detection codes that cannot be reset automatically (continued)

Code	Name	Possible causes	Remedy
OCF	Overcurrent	• Parameters in the Motor control menu drC - page 55 are not correct • Inertia or load too high • Mechanical locking	• Check the parameters • Check the size of the motor/drive/load • Check the state of the mechanism • Connect line motor chokes • Reduce the Switching frequency SFr page 57 • Check the ground connection of drive, motor cable and motor insulation.
SCF1	Motor short circuit	• Short-circuit or grounding at the drive output • Ground fault during running status • Commutation of motors during running status • Significant current leakage to ground if several motors are connected in parallel	• Check the cables connecting the drive to the motor, and the motor insulation • Connect motor chokes
SCF3	Ground short circuit		
SCF4	IGBT short circuit	• Internal power component short circuit detected at power on	• Contact your local Schneider Electric representative
SOF	Overspeed	• Instability • Overspeed associated with the inertia of the application	• Check the motor • Overspeed is 10% more than Maximum frequency tFr page 55 so adjust this parameter if necessary • Add a braking resistor • Check the size of the motor/drive/load • Check parameters of the speed loop (gain and stability)
tnF	Auto-tuning	• Motor not connected to the drive • One motor phase loss • Special motor • Motor is rotating (being driven by the load, for example)	• Check that the motor/drive are compatible • Check that the motor is present during auto-tuning • If an output contactor is being used, close it during auto-tuning • Check that the motor is completely stopped

Diagnostics and Troubleshooting

Fault detection codes that can be reset with the automatic restart function, after the cause has disappeared

These faults can also be reset by turning on and off or by means of a logic input (parameter Detected fault reset assignment rSF page 77). OHF, OLF, OPF1, OPF2, OSF, SLF1, SLF2, SLF3 and tJF faults can be inhibited and cleared remotely by means of a logic input (parameter Detected fault inhibition assignment InH page 81).

Code	Name	Possible causes	Remedy
LFF1	AI current lost fault	Detection if: • Analog input AI1 is configured as current • AI1 current scaling parameter of 0% CrL1 page 51 is greater than 3 mA • Analog input current is lower than 2 mA	• Check the terminal connection
ObF	Overbraking	• Braking too sudden or driving load too high	• Increase the deceleration time • Install a module unit with a braking resistor if necessary • Check the line supply voltage, to be sure that it is under the maximum acceptable (20% over maximum line supply during run status)
OHF	Drive overheat	• Drive temperature too high	• Check the motor load, the drive ventilation and the ambient temperature. Wait for the drive to cool down before restarting. See Mounting and temperature conditions page 12.
OLC	Process overload	• Process overload	• Check the process and the parameters of the drive to be in phase
OLF	Motor overload	• Triggered by excessive motor current	• Check the setting of the motor thermal protection, check the motor load.
OPF1	1 output phase loss	• Loss of one phase at drive output	• Check the connections from the drive to the motor • In case of using downstream contactor, check the right connection, cable and contactor
OPF2	3 output phase loss	• Motor not connected • Motor power too low, below 6% of the drive nominal current • Output contactor open • Instantaneous instability in the motor current	• Check the connections from the drive to the motor • Test on a low power motor or without a motor: In factory settings mode, motor phase loss detection is active Output Phase loss detection OPL page 80 = YES. To check the drive in a test or maintenance environment, without having to use a motor with the same rating as the drive, deactivate motor phase loss detection Output Phase loss detection OPL = nO • Check and optimize the following parameters: IR compensation (law U/F) UFr page 56, Rated motor voltage UnS page 55 and Rated motor current nCr page 55 and perform an Auto-tuning tUn page 58.
OSF	Main overvoltage	• Line voltage too high: - At drive power on only, the supply is 10% over the maximum acceptable voltage level - Power with no run order, 20% over the maximum line supply • Disturbed line supply	• Check the line voltage

