LEIBNIZ INSTITUT FÜR ASTROPHYSIK POTSDAM

LEIBNIZ-INSTITUT FÜR SONNENPHYSIK (KIS)

MAX PLANCK INSTITUT FÜR SONNENSYSTEM-FORSCHUNG

GREGOR:
OT Power Supply GUI Operating Manual

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Signatures & Approval

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Change Log				
Vers.	Date	Author	Description of Changes	Sect./Para.
1	21.06.23	F. Heidecke	New Document	
2	19.07.23	F. Heidecke	Add Level monitoring of the day tank in manual mode Add Clear Climate control cabinet and minor changes	Page 9 Page 19 all

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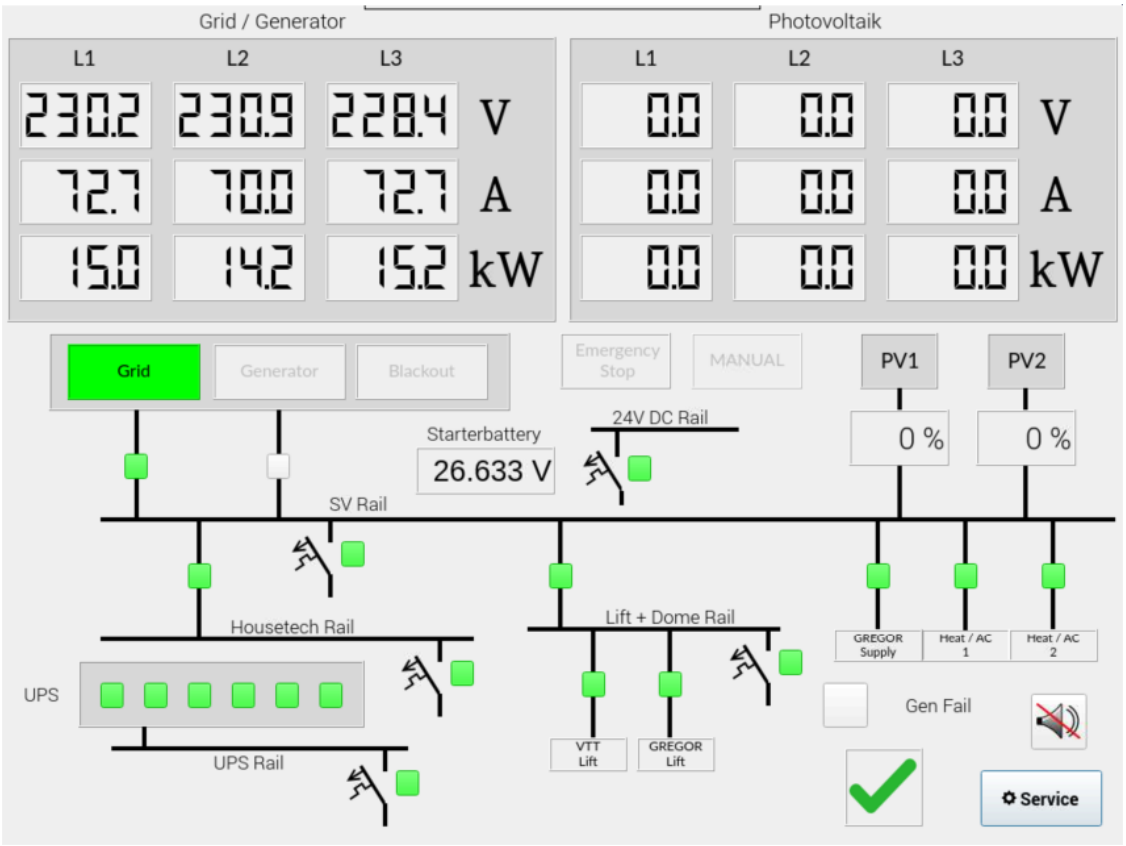
List of Tables

1 Scope

This document describes how to operate the three user interfaces (Start screen, Error list, Service user interface). The scenarios that occur most frequently in practice are shown and run through. In addition, the operation of the emergency operation panel is described.

2 Start screen of the user interfaces

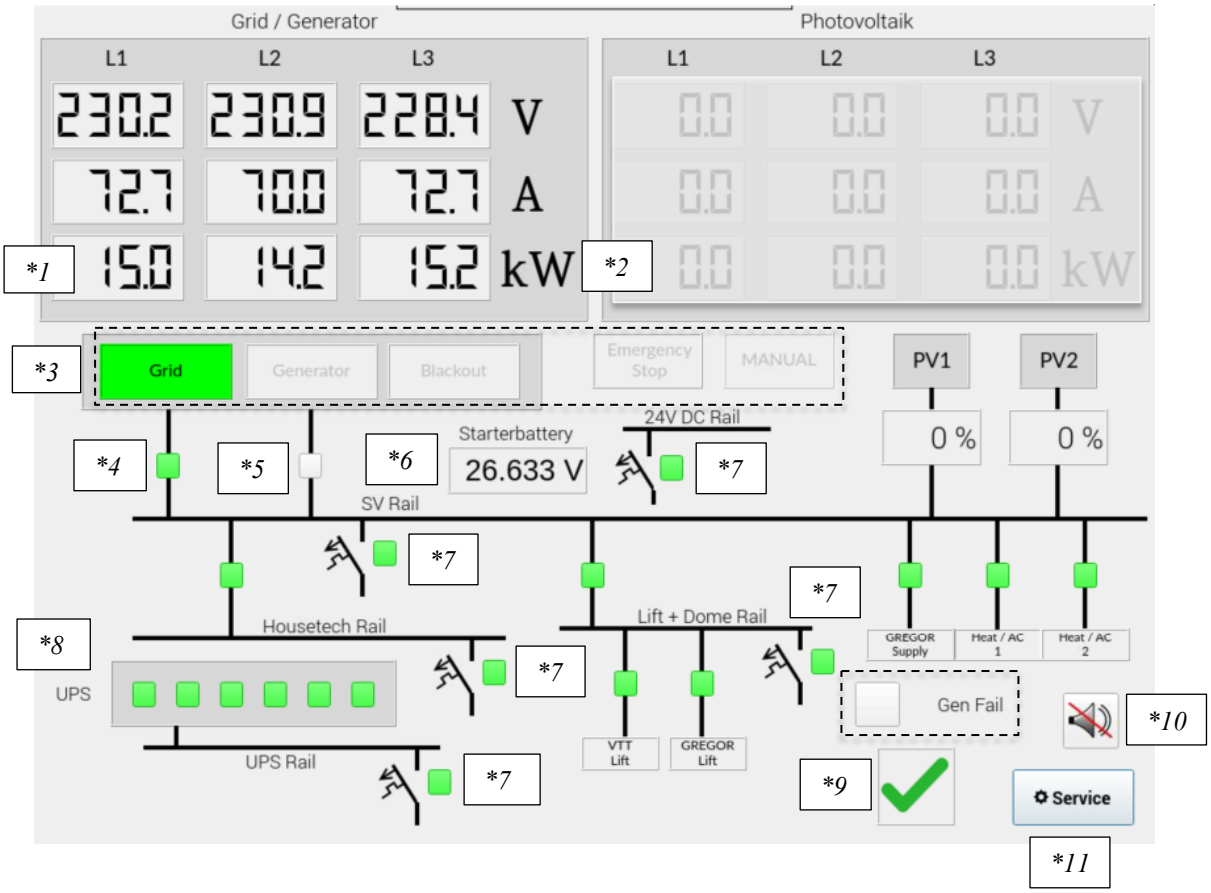
Figure 1: Start screen of the user interfaces



Calling up the start screen:

Touch the screen and/or go back (button) from other screens

Figure 2: Start screen with numbering



1 Current power from Grid or Generator, **2* PV (planned)

*3	Illuminated areas	Colour when activated	Meaning
	Grid	green	TF power grid active
	Generator	orange	Generator supplies grid
	Blackout	red	Power failure is present
	Emergency Stop	red	Emergency stop pressed
	MANUAL	orange	PLC in manual mode
	Gen Fail (box left of text)	red	Diesel stopped, sys. error

**4/*5* Circuit breaker for **4* Grid and **5* Generator (interlocked against each other)

**6* Starter battery voltage for the diesel engine

**7* Fuse tripping displayed on respective rail, respective area is then red

**8* UPS State

all okay	no Bypass Mode	Fan okay
Battery no discharge	Battery okay	Grid okay

*9 There is no error, view error list can be called up if area is yellow

*10 Acknowledge horn

*11 Call Service user interface

In contrast to the installation technology, showing the colour green means that everything is in order or switched on and working. Grey areas indicate deactivation. Red areas (not shown in figure 1 and 2) represent failures or stopped processes, such as a power failure or emergency stop pressed. The Generator and Manual areas appear orange when activated. In addition to the start screen, there are two other operating views - an error list and the service user interface.

