User manual for
Exalto windshield wiper
Type 233 BD 12/24 Volt

Cat.no. 2151.30/32/35/40/45/50 (12 Volt)
Cat.no. 2152.30/32/35/40/45/50 (24 Volt)

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Safety

Exalto windshield wipers are easy to install yet a fair amount of technical knowledge (mechanical and electrical) is required of the installer. Please consult the manual or contact your vendor in case of doubt during installation or malfunctioning.

Safety symbols

An exclamation mark in front of the text warns you, that injury or damage can occur if a procedure is badly performed.

Dangers

The installation and use of Exalto wipers will not inflict any personal dangers or damage, provided that installation is done according to the procedures specified in the manual.
• Never remove covers or other safety provisions, unless maintenance is being performed and all safety requirements are obeyed.
• The installer must provide all necessary covers.
• Always disconnect the electrical circuit when performing maintenance. Prevent the installation from being started (accidentally) by others.

Safety provisions

The safety provisions will protect the user against contact with moving, electrical or hot parts. Some of them have to be provided by the installer. There are several safety provisions:
• Cover or panel (obligatory): covers moving parts and electrical connections. The installer MUST provide a self-made cover or place the wiper behind a panel.
• Make sure the wiper has enough ventilation when placing it behind a panel or cover.
• Place a fuse (see specifications) in the main cable.

Safety requirements

Before the Exalto wiper is installed, we strongly recommend the following:
• Read the entire manual before installation.
• Make sure your working environment as well as the wiper parts are clean.
• Check to be sure no parts are missing or damaged.
• Use only high quality tools and have them within reach when installing.
• Handle the parts with care.
• Never install or maintain the wiper with the electrical voltage applied, unless this is specifically mentioned in the manual.
Clear your tools after installation.
Use of the manual
Read the entire manual before installation. In this manual you can find the following expressions and symbols:

**Hint!**
Gives you advice on how to perform a task more easily.

**Attention!**
Alerts you to possible problems and safety warnings.

**Careful!**
Warns if the product can be damaged when working carelessly.

**Warning!**
You can hurt yourself or damage the product severely.

At back of manual
Look at the back of the manual for a drawing.
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1 Introduction

With this user manual we want to guide you in the installation and use of the Exalto windshield wiper. Follow all instructions and install all safety provisions.

1.1 Introduction

The Exalto windshield wipers are especially designed to keep working even with the most extreme weather conditions at sea. All external parts are made of corrosion resistant materials. The housing of the self-lubricating bearings is made of bronze. All arms and blades have a black, weather-resistant coating, to prevent reflection of the sunlight.

Wiper type 233 BD is designed to be mounted in the bulkhead. The wiper arc is adjustable from 40° to 90° with steps of 5°. Standard the 233 BD can be supplied for a bulkhead thickness of either 20, 35, 55, 75, 100 or 125 mm. The pantograph arms are adjustable in length, to set the wipe area accurately. The motor of the 233 BD has insulated earth return as a standard.

1.2 Environmental factors

In the wiper, materials are used that are harmful for the environment (e.g. copper). The parts of the wiper can be re-used or recycled. No harmful substances are disseminated when using or disassembling the wiper.

1.3 Modified use and guarantee conditions

All modifications or defects in the product are subject to the Orgalime General Conditions of Sale. Please contact your vendor in case of any questions or if you want to use Exalto wipers in a non-maritime environment or other applications.
# Technical data

## 2.1 General
- **Product**  
  Exalto windshield wiper
- **Types**  
  233 BD – 12 Volt and 24 Volt
- **Catalogue numbers 12V**  
  2151.30/32/35/40/45/50
- **Catalogue numbers 24V**  
  2152.30/32/35/40/45/50

## 2.2 Electrical data 12 Volt
- **Torque (max.)**  
  23 Nm
- **Voltage**  
  12 Volt
- **Current**  
  3 A
- **Power consumption (max.)**  
  36 W
- **Number of revolutions**  
  Low 38 rpm, high 59 rpm
- **Recommended cable**  
  5 wires, 1½ (16 g) or 2½ mm² (14 g) 
  up to 10 m long
- **Recommended fuse**  
  6 A slow blow
- **Grounding**  
  Insulated earth return

## 2.3 Electrical data 24 Volt
- **Torque (max.)**  
  15 Nm
- **Voltage**  
  24 Volt
- **Current**  
  1.5 A
- **Power consumption (max.)**  
  36 W
- **Number of revolutions**  
  Low 35 rpm, high 56 rpm
- **Recommended cable**  
  5 wires, 1½ (16 g) or 2½ mm² (14 g) 
  up to 10 m long
- **Recommended fuse**  
  4 A slow blow
- **Grounding**  
  Insulated earth return

## 2.4 Mechanical data
- **Dimensions**  
  l x w x h = 180 x 105 x 110 mm
- **Bearing diameters**  
  Drive shaft Ø 20 / support shaft Ø 8 mm
- **Mounting**  
  In bulkhead (20/55/75/100/125 mm)
- **Bearing**  
  Bronze housing, self-lubricating
- **Wiperarms**  
  Model PU up to 750 mm
- **Wiperblades**  
  Up to 750 mm
- **Wipe arc**  
  Wipe arc disc 40°-90° adjustable per 5°
- **Number of revolutions**  
  Low 37 rpm, high 59 rpm
- **Weight**  
  approx. 2.3 kg
3 Installation

Read the chapter on safety. Check before installation if the parts are all present and undamaged. In case of errors, contact your vendor.

