Blockheizkraftwerke
Notstromaggregate
Automation + Prozessvisualisierung
Rationelle Energieanwendung + Energiemanagement

Beratung, Planung, Programmierung, Herstellung, Lieferung, Montage, Service

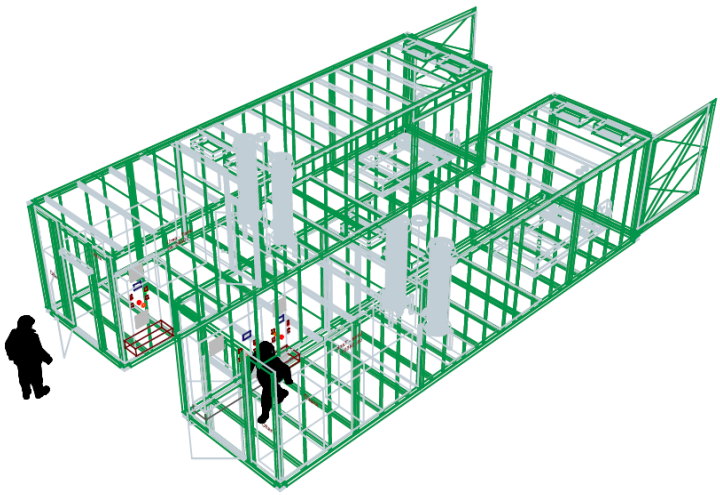
SOMMER ENERGY GMBH

User manual emergency power unit with a control-S7

Operating instructions, manual, notes

APO

25.09.2017



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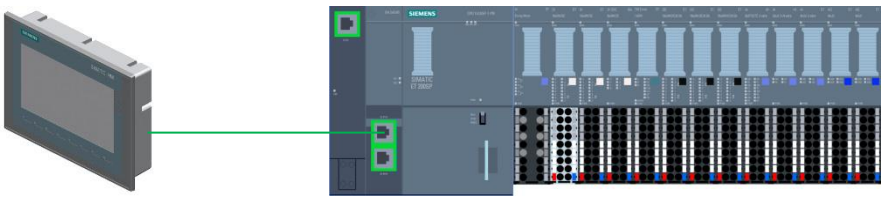
The control unit

To control the system, a decentralized peripheral ET200SP Siemens is used. The control unit is equipped with an external power failure protection to meet the requirements of the 2009 Machinery Directive (UFR1001e). An external synchronizer is used to synchronize with the prevailing power supply network (SYFN30-G002).



The entire system is operated and monitored via the control panel KTP700 attached to the switch cabinet. This is directly connected to the ET200SP.

