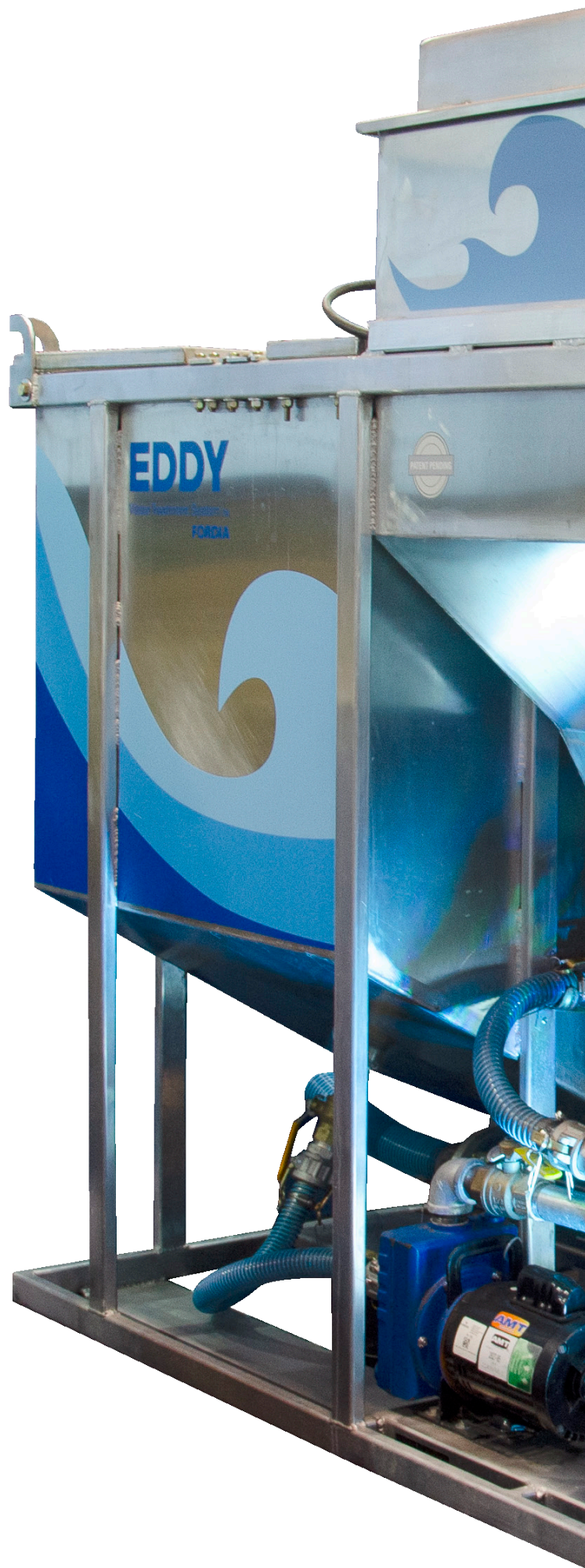




OPERATION MANUAL

EDDY WATER TREATMENT SYSTEM



FORDIA®

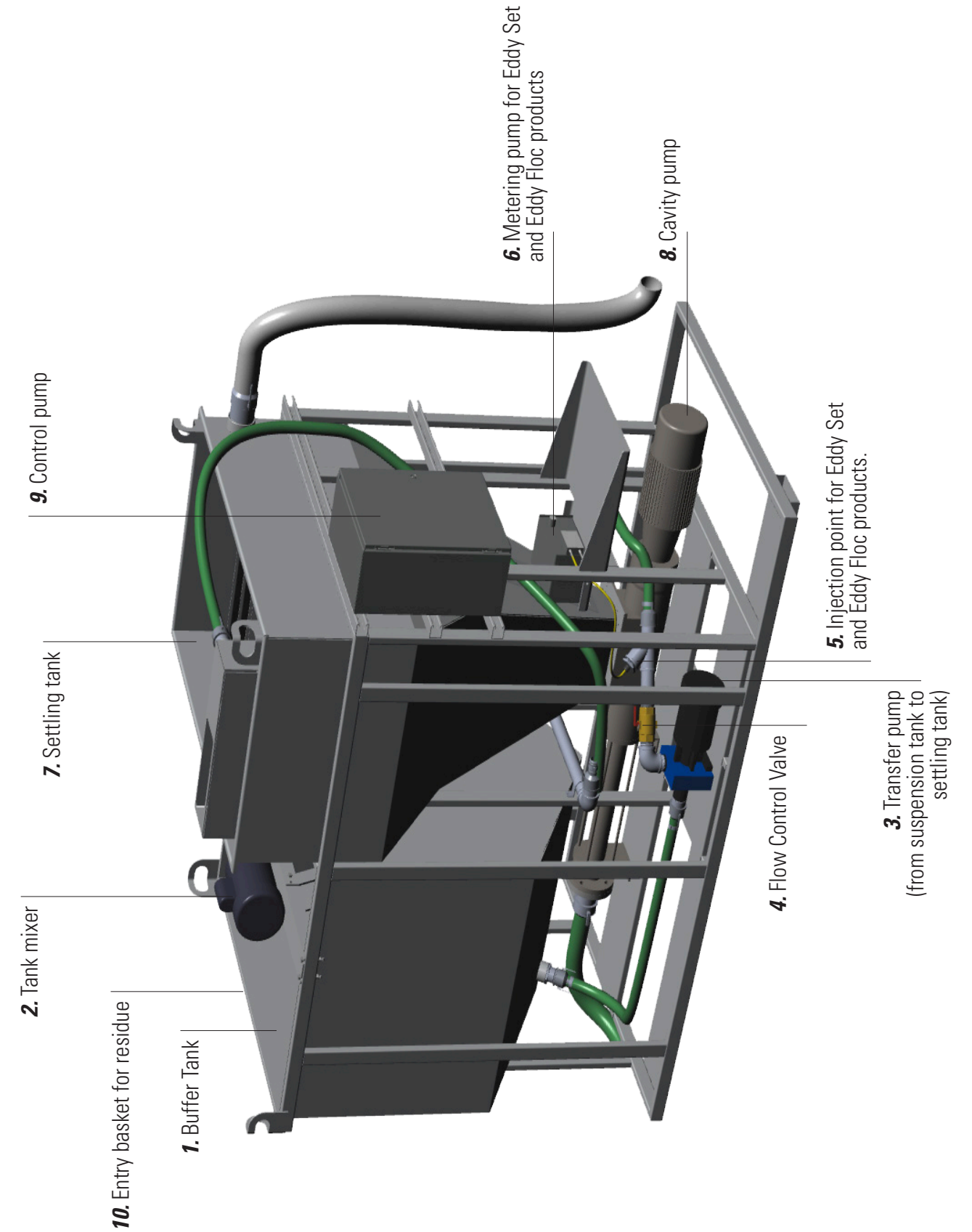
SYSTEM COMPONENTS

A demonstration video of the system is available on our YouTube channel. You can view it by clicking on the following link.

[youtube.com/watch?v=mwLcfelluzc](https://www.youtube.com/watch?v=mwLcfelluzc)



REFERENCE NO.	NAME	DESCRIPTION
1	Buffer Tank	<ul style="list-style-type: none"> Cuttings flow from the casing into the tank. Controls the product dosage during the transfer of drill water from the settling tank.
2	Tank mixer	<ul style="list-style-type: none"> Keeps the solid particles in suspension. Provides a better decantation result.
3	Transfer pump (from suspension tank to settling tank)	<ul style="list-style-type: none"> Moves the drill water from the buffer tank to the settling tank.
4	Flow Control Valve	<ul style="list-style-type: none"> Controls the flow of water moving from the buffer tank to the settling tank.
5	Injection point for Eddy Set and Eddy Flocc products	<ul style="list-style-type: none"> Situated in front of the flow control valve. Allows addition of Eddy Set or Eddy Flocc during the transfer of drill water from buffer tank to the settling tank.
6	Metering pump for Eddy Set and Eddy Flocc products	<ul style="list-style-type: none"> Injects a dose of Eddy Set or Eddy Flocc during the transfer of drill water. Calculated as a percentage of injection.
7	Settling tank	<ul style="list-style-type: none"> Used to separate solids from drill water. Has a hole at the bottom of the tank to eliminate solids. Has a hole at the front for water Has a window in the front to see the level of solids Has a compartment that controls the flow speed of the fluids entering the tank in order to maintain stillness of the water.
8	Cavity pump	<ul style="list-style-type: none"> Positioned beneath the settling tank. Extracts the solids that have been separated from the water. Pumps at an approx. speed of 19-23 litres/minute.
9	Control pump	<ul style="list-style-type: none"> Configured with 120 and 240 V. Must have a 120/240 V connection during set up.
10	Entry basket for residue	<ul style="list-style-type: none"> Keeps the drilling waste from clogging up the transfer pump. Must be cleaned regularly as needed.



