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Operating instructions

S1900071 Reforming Unit

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TABLE OF CONTENTS

1. Safety information, warnings

Reformations may only be carried out by appropriately trained and instructed persons!

Read the safety instructions carefully before using the S1900071 reforming unit.

Symbols used on the device or in the operating instructions:

WARNING

- The operating instructions contain information and notes that are necessary for the safe operation and use of the device. Before using the device, the operating instructions must be read carefully and followed in all points.
- If the device is used in a manner not described by the manufacturer, the protection of the device may be impaired.
- If the instructions are not followed or if you fail to follow the warnings and instructions, serious injury to the user or damage to the device may occur.

2. Introduction

You have purchased a high-quality reforming unit from EHS Switzerland AG, with which you can reform drives from any manufacturer. Drives up to approx. 250 kW can be reformed. The limit depends on the manufacturer and the components used. The supply voltage of the drives must be either 230 VAC or 400 VAC.

3. Safety instructions

The S1900071 reforming unit has been built and tested in accordance with the applicable safety regulations and has left the factory in a safe condition. In order to maintain this condition and to ensure safe operation, the user must observe the notes and warnings contained in these operating instructions.

WARNING
RISK OF ELECTRIC SHOCK

- Precautions must be taken to avoid electric shock. Voltages of up to 600 VDC may be present.
- The applicable accident prevention regulations for electrical systems and equipment must be observed during all work.
- Before each use, make sure that the reforming unit, the test leads, the power cable, and the accessories are in perfect condition.
- The reforming unit may only be operated on the power grid specified in the specifications.
- It is imperative that the reforming unit is connected and supplied from a properly connected socket (protective conductor connection must be grounded) before connecting the drive! This ensures that the reforming unit is grounded before each use. Otherwise, a potential hazard may result!
- The reforming unit may only be used in the areas as indicated in the specifications under point 14.
- The alligator clips and test leads may only be touched at the grip areas provided for this purpose behind the finger guard. Never touch the alligator clips directly. Direct contact with the alligator clips must be avoided at all times.
- The reforming unit may only be used in a dry and clean environment. Dirt and moisture reduce the insulation resistance and can lead to electric shocks, especially at high voltages. The reforming unit must not be used when exposed to precipitation such as dew or rain. If the reforming unit has become dewy, for example due to large temperature jumps, the unit must not be used.
- A correct display of the values is only guaranteed in the temperature range from 0 °C to +35 °C.

- Before opening the device, it must be switched off and disconnected from all power circuits.
- For safe use, use only original test leads and accessories.
- If the safety of the operator is no longer guaranteed, the device must be taken out of operation and secured against unintentional use. Safety can no longer be guaranteed if the device (or the test leads):
  - has obvious damage,
  - does not carry out the desired reformation,
  - has been stored for too long under unfavorable conditions,
  - has been mechanically damaged during transport.
- Dangerous voltages may occur in devices to be reformed due to an insulation fault. During reformation, the devices to be reformed must not be touched. Danger of electric shock!
- Start each reformation with a visual inspection and measurement of the protective conductor resistance.
- After reforming, wait at least five minutes to allow the drive capacitors to discharge.
- Failure to follow the instructions
- can result in personal injury and fatal accidents or cause damage to the equipment.
- The housings of the drives must be grounded during the reforming process.

4. Storage

The device must be stored in dry, closed rooms.

If the device has been transported in extreme temperatures, it requires acclimatization of at least two hours before use.

5. Delivery

- 1 pc. S1900071 Reforming unit
- 1 pc. Power supply cable
- 3 pcs. Crocodile clip 4 mm red
- 3 pcs. Crocodile clip 4 mm black
- 3 pcs. Crocodile clip 4 mm green
- 3 pcs. 4 mm Test lead, 2 m, Cat. III, 1000 V, red
- 3 pcs. 4 mm Test lead, 2 m, Cat. III, 1000 V, black
- 3 pcs. 4 mm Test lead, 2 m, Cat. III, 1000 V, green
- 1 pc. Operating instructions German

6. Intended use

WARNING

- The reforming unit may only be used under the conditions and for the purposes for which it was designed. For this purpose, the safety instructions, the technical data with the ambient conditions and the use in a dry environment must be observed in particular.
- In the event of modifications or conversions, operational safety is no longer guaranteed.
- The device may only be opened by an authorized service technician.

7. Description of the warning markings on the front panel

Figure 1: Warning markings

Outputs 1-3: CAT III 600 VDC, I_{max} 1 A!