3 Diesel system errors

If there is a Diesel system error, Diesel stops unexpectedly, it must be cleared via the service user interface:

Only for trained personnel (short cut): For questions call Reiner Volkmer -401

➔ Call Service user interface *11 – „Go further…"

➔ Diesel-Generator – Press Stop until the red area to the left of the lettering goes out

4 Nominal condition of the system

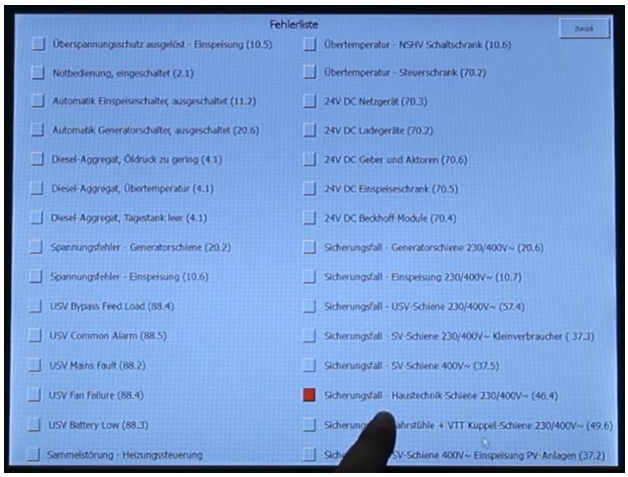
The start screen in chapter two shows the ideal state of the power supply - if one disregards the fact that a PV system has not yet been installed:

- Power consumption between 10...72 kW
- External Power grid available (diesel not running)
- Emergency stop not pressed
- PLC runs in Automatic Mode
- Grid circuit breaker and all subnetworks switched on
- All fuses switched on
- UPS status okay
- There are no errors - Error list cannot be called up

This condition should always be aimed for. If, for example, a fuse has tripped, it must be switched on again as soon as possible or the cause must be determined if it cannot be switched on again (repeated tripping).

5 Error list of the Power supply system

Figure 3: Error list of the Power supply system



The screen shows the current errors of the system. If there are no errors, it cannot be called up - green tick (See *9 in figure 2). In this case, a fuse has tripped (See also under Remedy for fuse tripping, chapter 7.4). See also page and path in the SAR documentation 03658 KIS - HW-Plan Stand 13.07.2017.PDF in the door of the control cabinet (in this case, page 46, path 4).

6 Service user interface

The service user interface is primarily to be called up for manual operations, such as a generator test or a planned power failure (see also subsections and/or videos).

To access the service operation, click on the "Service" area on the start screen (see *11 in figure 2). A warning appears (see figure 4, next page), which makes it clear that from here on only trained personnel should initiate further actions. Only those who feel well prepared should confirm the message with "Go further..."; if someone is unsure, he/she can cancel the call to the service user interface with "Go back..."; the start screen returns completely. Anyone who might find themselves in the situation of having to use the service user interface should familiarise themselves with it beforehand - see the following chapter on operation and/or videos on the USB stick in the “E-Zentrale”.

Figure 4: Call up the service user interface

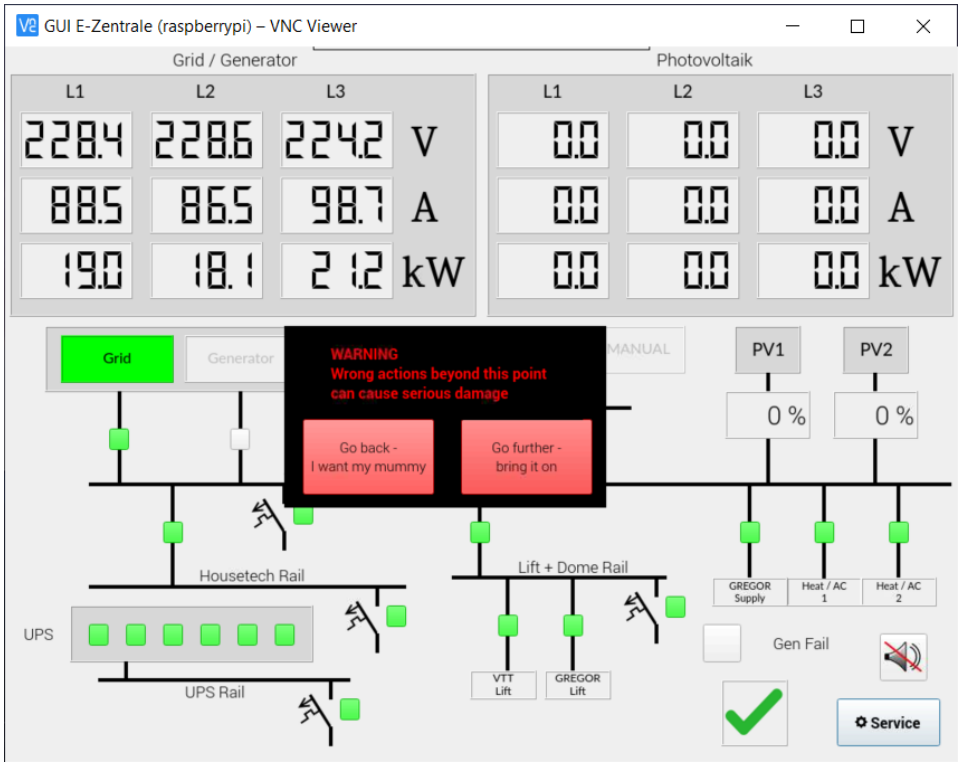
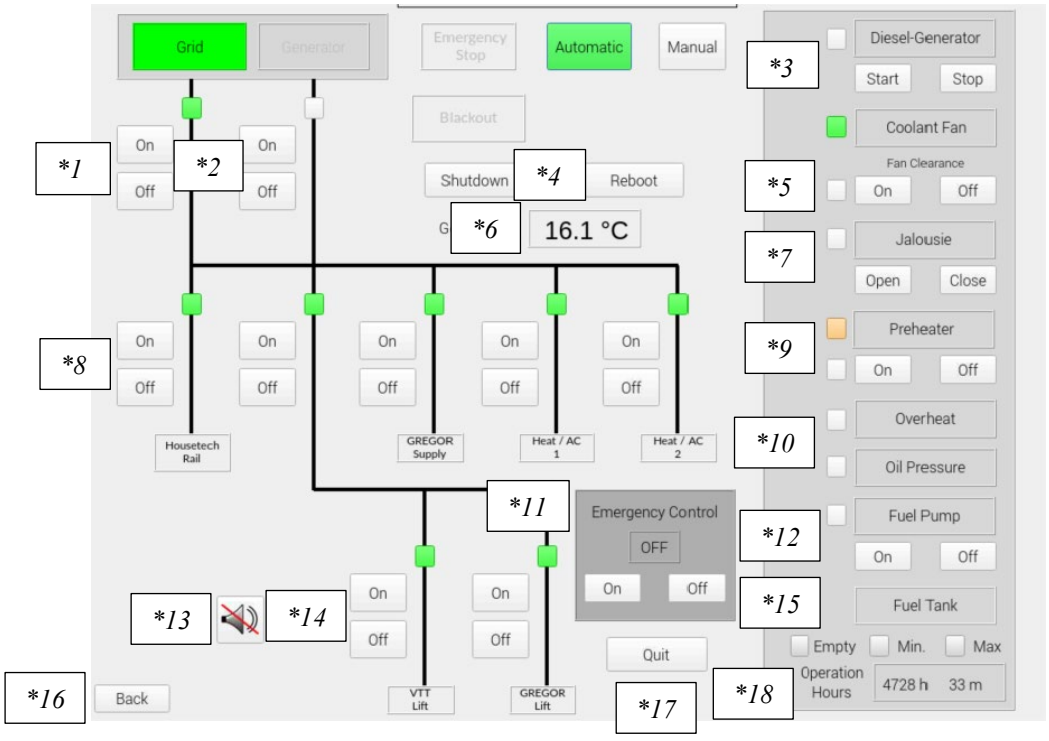


Figure 5: Service user interface with numbering



The Generator, Emergency Stop and Blackout areas behave in the same way as on the start screen (see *3 in figure 2) - the Manual area is also a control panel here, with the help of which the power supply can be switched to manual mode.

Click Manual	Area lights up orange or flashes back and forth between Automatic and Manual - if necessary, wait until the flashing stops
Click Automatic	Area lights up green or flashes back and forth between Automatic and Manual - if necessary, wait until the flashing stops

The service user interface has to be exited in automatic mode, unless there is a good reason for the system to remain in manual mode.

In order to be able to use the control surfaces, the system must be in manual mode - Manual lights up orange continuously. The following operations are then possible.

Service user interface:

*1 Grid circuit breaker On/Off switching

*2 Generator circuit breaker On/Off switching

*3 Diesel-Generator Start/Stop – Note: Press and hold for longer than 1 second!

*4 Shutdown and Reboot only operate after request or agreement

*5 Diesel Cooling Fan Enable (On) or Disable (Off)

*6 Diesel coolant temperature

*7 Diesel supply air Jalousie Open/Close

*8 Circuit breaker of the subnetworks On/Off switching

*9 Diesel Preheater On/Off switching (Currently defective)

*10 Diesel system errors: Overheat, Oil Pressure – Note: See *3 clear with Stop

*11 Emergency operation On/Off switching – Note: Switch off the PLC!

*12 Diesel Fuel Pump for the day tank - switches off automatically

*13 Acknowledge horn

*14 Circuit-breaker for VTT and GREGOR lifts On/Off switching

*15 Diesel day tank Limit indicators (Empty, Min. is currently defective, Max.)