CONTROL PANEL

The control panel allows you to activate the following components:

TRANSFER PUMP:

- Transfers drill water from the buffer tank to the settling tank.
- Three modes are available: automatic, manual and stop.

METERING PUMP

- Injects the decantation products into the line that transfers the additives.
- Three modes are available: automatic, manual and stop.

Attention: This pump works clockwise or counterclockwise. There will be a vacuum and an injection hose to install on the line that transfers additives. Once installation is complete, the same rotation direction must be maintained throughout the use of the pump.

SUMP PUMP

- Has an on and off function.
- Is only used if you need to install a pump directly onto the casing to send the drill water back into the system.

CAVITY PUMP

- Eliminates treated drill solids from the decantation tank.
- Moves water slowly at a speed of 19-23 litres/minute.
- Three modes are available: automatic, manual and stop.
- Works with the vibrator when in automatic mode.

MAIN MIXER

- Is found in the buffer tank.
- Creates continuous movement in order to keep drilling drill water from settling.
- Has an on and off function.

SECONDARY MIXER (Eddy Flocc)

- Prepare products for decantation
- Should be installed on the 115 litre container supplied with the system.
- Use this container to dissolve the decantation products by mixing with the amount of water recommended.
- Has an on and off function.

WTS OPERATION PROCEDURE

PRE-START UP PROCEDURE

1. Connect system to a 120/240 volt electric outlet.

Test each electric component in the system in manual mode.

- Main mixer
 - Transfer pump
 - Metering pump
 - Cavity pump
 - Secondary mixer
2. Manually test the floater in the buffer tank in automatic mode to make sure it functions properly.
 3. Make sure the transfer pump hoses are well-connected and in the proper position before using the system.
 4. Connect the metering pump hose to the "T" found on transfer pump's exit hose and place its vacuum part on the appropriate product (Eddy Set or Eddy Flocc).
 5. If you are using additives during drilling, make sure to use the liquid Eddy Set product. (See documentation on "Drilling with Additives – Eddy Set" for detailed information.)
 6. If you are not using additives during drilling, make sure to use the Eddy Flocc product and to make a smooth mix by using: 250 grams of powdered Eddy Flocc added to 115 litres of clean water. Mix for one and a half hours.
- Attention:** Do not empty the entire 250 gram packet of Eddy Flocc all at once into the water as it will clump and become very difficult to mix. (See documentation on "Drilling without Additives – Eddy Flocc" for detailed information.)
7. Install the cavity pump's exit hose.