Diagnostics and Troubleshooting

Fault detection codes that can be reset with the automatic restart function, after the cause has disappeared (continued)

Code	Name	Possible causes	Remedy
PHF	Input phase loss	• Drive incorrectly supplied or a fuse blown • Failure of one phase • 3-phase ATV12 used on a single-phase line supply • Unbalanced load • This protection only operates with the drive on load	• Check the power connection and the fuses. • Use a 3-phase line supply. • Disable the fault by setting Input Phase loss detection IPL page 80 = nO.
SCFS	Load short circuit	• Short-circuit at drive output • Short circuit detection at the run order or DC injection order if parameter IGBT test Strt page 81 is set to YES	• Check the cables connecting the drive to the motor, and the motor's insulation
SLF1	Modbus communication	• Interruption in communication on the Modbus network	• Check the connections of communication bus. • Check the time-out (Modbus time out ttO parameter page 83) • Refer to the Modbus user manual
SLF2	SoMove communication	• Fault communicating with SoMove	• Check the SoMove connecting cable. • Check the time-out
SLF3	HMI communication	• Fault communicating with the external display terminal	• Check the terminal connection
ULF	Process underload fault	• Process underload • Motor current below the Application Underload threshold tUL parameter page 53 during a period set by Application underload time delay ULt parameter page 53 to protect the application.	• Check the process and the parameters of the drive to be in phase
tJF	IGBT overheat	• Drive overheated • IGBT internal temperature is too high according to ambient temperature and load	• Check the size of the load/motor/drive. • Reduce the Switching frequency SFr page 57. • Wait for the drive to cool before restarting

Diagnostics and Troubleshooting

Faults codes that will be reset as soon as their causes disappear

The USF fault can be inhibited and cleared remotely by means of a logic input (Detected fault inhibition assignment InH parameter page 81).

Code	Name	Possible causes	Remedy
CFF	Incorrect configuration	• HMI block replaced by an HMI block configured on a drive with a different rating • The current configuration of customer parameters is inconsistent	• Return to factory settings or retrieve the backup configuration, if it is valid. • If the fault remains after reverting to the factory settings, contact your local Schneider Electric representative
CFI (1)	Invalid configuration	• Invalid configuration The configuration loaded in the drive via the bus or communication network is inconsistent. The configuration upload has been interrupted or is not fully finished.	• Check the configuration loaded previously. • Load a compatible configuration
CFI2	Download invalid configuration	• Interruption of download operation with Loader or SoMove	• Check connection with Loader or SoMove. • To reset the default re-start the download operation or restore the factory setting
USF	Undervoltage	• Line supply too low • Transient voltage dip	• Check the voltage and the parameters of Undervoltage Phase Loss Menu USb - page 81.

(1) When the CFI is present in the past fault menu, it means the configuration has been interrupted or is not fully finished.

HMI block changed

When an HMI block is replaced by an HMI block configured on a drive with a different rating, the drive locks in Incorrect configuration CFF fault mode on power-up. If the card has been deliberately changed, the fault can be cleared by pressing the ENT key twice, which **restores all the factory settings**.

Diagnostics and Troubleshooting

Remote keypad error messages

Code	Name	Description
InIt:	On initializing itself	• Micro controller initializing • Communication configuration search
COM. E (1)	Communication error	• It has 50ms time out error. • This message is shown after 220 retry attempts.
A-17 (1)	Key alarm	• Key has been pressed consecutively for more than 10 seconds. • Membrane switch disconnected. • Keypad woken up while a key is being pressed.
CLr (1)	Confirm Fault reset	• This message appears if the STOP key is pressed when there is a keypad fault.
dEU. E (1)	Drive mismatch	• Drive type (brand) did not match with keypad type (brand)
rOM. E (1)	ROM abnormality	• Keypad ROM abnormality detected by the checksum calculation.
rAM. E (1)	RAM abnormality	• Keypad RAM abnormality detected.
CPU. E (1)	The other defect	• The other defectt.

(1) Flashing