8. Why reform?

If drives have not been connected to line voltage for two years or more, the capacitors of the drives may be destroyed when the supply voltage is applied. To prevent this, the voltage at the input of the drives can be gradually increased up to line voltage. As a result, the capacitors are slowly reformed and are subsequently ready to be operated at nominal voltage again.

Drives that were last operated on the power grid less than two years ago can be reformed without hesitation. The drives cannot be damaged by this.

9. Reforming time

The reforming time depends on the time during which the drives were no longer operated at nominal voltage.

Please refer to the following table:

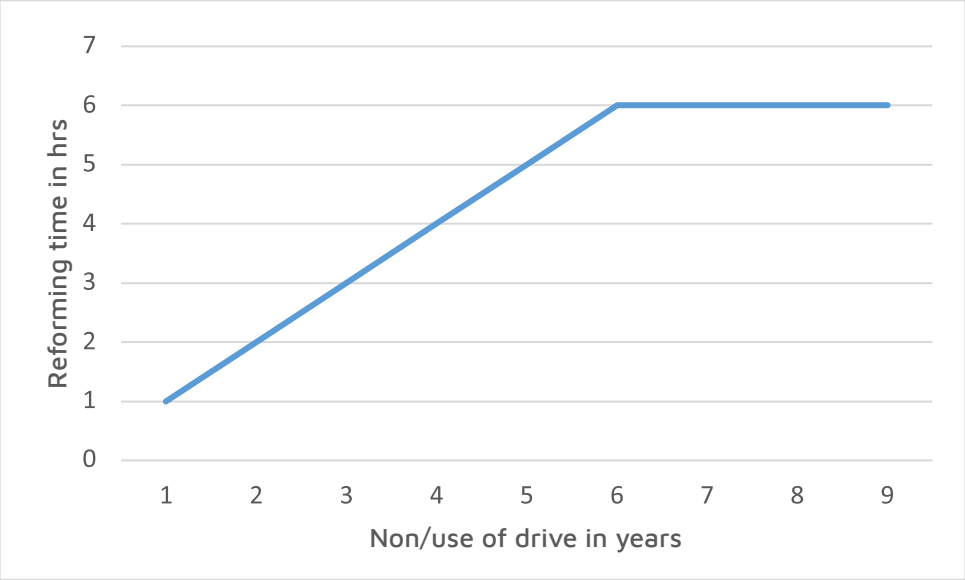

Table 1: Reforming time

Table 1 shows the reforming time. For drives which have not been operated with line voltage for six years or longer, the required reforming time is at least six hours.

10. Control keys and connections

Front panel of S1900071 Reforming unit

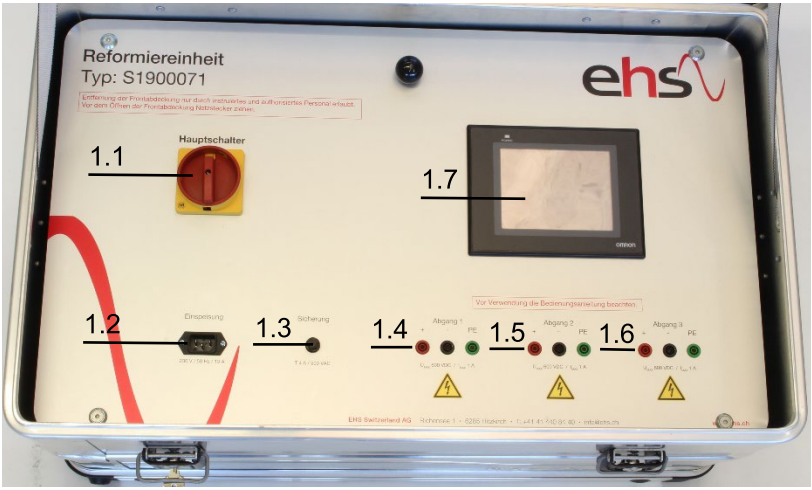

Figure 2: Control keys and connections of the reforming unit

- 1.1 Main switch on/off
- 1.2 IEC socket for supply voltage 230 VAC/50 Hz/13 A
- 1.3 Output fuse 100F2.1, T4A/500 VAC, 5x20 mm
- 1.4 Output 1, connection + (red), connection - (black) and connection protective conductor (green)
- 1.5 Output 2, connection + (red), connection - (black) and connection protective conductor (green)
- 1.6 Output 3, connection + (red), connection - (black) and connection protective conductor (green)
- 1.7 Touch screen for start/stop, measured values, limit values and settings

11. Navigation screens

Figure 3: Start screen

Tap the Start screen to reach the Home screen.