PROCEDURE FOR SYSTEM START UP

1. Check the two tanks to make sure there is no debris at the bottom, or in the cavity pump or settling tank.
2. Fill the settling tank with clean water before starting the system.
3. Install the drill water entry hose (which comes out of the casing directly) to fill the buffer tank (in the filter basket).
4. Check to see what kind of drilling will be done to ensure use of the right product (Eddy Set for drilling with additives or Eddy Flocc for drilling without additives).
5. Put the system on manual.
6. Fill the metering pump hose with the product to be used (Eddy Set or Eddy Flocc) up to the "T" in the transfer line.
7. Fill the buffer tank with drill water.
8. Wait until the mixer's blades are submerged before starting it.
9. Follow the instructions of the product used to perform a decantation test in manual mode (See documentation on "Drilling with Additives – Eddy Set" or "Drilling without Additives – Eddy Flocc" for more information).
10. Once adjustment has been made to the level of the metering pump, switch the mode to automatic.
11. Pay attention while filling up the buffer tank to make sure that the level float works, well and is in the right position.
12. When indicated by the level float, make sure the transfer pump and the metering pump are working simultaneously and that the metering pump is rotating in the right direction. (See "Control Panel – Metering Pump- for more information.)
13. After slightly more than 30 seconds of pumping, perform another decantation test to confirm dosage and make sure the solids have settled.
14. If you are using Eddy Flocc and are drilling only with water, the system is now operational. Continue performing decantation tests every after 21 metres of drilling.
15. If you are using Eddy Set and drilling with additives, you must make sure that the fluid viscosity remains the same throughout operations. If this is not the case, you must adjust your dosage accordingly with decantation tests. (See documentation on "Drilling with Additives – Eddy Set" for more information.)

SYSTEM IN OPERATION

Once the system is in operation, follow these steps for proper ongoing operation of the system:

1. Continue performing decantation tests for every 21 metres drilled throughout the entire period of operation.
2. For every 3-6 metres drilled, check the level of solids by looking through the window found on the front of the settling tank.
3. Once the level of the solids has reached the $\frac{3}{4}$ mark of the window, start the vibrator found on the side of the settling tank.
4. Once the level of solids is above the window, start eliminating the solids by using the cavity pump function in manual mode, found on the control panel.
5. Stop the elimination process once the level of solids is at the bottom $\frac{1}{3}$ of the window.
6. Stop the vibrator.
7. Restart as needed.
8. You must always verify the amount of product used (Eddy Set or Eddy Flocc) to avoid improper operation of the system.

WTS LIMITATIONS

1. Variability of drilling fluid viscosity

When drilling with additives or polymers and using the Eddy Set product, maintaining the same drilling fluid viscosity is crucial, as this will ensure minimal manipulation of the system. We recommend using a Marsh funnel to measure viscosity at the drill rig entrance. This measurement (i.e. 38 seconds) should remain the same in order to avoid having to adjust the amount of Eddy Set through the use of the metering pump. It is also important to monitor the viscosity at the exit of the casing as this will directly affect the efficiency of the system. This measurement should be 5 to 10 seconds less than the measure of viscosity at the entrance of the drill rig (i.e. 32 seconds).

It should be noted that certain procedures may influence the viscosity of fluids at the exit of the casing, specifically, the “pumping action” or “water circulation”, and during core recovery. The fluids recuperated during these two processes are not “used” drill water and will not have undergone the shearing effect of the polymer strings by the diamond tool at the bottom of the hole. As a result this fluid will have a viscosity similar to that at the entrance of the drill rig.

Fordia strongly recommends using a bypass valve to recover fluids that have not been “used” from the buffer tank so they can be re-used. This will allow you to better control the viscosity of fluids entering Fordia’s system, and will also provide a substantial cost savings of the drilling additives required to prepare drilling fluids.

2. Use of bentonite/baryte

Tests have shown that Fordia’s system **CANNOT**, on a regular basis, treat drilling fluids with a density greater than 1.2.

If Bentonite and/or Baryte must be used to balance pressure or for any other reason, Fordia recommends that the drilling fluids entering the system are diluted so that the density of the fluids to be treated will be reduced. Once diluted, Fordia’s system will be able to treat the drilling fluids, but in this case, the amount of the Eddy Set product will need to be adjusted.

3. Drilling Process

When the rate of penetration is low or while reaming the bore hole, it is very possible that the amount of

dust from rocks is not sufficient to counteract the floatation effect caused by the additives in the water. In this case, a reduction in viscosity could be considered and a change in the ratio of “Torqueless to DD-2000” would be recommended. If these measures are not enough to allow proper settling of the drill cuttings, it would be important to consider using the same bypass valve that controls viscosity, to recover drilling fluids that have a low level of rock dust.