*16 Return to the Start screen

*17 Exit operating displays with code 1986 - Desktop appears

*18 Diesel operating hours counter

Level monitoring of the day tank in manual mode

Sight glass for the fuel filling level (in the Diesel genset compartment)

When the Diesel is running in manual mode, you must monitor the filling level of the day tank yourself and refill it if necessary. Use the On button of the Diesel Fuel Pump (*12 in figure 5) – it will switch off automatically when the tank is full or you can switch off the pump beforehand.

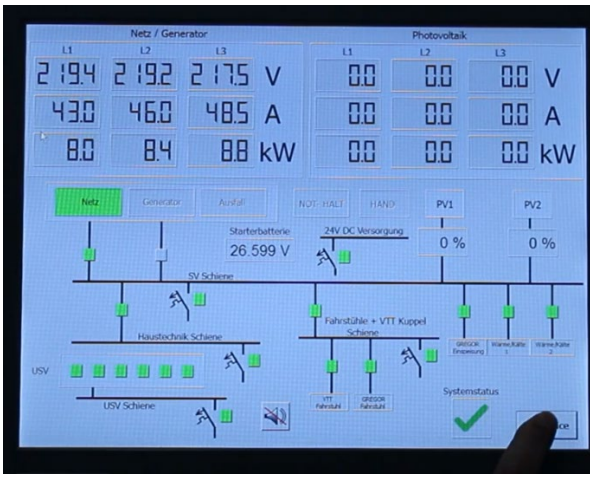
7 Operation (video)

Concrete operating scenarios follow, for each of which there is also a German-language video. The videos are available on a USB stick in the “E-Zentrale”.

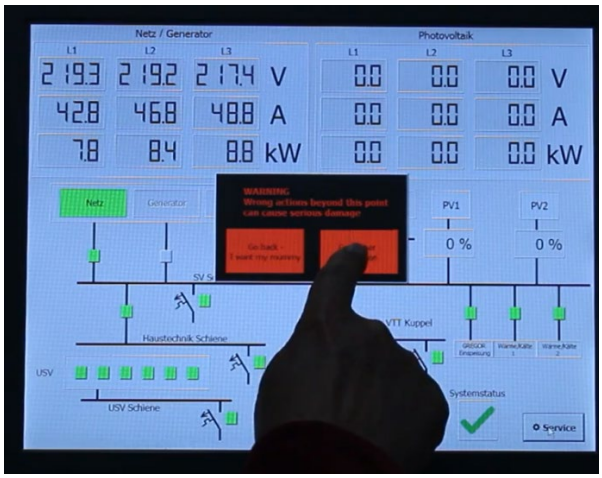
7.1 Generator Test with Service user interface (03)

To make sure that the diesel genset starts, the diesel engine can be started for test purposes or other operating scenarios with the help of the service user interface. The start button must be pressed for at least 1 second to initialize the generator operation correctly.

Calling up the Service user interface



Press Service area



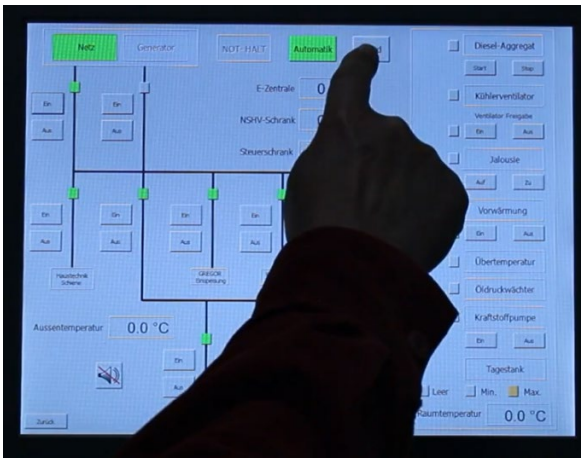
Press ‘Go further…‘

Service user interface will appear afterwards.

Note:

The warning is to be taken seriously. Only those who feel well prepared should confirm the message with "Go further..."; if someone is unsure, he/she can cancel the call to the service user interface with "Go back..."; the start screen returns completely.

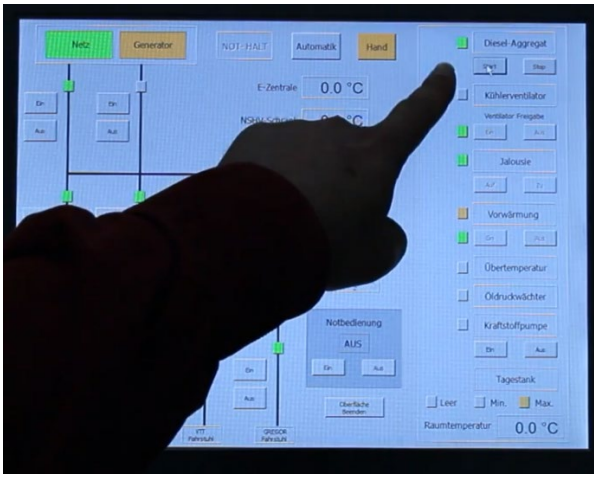
Switch to manual mode and start Diesel



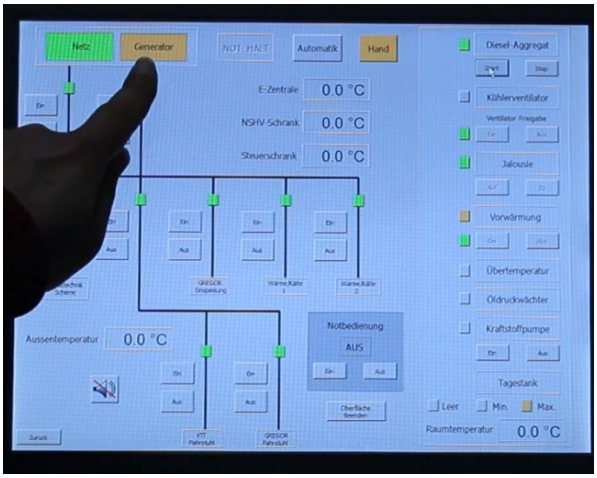
Press Manual area

Press Start for longer than 1 second

Start-up of the diesel genset and the generator supplies voltage – no action needed