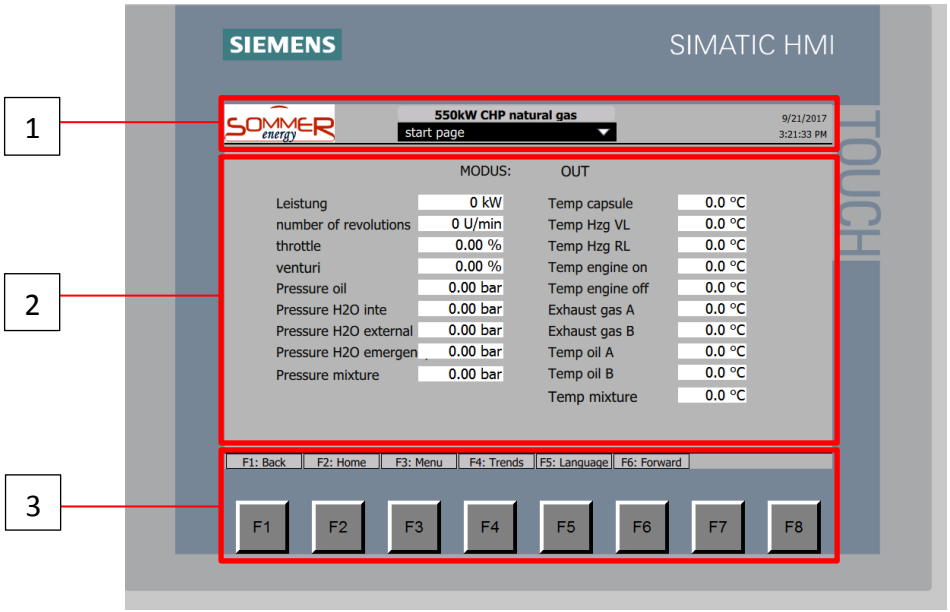
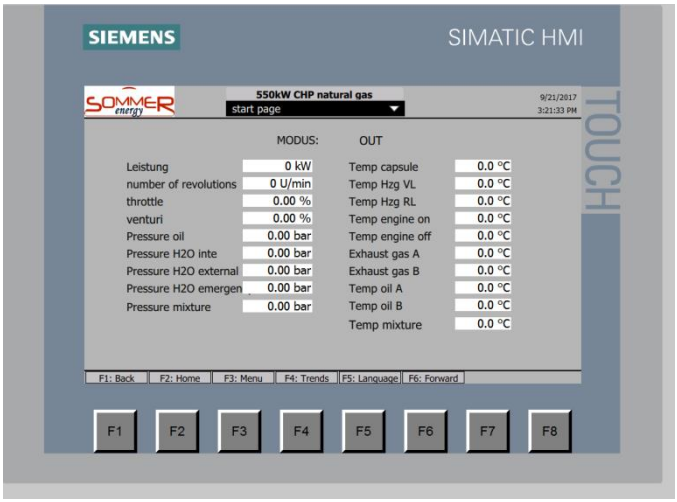


Figure 1 – General view

Nr	Area	Function
1	Header with quick selection menu	Time display, quick selection of pages
2	Range for displaying values and virtual controls	Input and output of values, status displays
3	Function keys	Navigation and main function tasks, labeling of the function keys in the area of the touch panel

Operating pictures and descriptions

Home screen (overview)

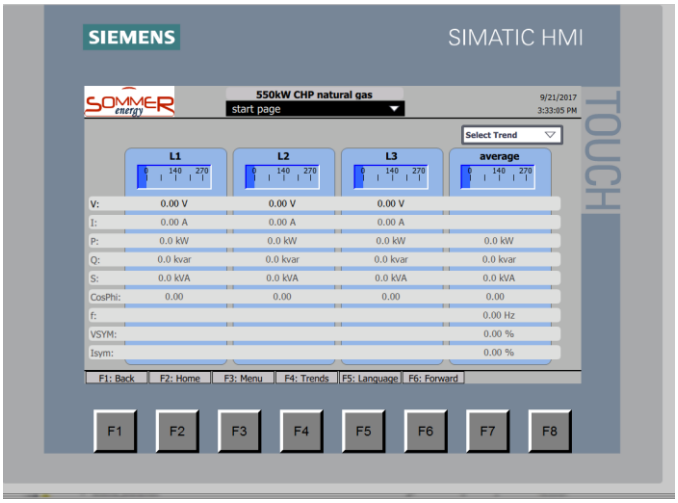


The overview shows the most important values. Starting from the current performance over the power factor CosPhi, the currently requested power up to the current number of revolutions.

The start screen is a general view of the system state and gives the operator a quick overview of the module in its entirety. In addition, the operator is informed of the current status of the unit and the phase and state of the unit.

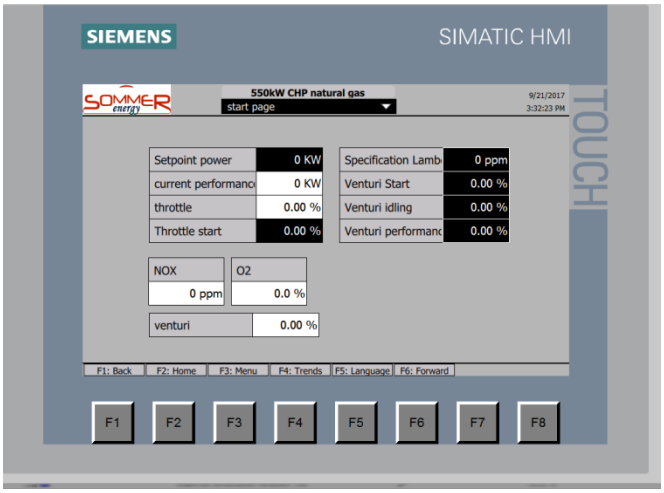
Use the quick selection (drop down list) or the function keys (F1, F2 or F6) to get to the next menu items.