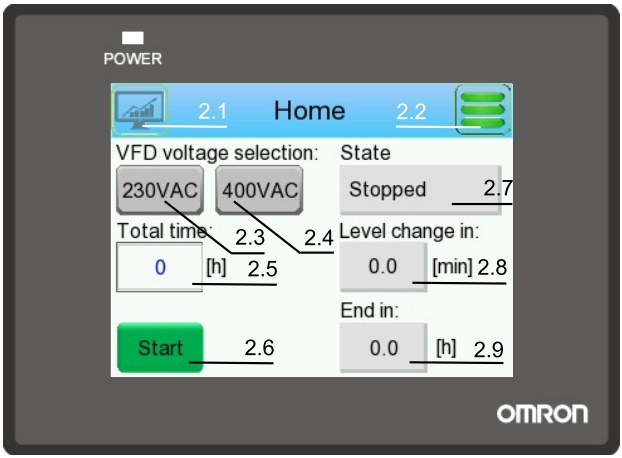

Figure 4: Home screen

Description of Home screen:

- 2.1 Current indicator
- 2.2 Menu
- 2.3 Selection - Rated voltage drive 230 VAC
- 2.4 Selection - Rated voltage drive 400 VAC
- 2.5 Selection - Total time
- 2.6 Start key
- 2.7 Status display of reforming unit
- 2.8 Time until next stage change
- 2.9 Time until reformation is completed

Press Current indicator (2.1) to show the current values of the three connections. Values are only shown when the reforming program is running.

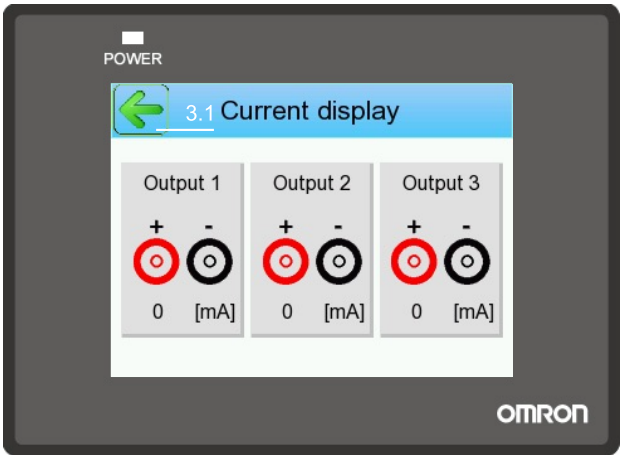

Figure 5: Current indicator

Press Back (3.1) to return to the Home screen.

Press **Menu (2.2)** on the Home screen to reach the Menu screen.

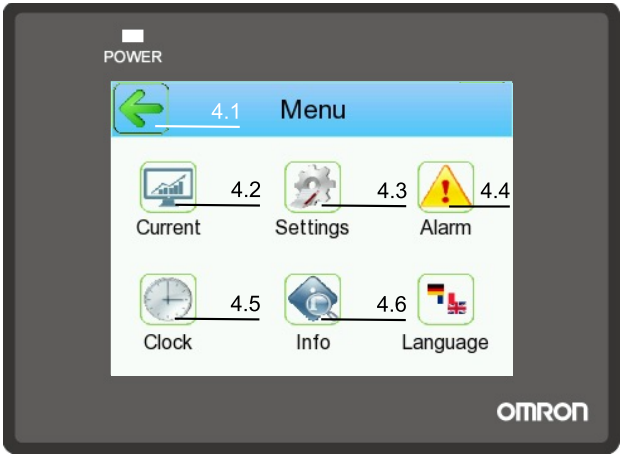

Figure 6: Menu screen

Description of Menu screen:

- **4.1** Back to Home screen
- **4.2** Opens the Current indicator screen
- **4.3** Opens the Settings screen
- **4.4** Opens the Error history screen
- **4.5** Opens the Time setting screen
- **4.6** Opens the Info screen

Press **«Settings» (4.3)** to access the following page:

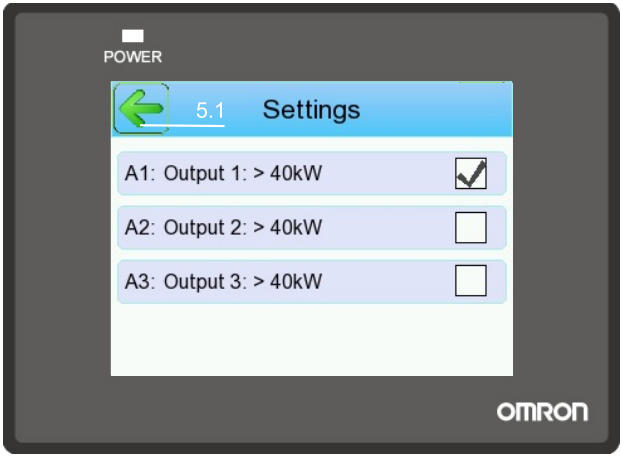

Figure 7: Display settings

The reforming unit monitors the reforming current of all outputs. The greater the power of the drive to be reformed, the greater the reforming current. The reforming unit registers when the reforming current becomes too large and stops the reforming program accordingly. In order to set the reforming current limit for the device to be reformed, use this screen to specify whether a drive with a power greater or less than 40 kW is connected to the respective output. If the correct settings are not made for the larger ratings, the reforming process may be aborted and an «Overcurrent» error message may be displayed.

Use this key **(5.1)** to return to the Home screen.

Press «Alarm» (4.4) to open the «Error history» screen.

Figure 8: Error history

This screen shows a list of recent errors.
Only possible overcurrents of the three outputs are detected and displayed.
Use this key (6.1) to return to the Home screen.

Press «Clock» (4.5) to access the following screen:

Figure 9: Clock

Use this screen to set the current time and date. Use the arrow key (7.1) to return to the Home screen.

Press **«Info» (4.6)** to access the «Information» screen.

Figure 10: Information

This screen contains information about the software version of the PLC and the HMI.
The address of the manufacturer can also be found here.
Use the arrow key **(8.1)** to return to the Home screen.

12. Operation

WARNING

- Drives may only be connected when the reforming unit is switched off.
- Close off the surrounding area of the reforming unit and the equipment to be reformed.
- Connect a maximum of one device per output.
- For the drives to be reformed, measure the resistances of the input connections (L1-L2-L3-N-PE) before starting the reforming program. If one of these resistors is smaller than 100 kΩ, it is possible that the drive already has a defect. Contact a specialist to clarify whether the drive already has a defect.
- The corresponding drive must not be reformed!
- During the reforming program, voltage is always applied to all three outputs, regardless of whether a drive is connected or not.

Check the resistances of the drive input connections. If these are smaller than 100 k , the respective device must not be reformed.

All drives that are connected at the same time must be designed for the same supply voltage, either 230 VAC or 400 VAC. 230 VAC and 400 VAC devices must not be reformed at the same time. Connect a maximum of one drive per output.

Connect the PE conductor of output 1 of the reforming unit to the PE connection of the drive. Connect the «+» connection of output 1 to the L1 connection (input) of the drive. Then connect the «-» connection to the L2 or N connection of the drive, depending on the type of drive. Depending on the number of devices to be reformed, repeat this procedure for output 2 and 3 and the other drives.

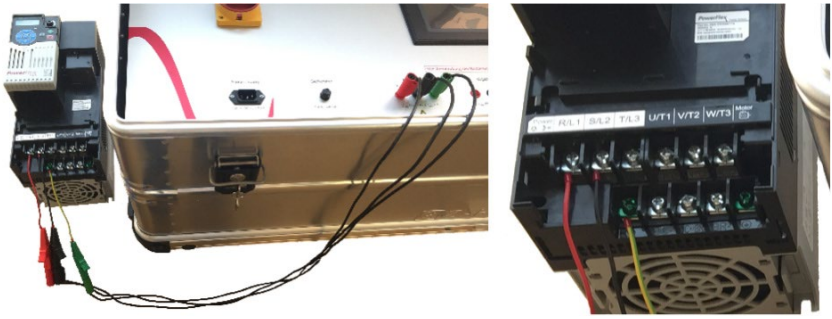

Figure 11: Cable connections

After installing the cables, the connections on the drive must be insulated (protection against accidental contact).

Figure 12: Insulated cable connections

Connect the device to 230 VAC with the power supply cable **(1.2)**. By turning the main switch **(1.1)**, the unit switches on and the start-up process of the reforming unit control system begins. During this time there is no voltage at the output.

After the startup process is completed, you will reach the Start screen (Fig. 3: Start screen). Tap the display to reach the Home screen (Fig. 4: Home screen).