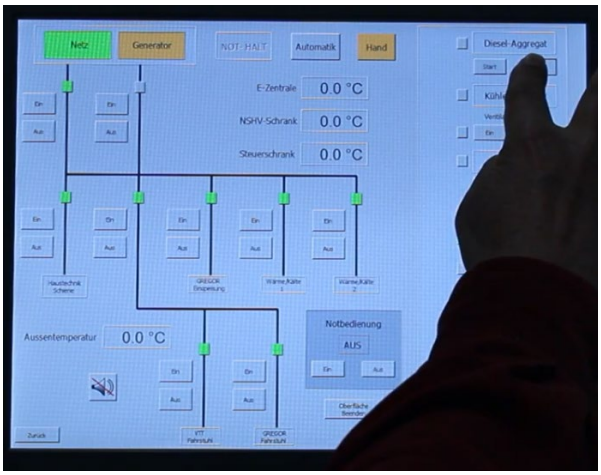


Diesel genset started up correctly

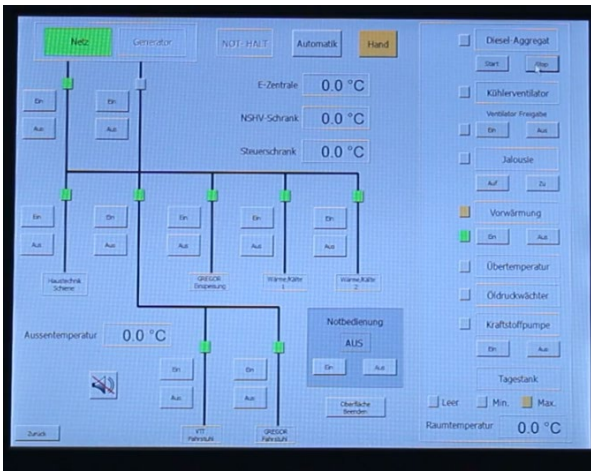


Generator supplies grid

Stop Diesel - generator grid disappears

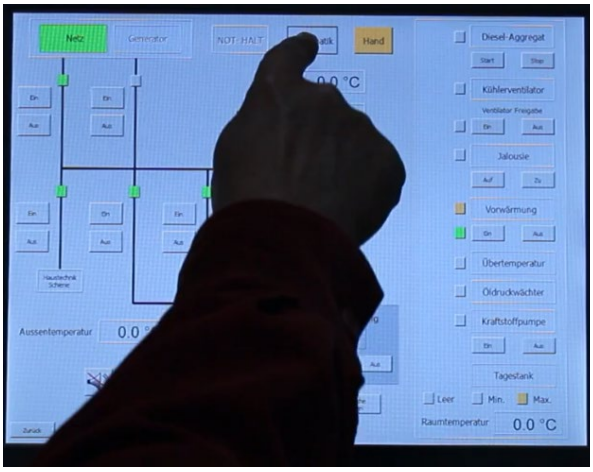


Press Stop until you hear the Diesel run out or press 2 seconds

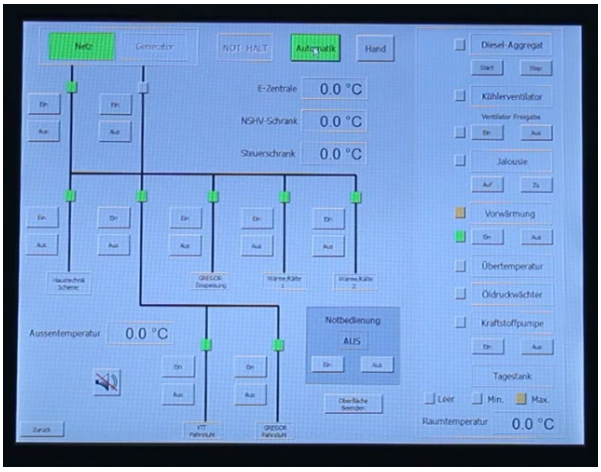


Generator grid goes off

Switch to Automatic mode and Return to Start screen

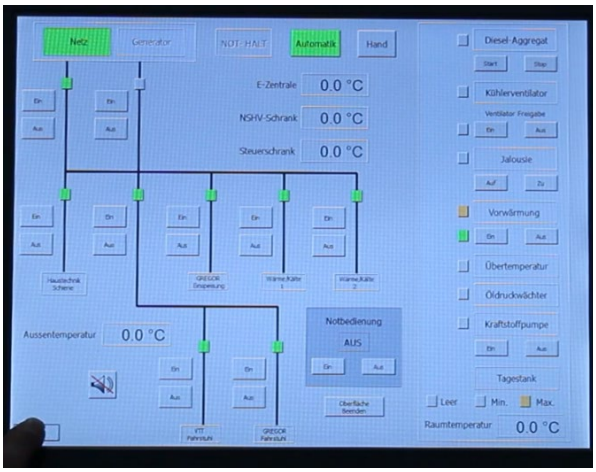


Press Automatic area



Area turns green

Return to Start screen



Press Back (below left)

Start screen reached

Generator Test with Service user interface finished.

7.2 Preparation for planned power blackout (06)

From time to time, work is carried out on the external power grid, which involves planned power cuts. The announcements for the people at the OT are usually made in time so that the OT power supply in the “E-Zentrale” can be brought into generator operation beforehand.

Reminder:

While the generator is in operation, we strongly recommend that persons present at the OT do not use the lifts. In manual mode, you must monitor the filling level of the day tank yourself and refill it if necessary. See also at the end of chapter 6.

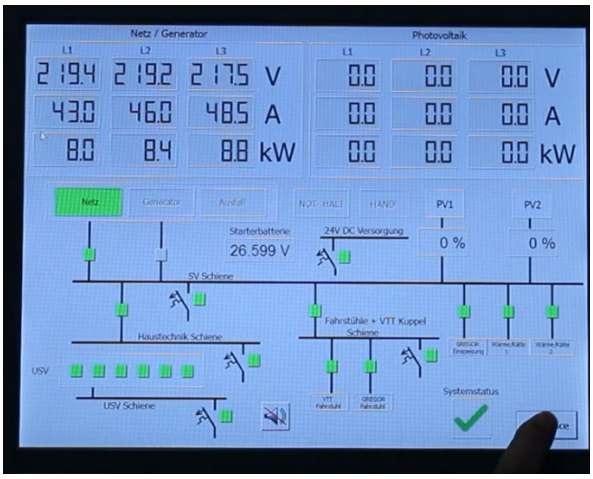
Short cut for return to normal (after power cut): Once the external grid is stable again – press

Automatic area (area becomes green)

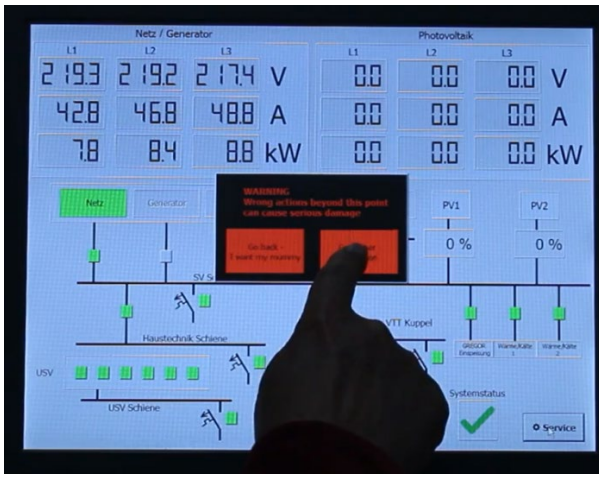
in the Service user interface and go back (bottom left) to the Start screen – finished.

The necessary steps for preparation follow:

Calling up the Service user interface



Press Service area



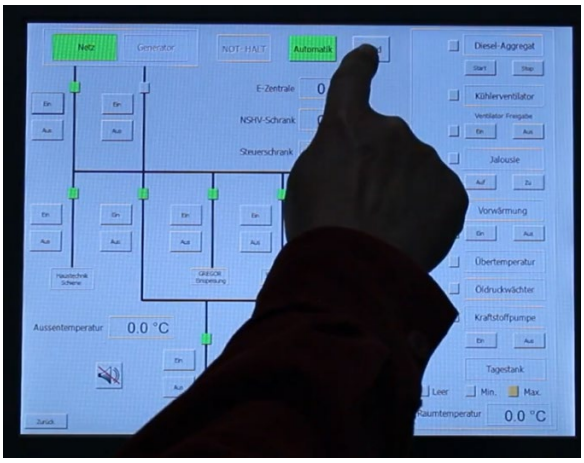
Press ‘Go further…‘

Service user interface will appear afterwards.

Note:

The warning is to be taken seriously. Only those who feel well prepared should confirm the message with "Go further..."; if someone is unsure, he/she can cancel the call to the service user interface with "Go back..."; the start screen returns completely.

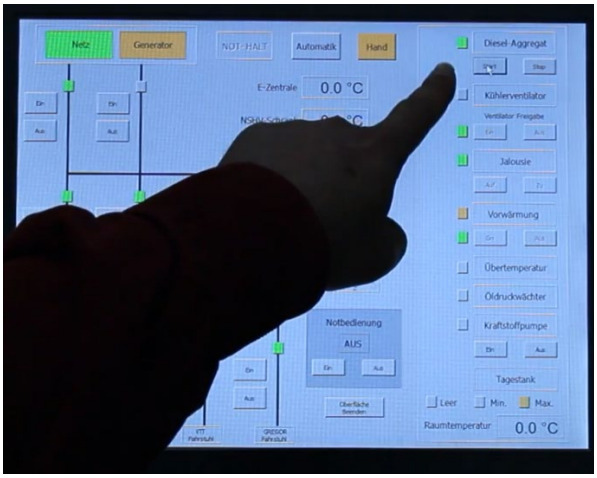
Switch to manual mode and start Diesel



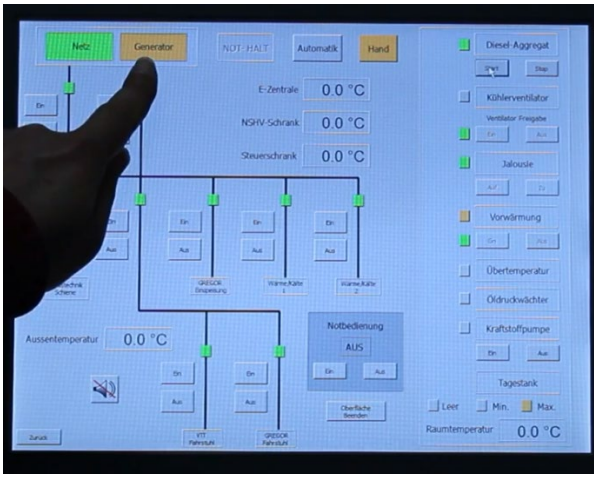
Press Manual area

Press Start for longer than 1 second

Start-up of the diesel genset and the generator supplies voltage – no action needed