Electrical specifications



The diagram shows the generator voltage of phase against the neutral and the current of each individual phase. As a result, defective phases can be tested, or if a current imbalance (> 30%) is too high, a shutdown with the corresponding message is carried out. Furthermore, all the important electrical data for diagnostic purposes are listed here.

Performance and exhaust settings



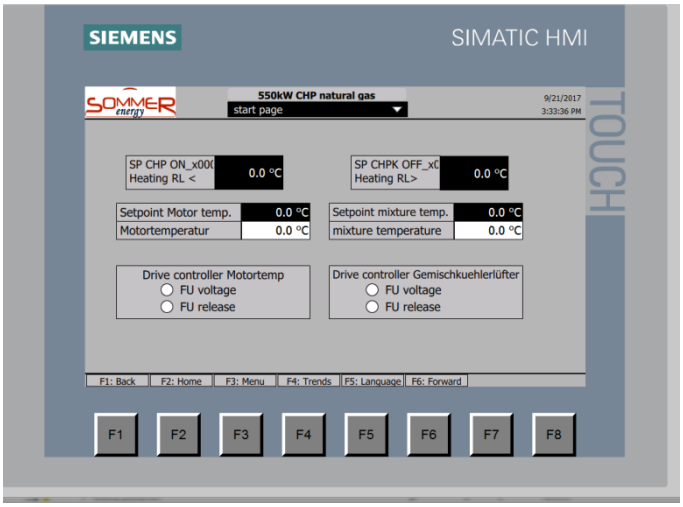
Black areas are - as indicated in the general part of the manual - input fields. In this menu point the desired setpoint can be set. Here, controlled between 100% P_{max} and 50% P_{max}.

After the start phase, the throttle valve start is used to immediately close the valve to an adjustable value in order to prevent an overspeed. This can be set here.

The machine is also equipped with a gas-air mixer (Venturi nozzle). This regulates the combustion in the engine and can be preset here according to the country-specific specifications. In the start, idle and transition from synchronization to the power trip, three further adjustment possibilities are given in the respective phase for the correction of the combustion. During start-up, the value is directly applied, in the idle or synchronizing phase, the value of start and idle is added according to the set value. When jumping into the power phase, the start value, the idle value and the power value are also added.

Note: Here are minus values also permissible!

Automatic operation and temperature control

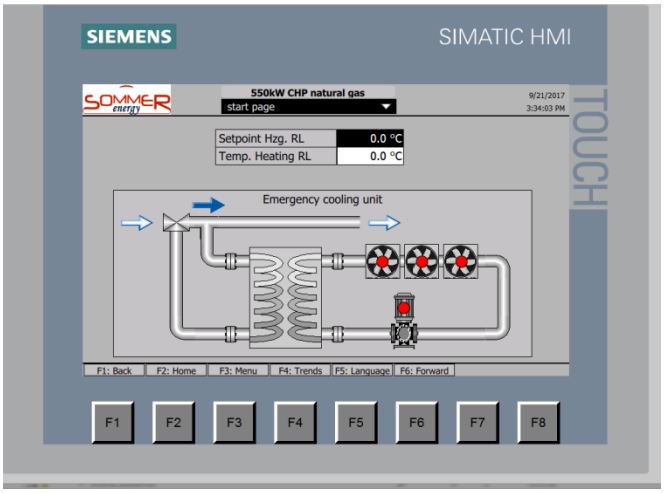


The end-user has the possibility to drive the module in heat-controlled mode during automatic pre-selection mode. This means that when a certain return temperature is reached, the unit starts and stops automatically depented on the return temperature.

In this case, it should be ensured that a return temperature of approx. 70 ° C should lead to the shutdown, that is, a cut-off point must be set by 70 ° C. This value may also vary in special cases.