4. pH level of water

The importance of the pH level of the water used to prepare the drilling fluids also applies to the products used by the Fordia system. While preparing fluids, it is important to keep the pH level between 8 and 10. (Use of the product pH 10 is recommended.) It is important to note that geological formations may have a large effect on the pH level of water returning to the surface. It is important to monitor the pH level of the water entering Fordia’s system and to treat it if necessary.

5. Water salinity

Fordia would like to point out that like drilling fluid additives, the products used by Fordia’s system to treat water will be similarly affected by the presence of salty water in the circuit.

6. Petroleum substances

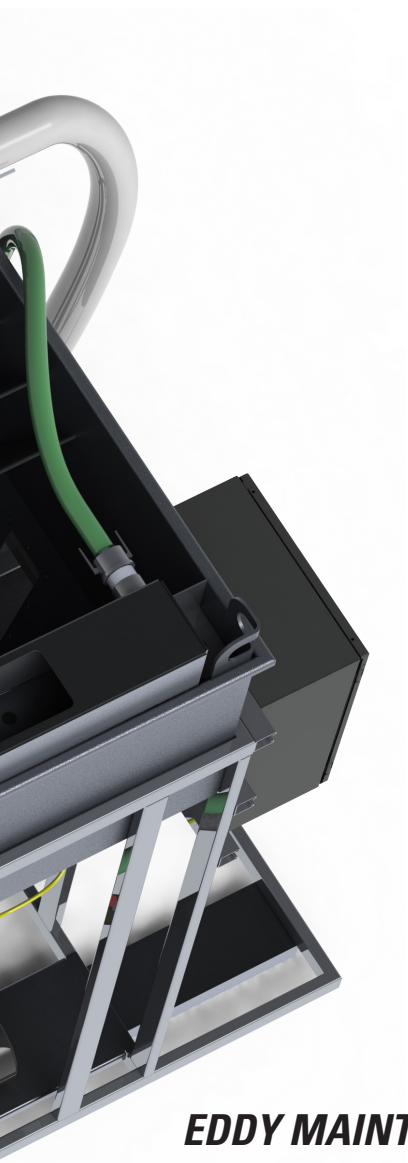
Fordia has no information on how the presence of liquid or gas petroleum will impact the drilling fluids in Fordia’s system. In these cases, adjustments may be necessary to optimize the operation of Fordia’s water treatment system.

7. Drilling mud handling

Fordia would like to point out that the use of drilling additives will greatly increase the amount of drilling mud exiting the system. Handling about 7,500 litres of drilling mud per day is to be expected. Fordia has no responsibility regarding the drilling mud that exits the system. This remains the responsibility of the user.

8. Freezing Eddy Set

Fordia would like to point out that the Eddy Set product in liquid form should not be frozen. Once frozen it will lose its strength. Makes sure to protect it from freezing.



EDDY MAINTENANCE

- Clean the point where decantation products are injected and the non-return valve every 3 days. (See page 3 to view the system components)
- Check the level of transmission oil in the main mixer every week.
- Lubricate the cavity pump monthly.
- During cold temperatures (lower than 0° Celsius), make sure to empty all debris from the pumps in the tanks to make sure it does not freeze and damage the equipment.

ADDITIONAL INFORMATION

If the rate of used drill water flowing from the buffer tank to the settling tank decreases, this is a sign that the transfer pump could be blocked. In this case, the pump will have to be opened and full maintenance performed.

If the pump shuts off frequently, this is a sign of an obstruction. Complete maintenance is required to remove the blockage.

If the density of the drill water to be treated is not high enough, meaning that the used drill water is not heavy enough to undergo decantation through normal operation of the system, a technician must be contacted in order to adjust the system operation parameters. This uncommon situation can arise for example, when drilling in rock that is very light and while the casing is being installed. Low-density drill water can then float to the surface of the settling tank. Should this occur, a Fordia technician can advise you with instructions.

NECESSARY PLUGS FOR WATER SYSTEM GENERATOR



**Water system male plug type
HBL 2711 (125/250V, 30A)**

**Generator type
L 14-30 (125/250V, 30A)**





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