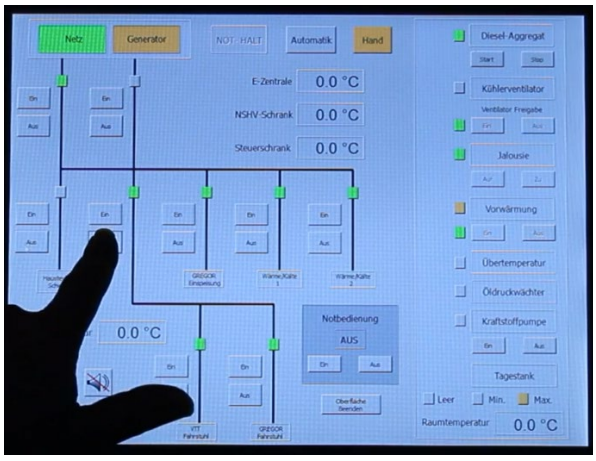
Diesel genset started up correctly



Generator supplies grid

Switch off circuit breakers of the subnetworks /1

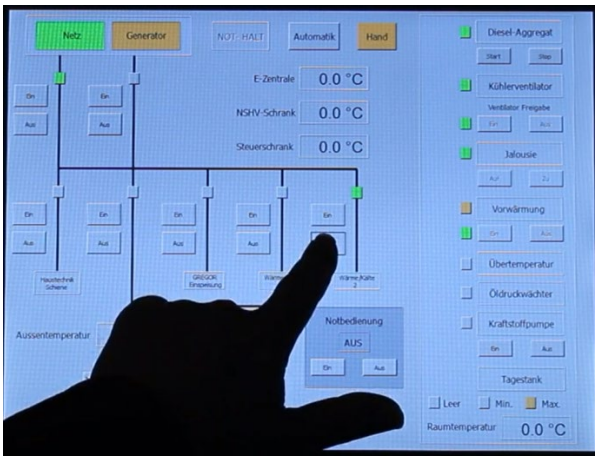
Press Off – Housetech Rail



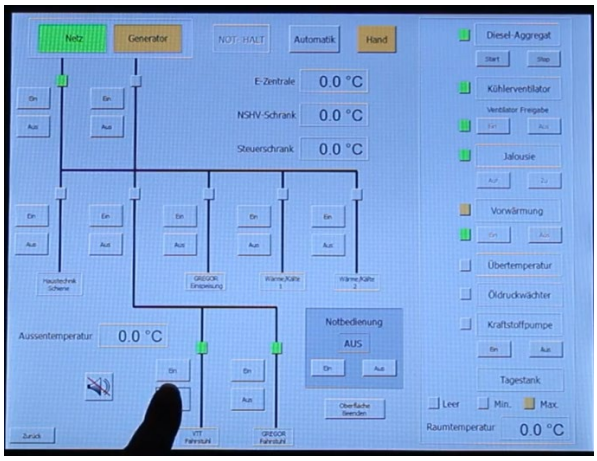
Press Off – Lift + Dome Rail

Do the same with the circuit breakers for GREGOR Supply and Heat / AC 1 Rail (no figures).

Switch off circuit breakers of the subnetworks /2

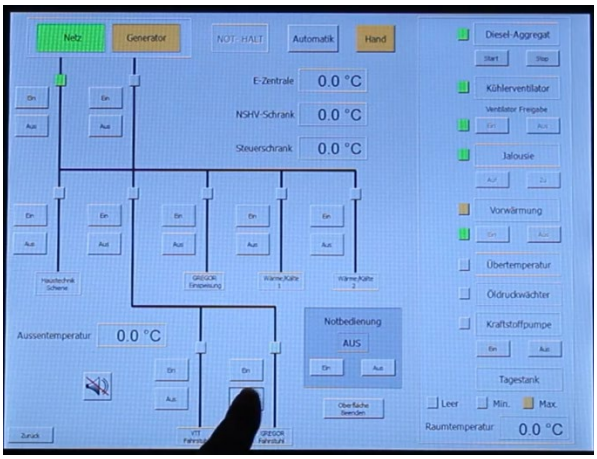


Press Off – Heat / AC 2 Rail

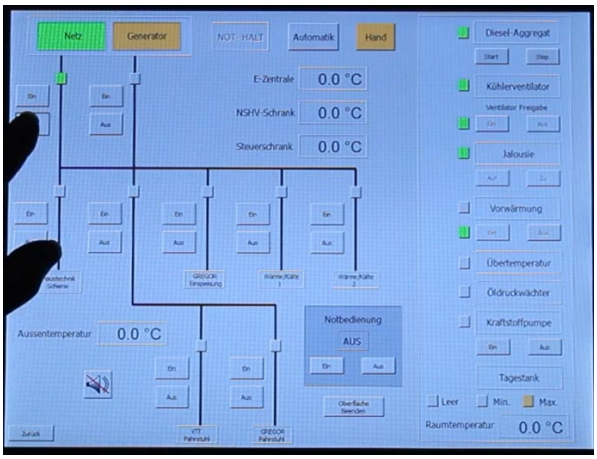


Press Off – VTT Lift

Switch off circuit breakers of the GREGOR Lift and of the Main Grid

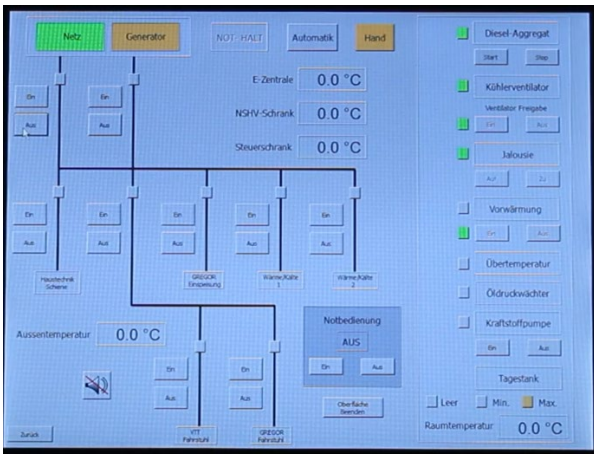


Press Off – GREGOR Lift

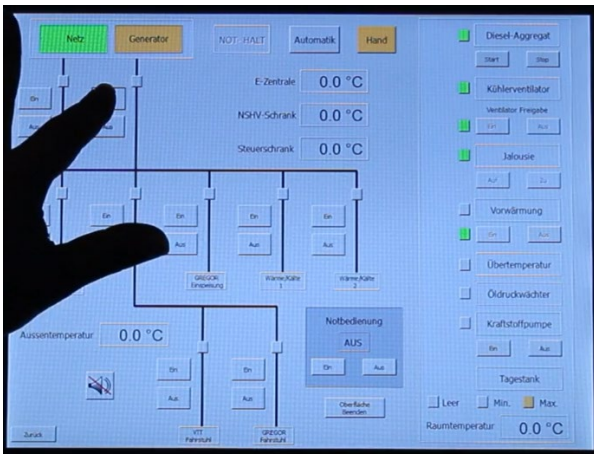


Press Off – Main Grid

Preparation completed for Generator takeover and switch on circuit breaker

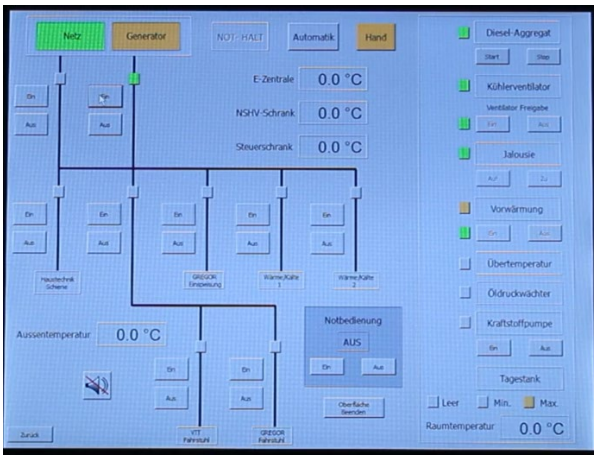


Prepared for Generator connection

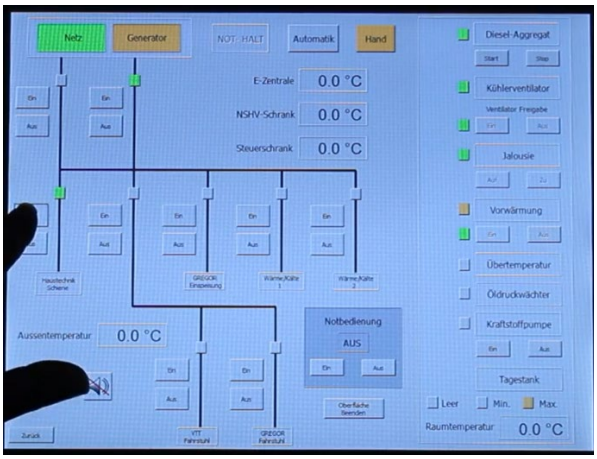


Press On – Generator circuit breaker

Generator supply enabled and switch on subnetworks /1



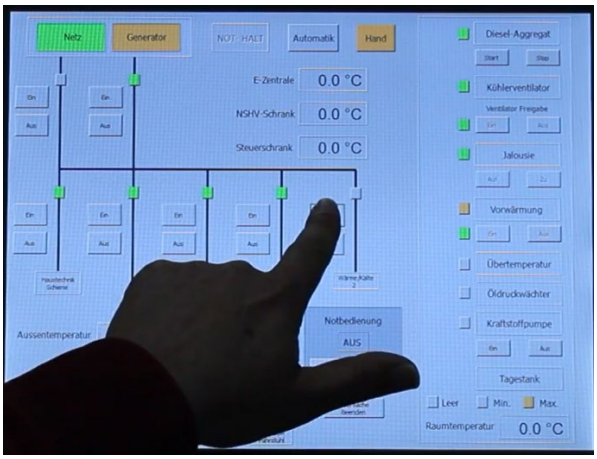
Ready for subnetworks



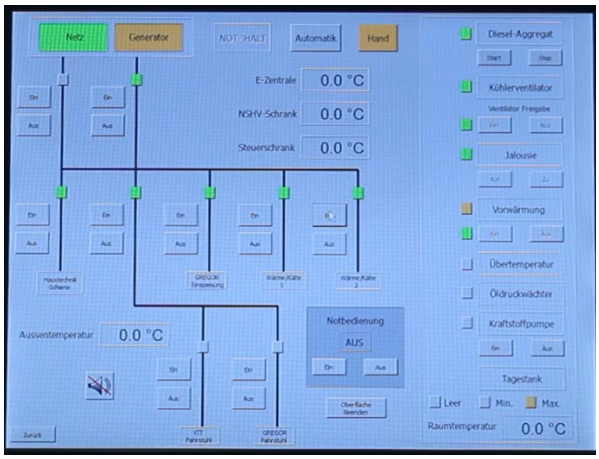
Press On – Housetech Rail

Do the same with the circuit breakers for GREGOR Supply, Lift + Dome Rail and Heat / AC 1 Rail (no figures).