The control unit also takes control of the motor temperature. The permissible values are between 78 ° C and 88 ° C. The mixture cooling in this case is generally to be set to 50 ° C.

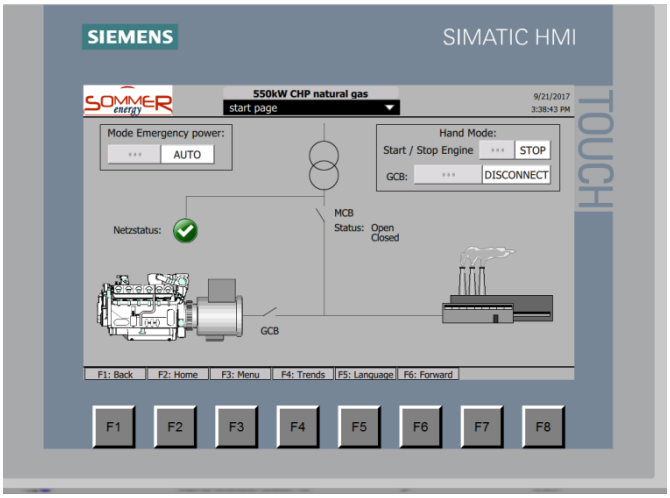
Emergency cooler unit



The temperature of the emergency cooler shall be adjusted in such a way as to ensure a uniform return water flow below 70 ° C in order to cool the engine sufficiently. The controller parameters are permanently programmed into the controller and are designed for the existing control loop when the system is put into operation.

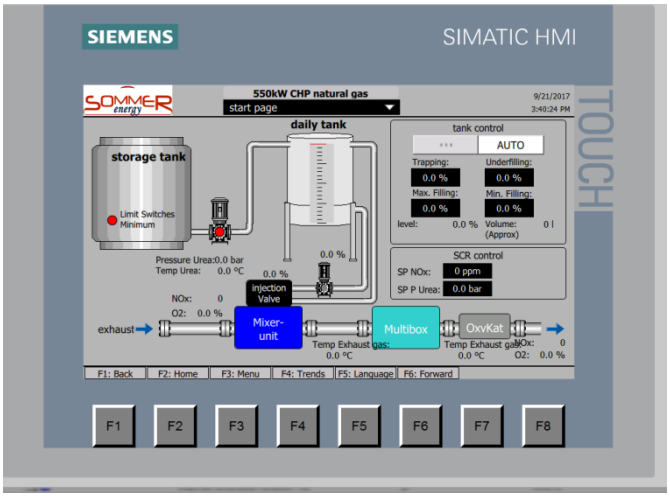
In addition to the frequency-controlled motor cooling, a 3-point control of the system is also possible and is also designed for the control system during commissioning and, if necessary, adapted.

Emergency power supply



The grid status provides information on the status of the utility grid before the main ciruit breaker (MCB) which must be decoupled in in emergency mode. In the automatic emergency power mode, the control unit decides whether the main switch is switched on or off by means of grid and plant mode status. If a malfunction of the public network is detected, the machine starts automatically, then disconnects the main switch and then connects to the power supply rail (generator switch) and provides the emergency power supply. If a malfunction of the public grid is detected, the machine starts automatically, then disconnects the MCB and then connects to the power supply rail (generator switch) and provides the emergency power supply. Synchronization back to the network is possible. The machine is then available again for parallel operation.

Selective catalytic reduction system (short: SCR System)



Fueling system:

The tank system consists of a storage tank and a day tank. The storage tank includes the supply of at least one maintenance interval cycle. The pump between the storage and the day tank to refill the day tank automatically with appropriate adjustment. An ultrasonic limit switch for signaling the refilling is installed in the storage tank. This is shown in the display.