In order to connect a drive with an input power greater than 40 kW, you must activate the appropriate setting. This will change the limit value of the current monitoring. To make this setting, press **2.2 Menu** at the top right to enter the Menu screen. Then press **4.3 Settings** to access the screen where you can select whether the connected device for each output is larger or smaller than 40 kW. If the connected device is larger than 40 kW, the check mark ☑ must be set at the respective output. Once these settings are made, use the arrow key to return to the Home screen.

Next, select the nominal voltage for which the connected drives are designed. Press this key 2.3 [230VAC] for 230 VAC devices. Press this key 2.4 [400VAC] for 400 VAC devices

Then select the desired reforming time. In Table 1 you can find the reforming time your devices should take. The default setting is six hours.

In Table 1: The values shown are the minimum reforming times. In case the drives are reformed longer than listed in the table, the devices will not suffer any damage. If you are not sure how long the drives have been disconnected from line voltage, select six hours.

If you press on the field with total time 2.5 [0 [h]], you can enter the total number of hours using the numeric keypad. This can be from 1 to 9 hours.

After entering the reforming time, all entries are completed and the reforming program can be started.

WARNING

- Make sure again that all connections are properly made.

If all settings have been made correctly and all safety regulations have been observed, the reforming program can be started.

To start the program, press 2.6 Start [Start]. This starts the reforming program with the lowest voltage level. The voltage levels are 56, 113, 226, 325 VDC for the 230 VAC rated units. For the 400 VAC units, there are two additional stages, 425 and 565 VDC.

Status 2.7 [Stopped] shows the status of the reforming program. Field 2.8 [0.0] shows the remaining time until the next stage is reached, and field 2.9 [0.0] shows the remaining time until the reforming program is completed.

The key **Pause** Pause is only visible when the reforming program has been started. To interrupt the reforming program, press Pause. To continue the reforming program, press **Start** again. To abort the reforming program, press the key **Cancel** Abort. The keys **Pause** and **Cancel** are only visible when the reforming program has been started.

During the reforming program, the reforming current can be monitored. Press the key **2.1** to access the current indicator screen. The current values of the three outputs are shown in mA. The values depend on the power of the drive to be reformed, the manufacturer/type, the current voltage level and the condition of the device. It may be that no reforming current is yet displayed at the first stage, since the value may be so small that it cannot be measured.

When the reforming program is complete, the output of the reforming unit is automatically de-energized. However, you must wait five minutes to allow the drive capacitors to discharge so that you can disconnect the cables from the drive again. Subsequently, other drives can be reformed.

WARNING

- After the reforming program, wait five minutes to allow the drive capacitors to discharge.
- Failure to follow the instructions can result in injury and fatal accidents, or cause damage to the equipment.

13. Troubleshooting

Display remains dark

- Check if the power cable is plugged in.
- Does the power cable carry current?
- Check if the main switch is on.
- Contact the supplier.

The reforming program always aborts with error message Overcurrent at output 1...3

- Check if the reforming unit and the drive are correctly wired.
- Check if the settings >40 kW are correct. See Figure 7: Display settings
- Check if the drive has a short-circuit. Measure the resistance.
- Check if the power of the drive is too high. Maximum limit cannot be defined, because the limit depends on the manufacturer, type, rated power and condition of the drive. Reforming unit tested up to 250 kW drive.
- Contact the supplier.

No current consumption shown on Current Consumption screen Figure 5: Current indicator

- Is the reforming program running? Check the status under 2.7.
- Has the reforming program started? Start the reforming program.
- Has the reforming program paused? Start the reforming program.
- Is the reforming unit at stage 1 (56VDC)? Wait for stage 2.
- Is the wiring done correctly? Check the wiring.
- Is there voltage at the output of the reforming unit? Measure the voltage at the drive.
- Do all three outputs have no measurable voltage? Check the fuse on the front panel.
- Is the drive defective? Contact the drive manufacturer.
- Contact the supplier.

14. Specification

Power supply:	230 VAC, +10 %/-15 %, 50 Hz, 13 A
Outputs 1 to 3:	0-600 VDC, 1 A
Fuse 100F2.1:	T4A / 500 VAC
Protection class:	IP 54 with closed cover
Operating temperature range:	0 to +35 °C
Storage temperature:	-10 to +50 °C
Max. relative humidity:	90% (non-condensing)
Weight:	35 kg
Dimensions:	800x500x385 mm (LxWxD)
Housing:	Roller case lockable

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