Switch on subnetworks /2 – but leave out the lifts



Press On – Heat / AC 2 Rail

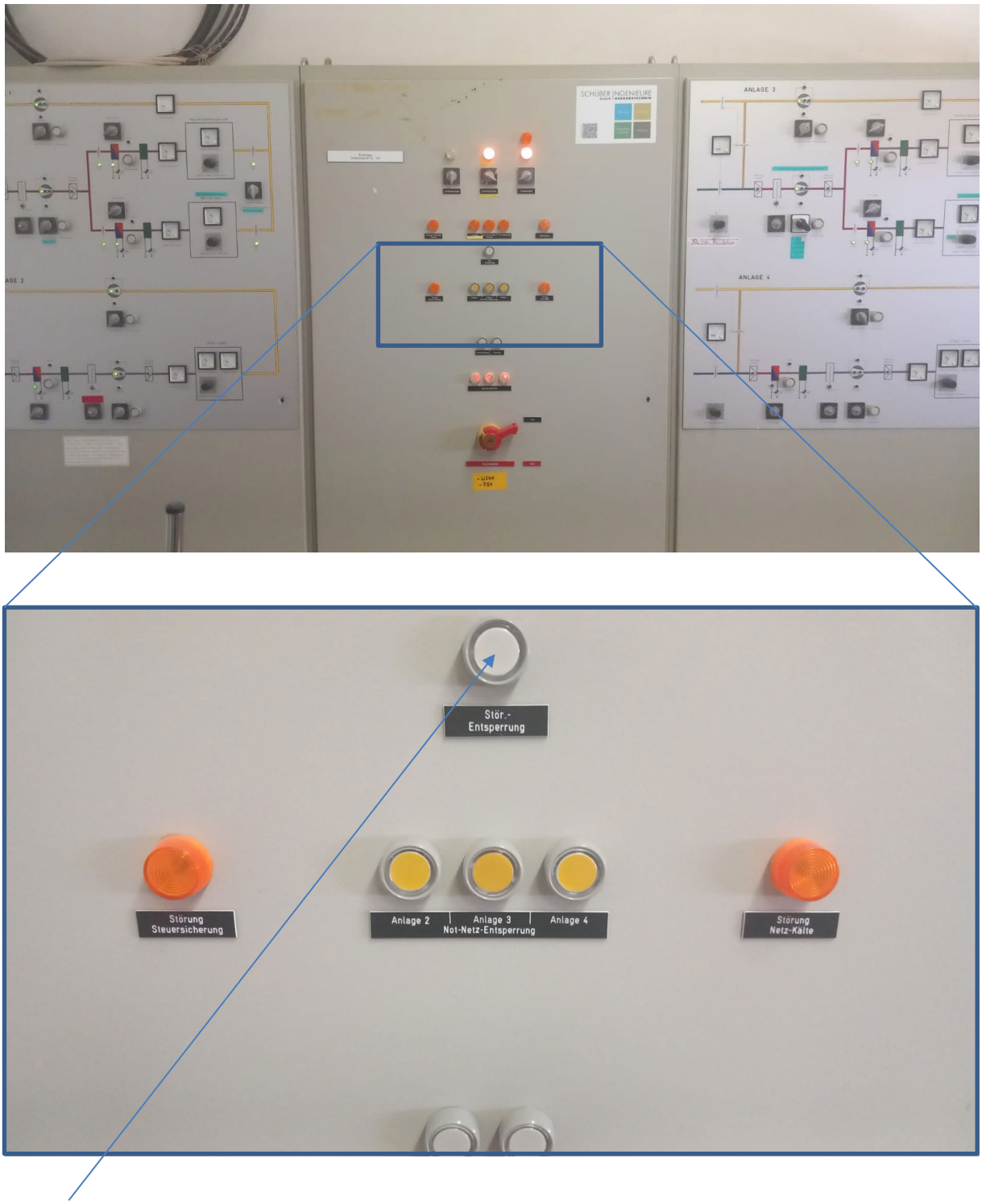


Everything supplied, except the lifts

Note:

As the lifts can stall the generator, the lifts shall not be used when the generator is in use.

Clear Climate control cabinet



Unlocking the control unit after a power failure (Stör.-Entsperrung) – press button

Note:
Even after mains recovery in automatic mode – clear it

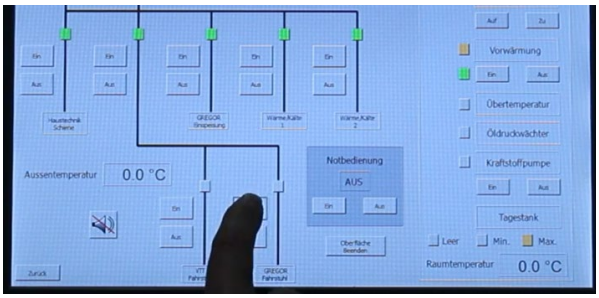
7.3 Rescuing persons from a lift (08)

In the event that a person is trapped in a lift while the generator is supplying all loads except the lifts, the corresponding lift can be resupplied in manual mode (Manual area must be orange) in the Service user interface. In the example below, the person is stuck in the GREGOR lift.

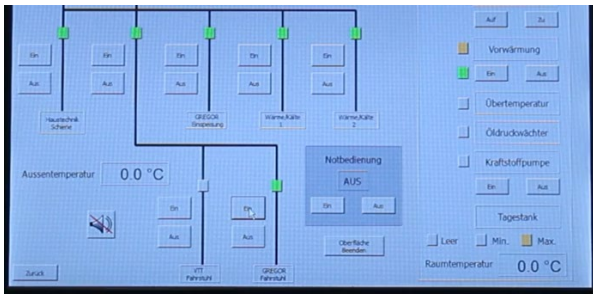
If the Service user interface is not displayed, change the view by pressing the Service button at the bottom right of the Start screen. Heed the warning and make up your mind. If the Power supply is not in manual mode, press the Manual area (wait until its orange).

When the Power supply was in automatic mode before the rescue, press the Automatic area (wait until green) afterwards.

Switch on the circuit breaker



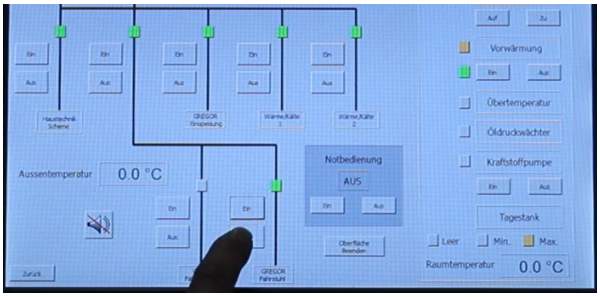
Press On – GREGOR Lift



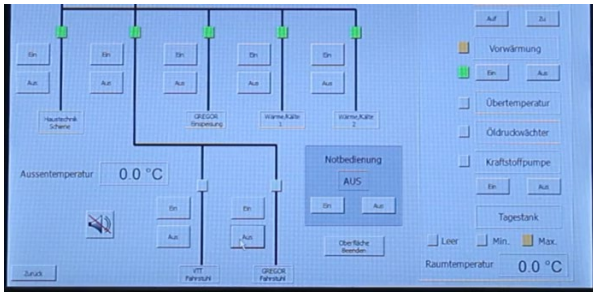
GREGOR Lift is supplied

Free the person from the lift if possible - only allow the lift to descend (this should prevent the generator stalling).