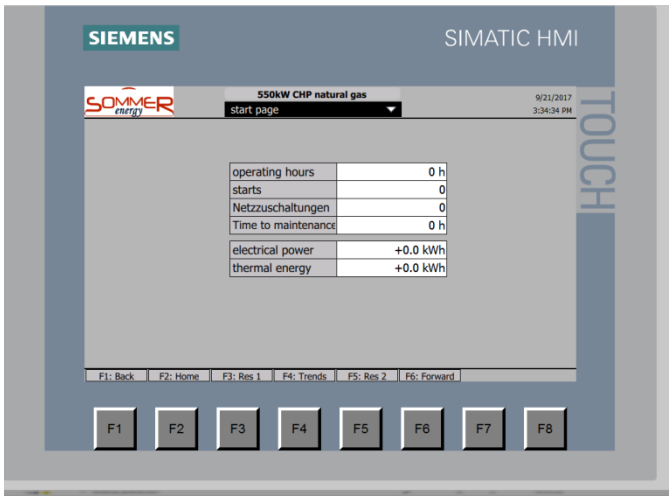
A pressure measuring cell with reference pressure probe is installed in the day tank to measure the level. Various messages and actions are started from the filling level, such as errors and refilling actions. These are then output in the plain text in the display.

The SCR system:

The main components are mixer and multibox units as well as a downstream oxidation catalytic converter for reducing exhaust emissions. This includes three sensor units which are directly connected to the control via CAN bus.

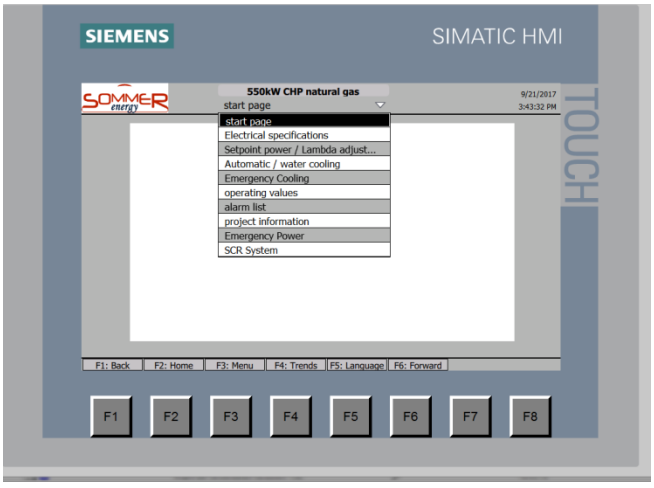
These are two NOx sensors and a double unit temperature sensors. In the mixing unit, urea is added according to the NOx sensors in order to reach the emission values of the destination country. This value can be set in the set point NOx. A delivery module keeps the pressure at the injection nozzle constant. This is between 9 and 11bar and can also be adjusted (set point P Urea).

Statistics



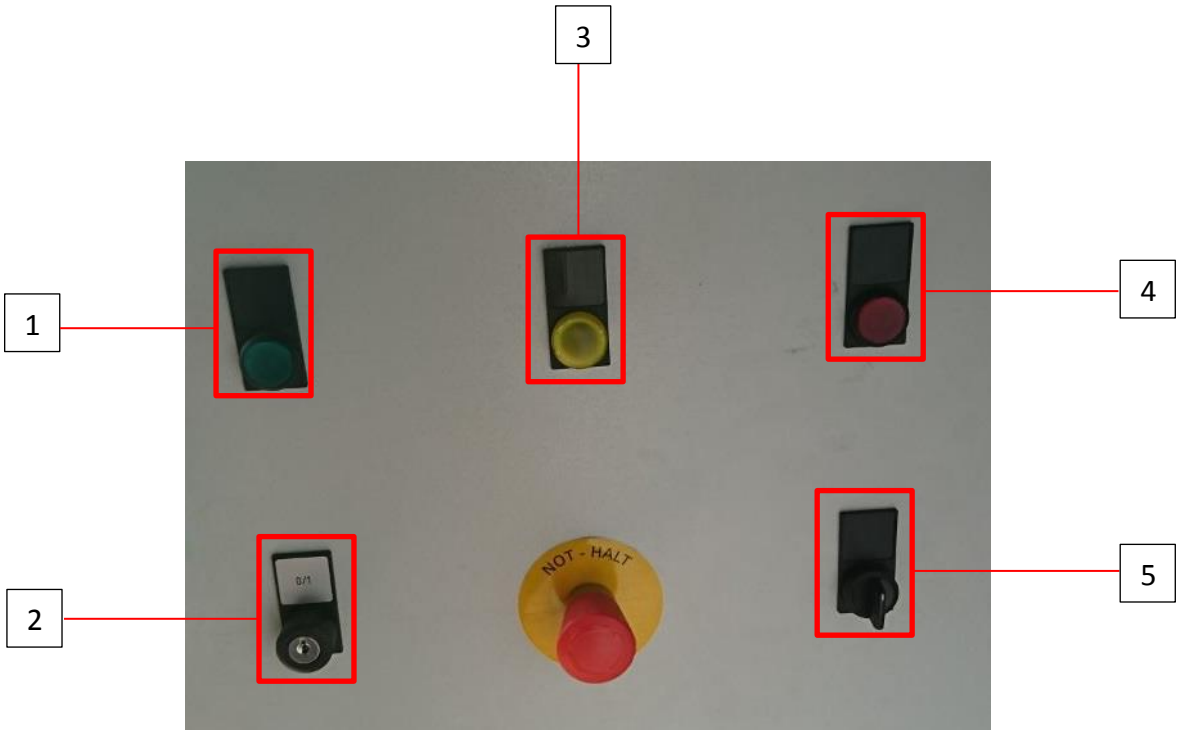
The statistics provide information on operating times, maintenance intervals, generated services and can be assigned with their own external values. The maintenance interval can be reset by pressing the function keys F3 and F5 in the maintenance interval screen longer than 5 Seconds.

Quick selection menu



The quick selection menu allows the operator to quickly switch between individual pages. Pressing in the header line to the drop-down list opens it and the desired page can be selected.

Switch positions



The switch layout shown above is shown on the switch cabinet door.

Switch 1 is the status of the generator switch in the form of a built-in green LED to the operator. When the generator contactor is closed, the button is lit. In the event of an emergency shutdown, the installed emergency stop switch must be acknowledged by means of this button to acknowledge the alarm of the emergency stop.

Switch 2 is responsible for locking the machine. If this switch is set to 0, the unit stops immediately ("hard") or does not start at all. Thus, the system can be "closed", so to speak.

Luminaire 3 is used to signal that the module is in emergency power operation and has detected a mains failure.

Switch 4 is used to acknowledge possible faults. Errors and warnings can have two states: “Coming” or “Gone” (CG). If a fault is indicated in the display, it must be repaired and if it is repaired it can be acknowledged by switch 4 and go to the status “Gone”.

Note: Faults have to be cleared before they are acknowledged!

Switch 5 is to preselect the mode. Three modes can be selected:

- Hand :
    - Start the aggregate without preconditions such as return or buffer storage temperatures
- Zero :
    - Switch off the module
- Automatic:
    - Start and stop the module according to preconditions

Error and Diagnosis

ID		Class	Reason	Elimination
1	ALARM: EMERGENCY STOP	error	- Emergency chain interrupted (upper LED on K100 does not light up) - Missing acknowledgment (lower LED on K100 does not light up)	- Unlock all emergency stop switches - Push the green Button on the Front door
3	ALARM: OIL PRESSURE START	error	- Oil pressure switch defective	- Check the oil pressure switch
4	ALARM: MOTOR PROTECTION SWITCH	error	- Motor protection switch tripped	- Check the motor branches and eliminate the fault
5	ALARM: EVU INTERFERENCE	error	- Fault in the power supply network	- a stable power supply is disconnected for more than 2 min
6	ALARM: OVER TEMP. STARTER TRANSFORMER	error	- thermocontact on the mains power system	- Check the starter transformer and eliminate the fault
7	ALARM: OVER TEMP. MOTOR (95 ° C)	error	- Air in the heating system Circulation pump (internal pump) defective	- Check the circulating pump
8	ALARM: OVER TEMP. OIL (98 ° C)	error	- Faults in the lubrication system too little motor oil	- Check oil level
9	ALARM: OIL PRESSURE TOO LOW	error	- too little motor oil	- Check oil level
10	ALARM: OILSTAND MINIMUM	error	- Oil reservoir empty Defective oil level control contact	- Check for leaks
11	ALARM: OIL TANK	error	- Water or oil leaks	- Check the tightness
12	ALARM: GAS PRINT MINIMUM	error	- Gas supply failed	- Check the stopcocks on the opening
13	ALARM: CAPSULE TEMP. MAX	error	- Temperature in the sound insulation hood too high	- Check the capsule fan
14	WARNING: TROUBLESHOOTING. EXHAUST	error	- Exhaust gas temperature warning reached	- Motor reduces its power automatically
15	ALARM: TEMP.MAX EXHAUST	error	- Exhaust gas temperature too high	- Check air filter, spark plugs
16	ALARM: OVERRIDE	error	- Motor speed above 115% of nominal speed	- Restart the CHP with other start parameters
17	ALARM: WATER PRESSURE MIN	error	- Leakage in the cooling system	- Check the cooling system
18	ALARM: REVERSE POWER	error	- EVU grid drives generator	- Restart with higher Lambda Mixture at Synchpoint