Switch off the circuit breaker



Press Off – GREGOR Lift

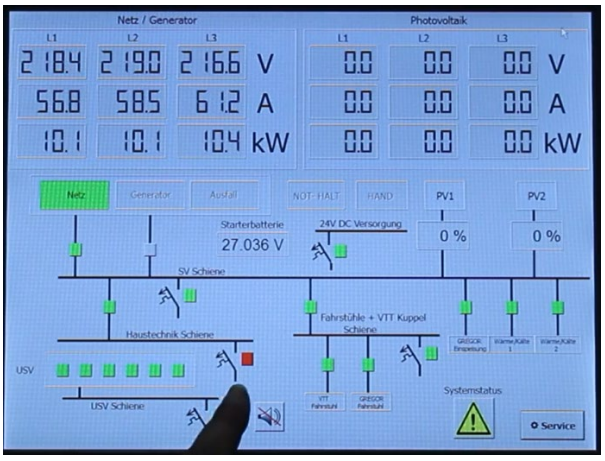


GREGOR Lift is switched off

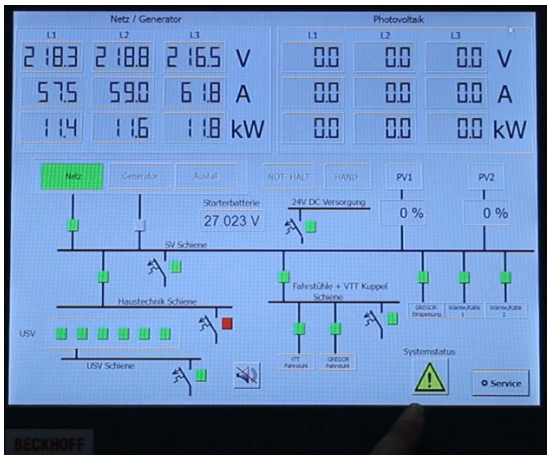
7.4 Remedy for fuse tripping (09)

If a fuse has tripped, it must be switched on again as soon as possible or the cause must be determined if it cannot be switched on again (repeated tripping). The fuses are grouped together for monitoring with the PLC. Here in the example, a fuse of the Housetech Rail has tripped. The green tick of the system state disappears and the area turns yellow.

Fuse tripping at the Housetech Rail and System State turns yellow

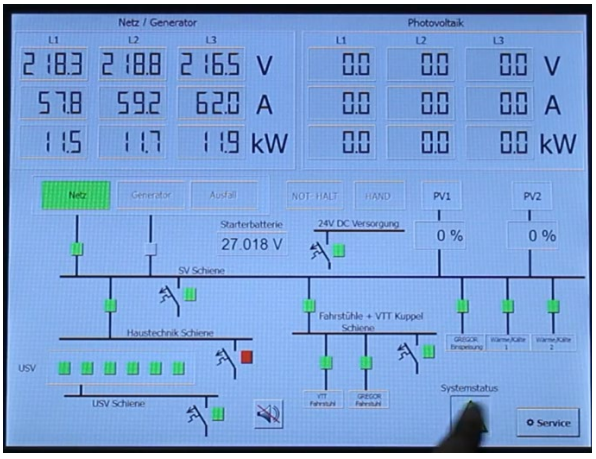


See fuse indicator – Start screen

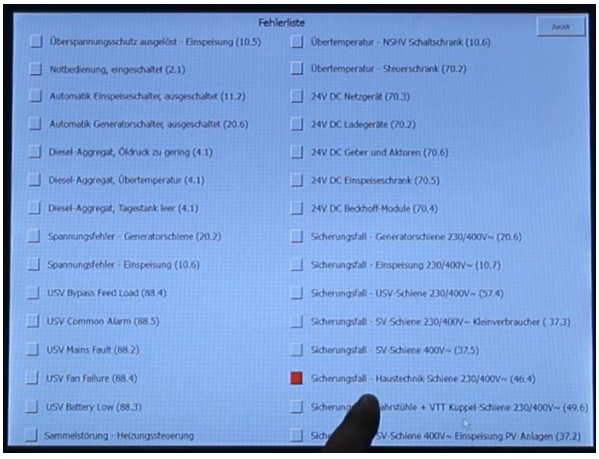


See system state – Start screen

Calling up the error list



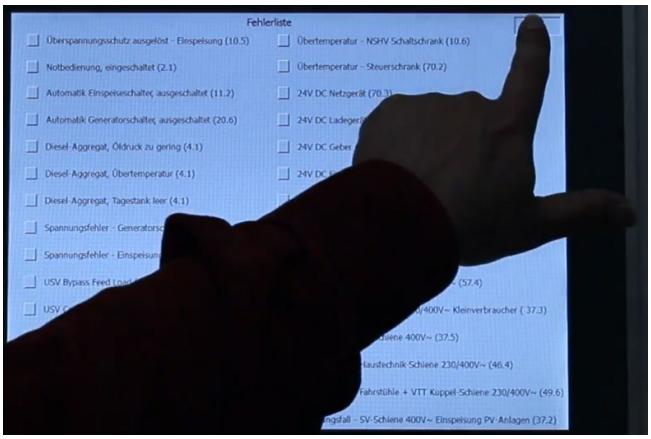
Press yellow area – system state



Note the info in the error list

In the corresponding line (error list) at the end is the page and path where further information (SAR documentation) can be found. If necessary, note the page and path.

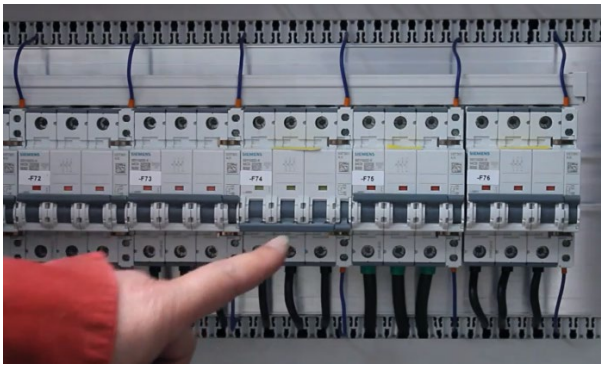
Go back to the Start screen



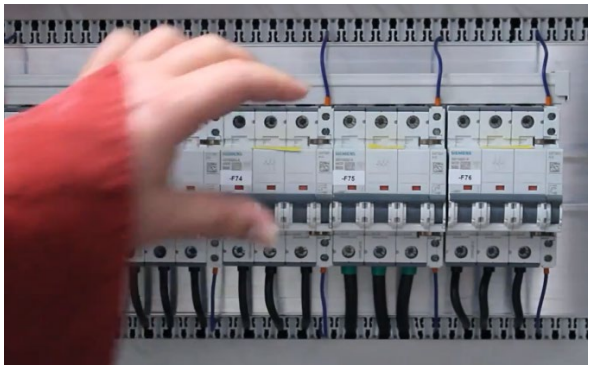
Press Back – leave Error list

Open the NSHV cabinet - Caution: High voltage! - and identify the fuse that has been switched off. In this case F74.

Switch on tripped fuse



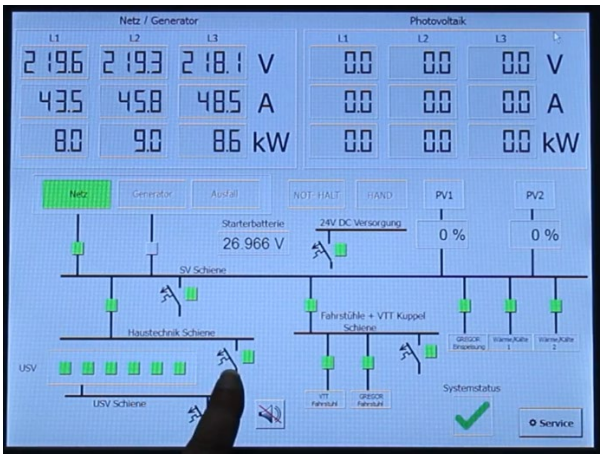
See tripped fuse – safety bar down



Push the safety bar upwards

If the fuse remains switched on, the process is completed for the time being. If the fuse cannot be switched on permanently, the cause must be investigated. The circuit documentation (see page and path in the SAR documentation) can be helpful.

Successfully switching the fuse on again



See fuse indicator – Start screen

System state is also fine again.

7.5 Introduction of emergency operation (11)

The emergency operation is only used if the PLC has failed. It can be used to carry out all actions that can also be carried out with the help of the PLC control in manual mode. Therefore, the same recommendation applies here for the user to familiarise himself with the operation beforehand.

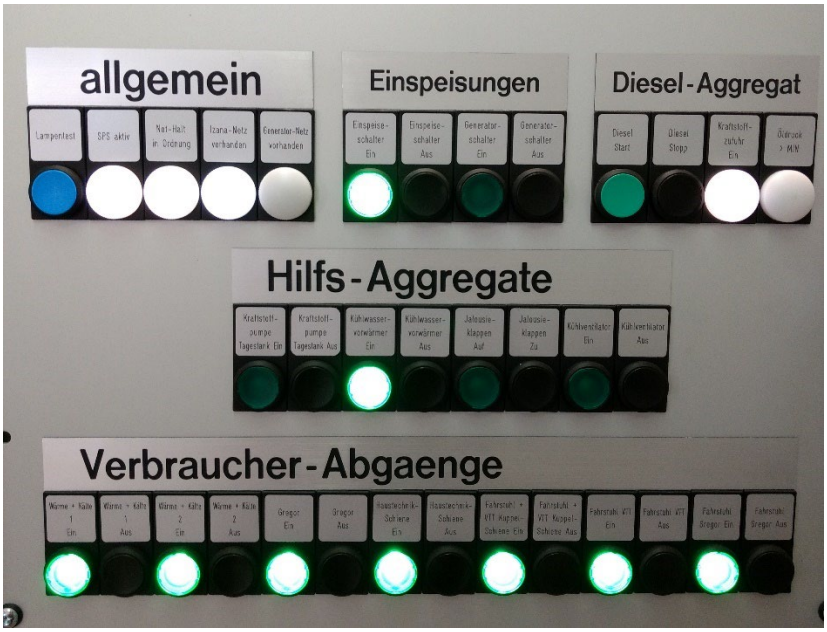
WARNING

Wrong actions beyond this point

can cause serious damage

In the following, the emergency operation is introduced and the handling of it is demonstrated with some examples.