19	ALARM: PERFORMANCE DIFFERENCE	error	-	Setpoint and actual value deviate too much	-	Check the lambda setting
20	ALARM: OVER TEMP. MIXTURE	error	-	no mixture cooling	-	Check the mixture cooling system
21	ALARM: SPEED DIFFERENCE	error	- Faulty ignition - Outdated lambda deer - Ignition strip defective		-	Check ignition distance
22	ALARM: LAMBDA DIFFERENCE	error	-	Lambda control defective / at control limits	-	Check the lambda setting
23	ALARM: COS PHI DIFFERENCE	error	-	CosPhi controller defective	-	Check wiring for the CosPhi controller
24	ALARM: REFILL OIL	error	-	Oil reservoir empty	-	Add oil to the container
25	ALARM: SYNCHRONIZATION	error	-	No mains connection within 7 min	- Check Generators Circuit breaker - Restart	
26	ALARM: START SPEED (STARTER)	error	-	Starter has been set but engine does not rotate	-	Check the speed sensor
27	ALARM:> 3 STARTS	error	-	CHP has not started	-	Check the starting settings
28	WARNING: MAINTENANCE REQUIRED	warning	-	the maintenance period has expired in the next 50 operating hours	-	Notify maintenance service
29	ALARM: MAINTENANCE TIME EXCEEDED	error	-	Maintenance time has expired	-	Carry out maintenance work (let)
30	ALARM: OVER TEMP. HEATING PROCEDURE	error	-	Heating over 98 ° C	-	Check the circulating pump externally and the water pressure
31	ALARM: SMOKE DETECTED	error	-	Smoke gas detected	-	Locate and eliminate smoke
32	ALARM: GAS OVER LIFT (40%)	error	-	Gas warning system has detected gas	-	Locate and eliminate the gas
33	ALARM: FU 1 EXTERNAL PUMP	error	-	Pending error in the frequency converter for the external pump	-	Observe the display of the drive and correct the diagnosis via the error list of the drive
34	ALARM: FU 2 MIXED COOLER FAN 1	error	-	Incident on the frequency converter	-	Observe the display of the drive and correct the diagnosis via the error list of the drive
35	ALARM: FU 3 MIXED COOLER FAN 2	error	-	Incident on the frequency converter	-	Observe the display of the drive and correct the diagnosis via the error list of the drive
36	ALARM: FU 4 MIXED COOLER FAN 3	error	-	Incident on the frequency converter	-	Observe the display of the drive and correct the diagnosis via the error list of the drive
37	ALARM: FU 5 OTHERS	error	-	Incident on the frequency converter	-	Observe the display of the drive and correct the diagnosis via the error list of the drive
38	ALARM: HEATING RETURN TO WARM	error	-	Cooling water for control outside the	-	Observe the limit values

				permissible temperature range		
39	ALARM: PRESSURE WATER EXTERNAL	error	-	Leakage at the external circuit	-	Observe the limit values
40	ALARM: Biogas temperature	error	-	Temperature of the fuel biogas too high	-	Observe the limit values
41	ALARM: Pressure mixture	error	-	leakage at the mixture cooling circuit	-	Observe the limit values
42	ALARM: Pressure Biogas Analog	error	-	Absence of gas pressure measured analogously	-	Observe the limit values
43	ALARM: ERROR AVR GENERATOR	error	-	General fault of the voltage regulator	-	Check the regulator
46	ALARM: COMMUNICATION PARTNER 1	error	-	Lost connection to partner	-	Check the connection cable
47	ALARM: COMMUNICATION PARTNERS 2	error	-	Lost connection to partner	-	Check the connection cable
48	ALARM: COMMUNICATION PARTNER 3	error	-	Lost connection to partner	-	Check the connection cable
49	ALARM: COMMUNICATIONSPARTNER 4	error	-	Lost connection to partner	-	Check the connection cable
50	ALARM: COMMUNICATION PARTNER 5	error	-	Lost connection to partner	-	Check the connection cable
51	ALARM: COMMUNICATIONSPARTNER 6	error	-	Lost connection to partner	-	Check the connection cable
52	ALARM: COMMUNICATION PARTNERS 7	error	-	Lost connection to partner	-	Check the connection cable
65	SENSOR ERROR: TEMPERTUR MOTOR INPUT	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
66	SENSOR ERROR: TEMPERATURE MOTOR OUTPUT	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
67	SENSOR ERROR: TEMPERTURE CAPSULE	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
68	SENSOR ERROR: TEMPERATURE MIXTURE	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
69	SENSOR ERROR: TEMPERATURE HEATING PROCEDURE	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
70	SENSOR ERROR: TEMPERATURE HEATING RETURN	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
71	SENSOR ERROR: TEMPERATURE BUFFER 1	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
72	SENSOR ERROR: TEMPERATURE BUFFER 2	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary

73	SENSOR ERROR: TEMPERATURE BUFFER 3	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
74	SENSOR ERROR: TEMPERATURE BUFFER 4	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
75	SENSOR ERROR: TEMPERATURE BUFFER 5	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
76	SENSOR ERROR: TEMPERTURAL GAS A	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
77	SENSOR ERROR: TEMPERATURE EXHAUST B	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
78	SENSOR ERROR: OIL PRESSURE	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
79	SENSOR ERROR: WATER PRESSURE	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
80	SENSOR ERROR: LAMBDA A	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
81	SENSOR ERROR: LAMBDA B	error	-	Sensor defective outside the display range Cable breakage	-	Check encoder if necessary
102	WARNING: TEMPERATURE MOTOR INPUT	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
103	WARNING: TEMPERATURE MOTOR OUTPUT	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
104	WARNING: TEMPERATURE CAPSULE	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
105	WARNING: TEMPERATURE HEATING VL	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
106	WARNING: TEMPERATURE HEATING RL	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
107	WARNING: TEMPERATURE MIXTURE	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
108	WARNING: TEMPERATURE OF GAS A	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
109	WARNING: TEMPERATURE EXHAUST B	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
11	WARNING: PRESSURE OIL	warnin	-	Pre-warning of pressure outside the	-	Check plausibility of encoder if necessary

0		g		permissible range		
111	WARNING: INTERNAL PRESSURE WATER	warning	-	Pre-warning of pressure outside the permissible range	-	Check plausibility of encoder if necessary
112	WARNING: PRESSURE WATER EXTERNAL	warning	-	Pre-warning of pressure outside the permissible range	-	Check plausibility of encoder if necessary
113	WARNING: PRESSURE MIXTURE	warning	-	Pre-warning of pressure outside the permissible range	-	Check plausibility of encoder if necessary
114	WARNING: Temperature biogas	warning	-	Pre-warning the temperature outside the permissible range	-	Check plausibility of encoder if necessary
115	WARNING: PRESSURE BIOGAS	warning	-	Pre-warning of pressure outside the permissible range	-	Check plausibility of encoder if necessary
116	WARNING: FILL OIL	warning	-	Pre-warning oil level low	-	Check plausibility of encoder if necessary
117	WARNING: Gas	warning	-	Gas warning system has detected gas and gives warning	-	Locate and remove the gas outlet Ventilate the room well Immediately stop in doubt machine