Emergency control panel – **inside the Control cabinet** (Steuerschrank)



Operating / display elements

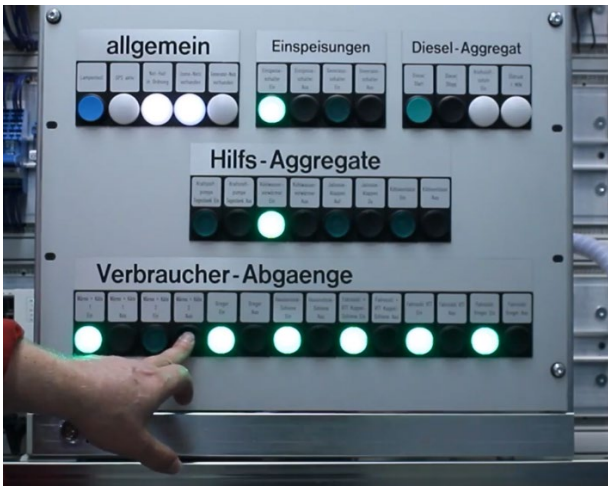
General (allgemein)	*elements:*
Lamp test (Lampentest)	button
PLC running (SPS aktiv)	when Indicator light on
No emergency stop (Not-Halt in Ordnung)	when Indicator light on
External grid present (Izana Netz vorhanden)	when Indicator light on
Generator grid present (Generator Netz vorhanden)	when Indicator light on

Supply Inputs (Einspeisungen)	*elements:*
Grid circuit breaker (Einspeiseschalter Ein / Aus)	on button / off button
Generator circuit breaker (Generatorschalter Ein / Aus)	on button / off button
Diesel gen-set (Diesel-Aggregat)	*elements:*
Diesel Start / Stop (Diesel Start / Stopp)	start button / stop button
Fuel supply enabled (Kraftstoffzufuhr Ein)	when Indicator light on
Oil pressure > Minimum (Öldruck >MIN)	when Indicator light on
Auxiliary units, Diesel engine (Hilfs-Aggregate)	*elements:*
Fuel pump day tank (Kraftstoffpumpe Tagestank Ein / Aus)	start button / stop button
Cooling water preheater (Kühlwasser Vorwärmer)	start button / stop button
Jalousie blades (Jalousie-Klappen)	open button / close button
Cooling fan (Kühlventilator)	start button / stop button
Subnetworks (Verbraucher-Abgaenge)	*elements:*
Heat / AC 1 Rail (Wärme + Kälte 1)	on button / off button
Heat / AC 2 Rail (Wärme + Kälte 2)	on button / off button
GREGOR Supply	on button / off button
Housetech Rail (Haustechnik Schiene)	on button / off button
Lift + Dome Rail (Fahrstuhl + VTT Kuppel-Schiene)	on button / off button
VTT Lift (Fahrstuhl VTT)	on button / off button
GREGOR Lift (Fahrstuhl GREGOR)	on button / off button

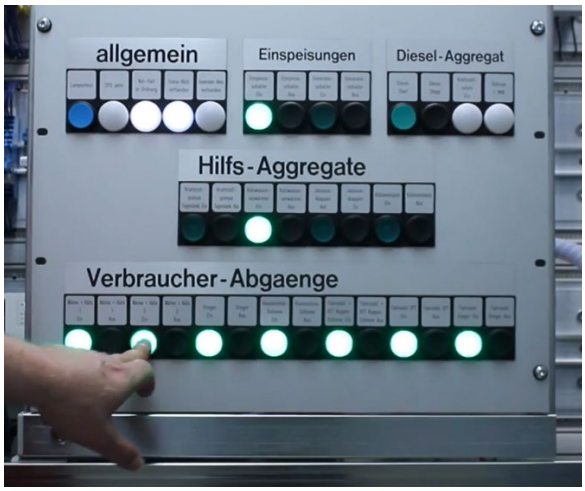
Note:

Switch-on push-buttons are illuminated, except for lamp test (Lampentest) and Diesel Start.

Subnetworks – switch off and on using the example of Heat / AC 2 Rail (Wärme + Kälte 2)



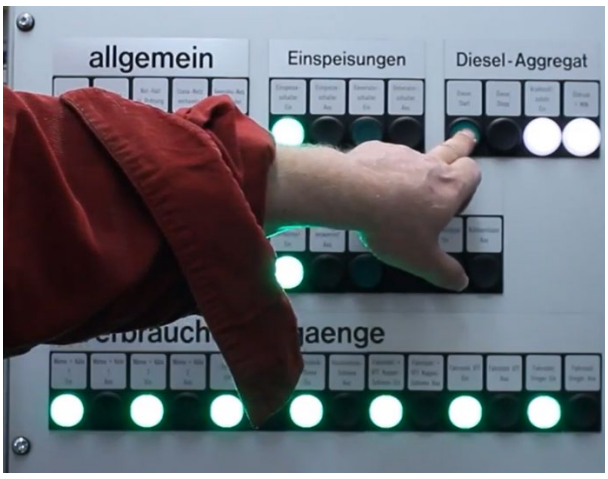
Press off button – Heat / AC 2 Rail



Press on button – Heat / AC 2 Rail

Start Diesel engine

Press Start – fuel supply must be on



Press Start until Oil pressure okay!

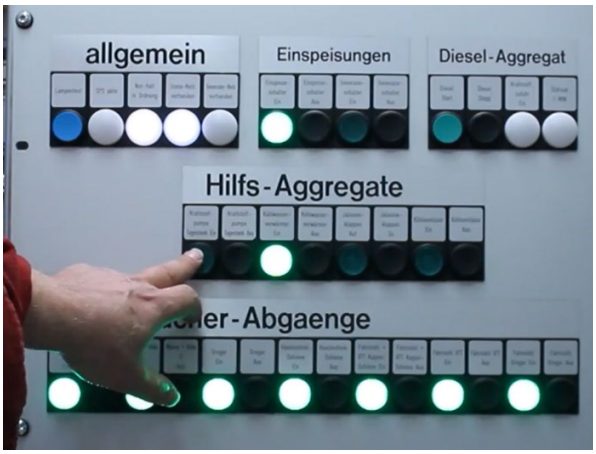
Stop Diesel engine

Press Stop – fuel supply went off

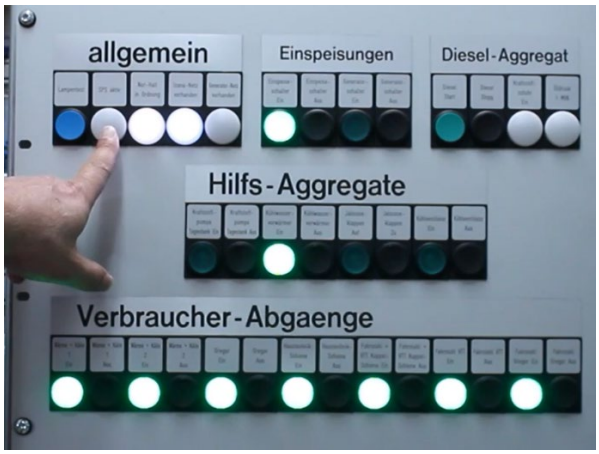
Press Stop until Oil pressure indicator goes out

Otherwise the engine will not stop running…

Start Fuel pump of day tank



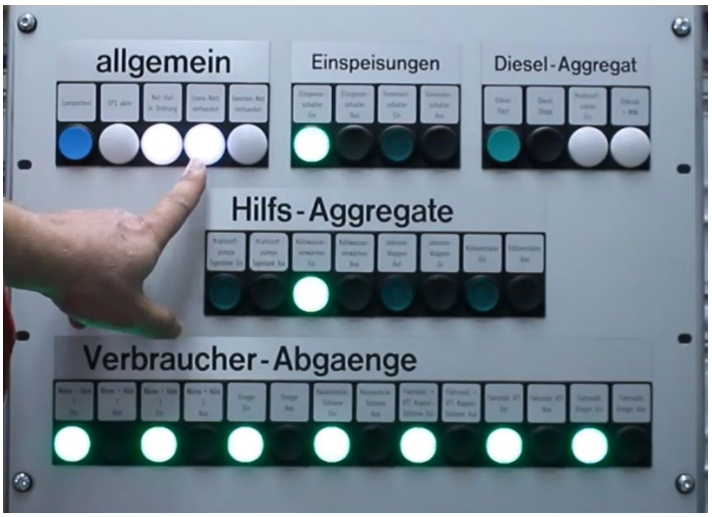
Press Start – indicator will turn on



Note: PLC must be off

The fuel pump switches itself off again when the day tank is filled - even when the PLC is switched off.

Here in this example, everything is supplied by the external TF power grid.



External grid present (Izana Netz vorhanden)

Note:

The photos for the individual step instructions have been taken from the videos on the USB stick in the "E-Zentrale". The descriptions on them are almost all in German – but the operation is currently in English, as can be seen from the first chapters. However, this circumstance does not change the operating concept and the placement of the operating elements. The emergency operation unit in the Control cabinet is still in german.

-End-