3.1 Preparation

The complete wiper, with packaging, can be handled and transported by hand. Leave the wiper in the packing, until you are ready to install it; this to reduce the risk of damage. Make sure all parts, tools and other means are ready.

3.2 Installation of mechanical parts

1. If your wiper is supplied with the wipe arc disc uninstalled, please follow steps 5.3 and 5.4 (pages 11-12) to set the wiping arc prior to installation.

   Determine the place where the wiper is to be installed. The dimensions are shown below. The wiper can be installed in any position.
Attention!
When installing the wiper, reserve space for a housing or cover.

2. Place the windshield wiper in the pre-drilled holes of the bulkhead (see figure). A nitrile plate must be placed at both sides of the bulkhead.

3. Do not fit the wiper arm before finishing the electrical connections.

3.3 Electrical installation
4. Install a wiper switch in the dashboard.

Wiring diagram 233 BD 12/24 Volt

<table>
<thead>
<tr>
<th>Colours</th>
<th>Function</th>
<th>Pol</th>
</tr>
</thead>
<tbody>
<tr>
<td>yellow</td>
<td>low speed</td>
<td>+</td>
</tr>
<tr>
<td>black</td>
<td>minus/earth</td>
<td>-</td>
</tr>
<tr>
<td>blue</td>
<td>common leg</td>
<td></td>
</tr>
<tr>
<td>red</td>
<td>selfparking</td>
<td>+</td>
</tr>
<tr>
<td>white</td>
<td>high speed</td>
<td>+</td>
</tr>
</tbody>
</table>

SLOW BLOW FUSE: 6A for 12V
SLOW BLOW FUSE: 4A for 24V
5. Connect the wiper to the ship's electrical installation; see the diagram above. Use a cable with 5 wires with diameter of at least $1\frac{1}{2}$ mm$^2$ (16 g) up to a maximum length of 10 m. Use larger diameters when using longer cables.

6. Fit a slow blow fuse of 6 A (12 Volt) res. 4 A (24 Volt) in the main cable.

7. Connect the switch to the wiper (refer to that specific manual for installation).

### 3.4 Final installation

8. Switch on the power and test the motor briefly. Wait until the motor stops after turning off the switch. The motor will be in park position. The standard park position is shown in the figure under point 9.

**Hint!**
*If you have doubts regarding the park position, make a vane with tape to simulate the position of the arms.*

**Attention!**
The 233 BD is suitable for wiper arms model PU up to 750 mm and wiper-blades up to 750 mm.

9. Place the wiper arm with the blade on the shafts. Fasten the nuts loosely onto the shafts.
10. Switch on the power and test the motor briefly again to check the wiped area.

11. If the wipe arc is correct, adjust the position and the length of the arm if necessary. Tighten the nuts properly now.

12. To complete the installation, the wiper must be enclosed by means of a panel or cover. Make sure to provide the wiper motor with sufficient ventilation.
4. Operation and use

4.1 Preparation for first use
If the wiper has been installed and been adjusted, the system can be prepared for first use. We recommend a thorough inspection of the system to ensure proper operation.

Check:
… if there are no leaks where the shafts go through the bulkhead;
… if the wipe arc cleans the entire window;
… if the park position is correct.

If the wipe arc or the park position is wrong, adjust them again. Follow the procedure in section 5.3.

4.2 Use
All Exalto windshield wipers are provided with the following functions:
• low speed;
• high speed;
• self parking.

Do not use the wiper on a dry window; excessive wear of the blades and the motor can occur in this case. Clean the wiper frequently with fresh water (see also paragraph 5.1).

Because of the big variety of wiper switches, we refer to the user manual of the installed switch to learn about the functions of that specific switch.
5 Maintenance

5.1 **General maintenance**
To keep the Exalto wiper in good condition, you are advised to:
- clean wiper, arms and blades with fresh water after every journey in salt water (to prevent salt from clogging moving parts);
- do not use the wiper on a dry window.

5.2 **Servicing**
As long as the wiper system functions normally and is kept in good shape (see section 5.1), servicing the motor is not necessary. Check yearly (monthly when used intensively) if the wiper blades are worn. Replace blades when worn or when the blades leave many stripes across the glass. In case of failure or adjustments, have servicing done solely by qualified mechanics. In chapter 6, “Troubleshooting”, a listing is given of possible problems and their solutions.

5.3 **Changing the wipe arc and park position**
If the wiped area is too small or too large, the wipe arc and park position can be changed. Always disconnect the power supply before opening the housing.

**Adjusting the wipe arc**
- disconnect the power supply;
- remove the wiper from the bulkhead;
- remove the wipe arc disc (see figure on the right) from the motor-shaft;
- relocate the pin into the hole of the desired wipe arc (see section 5.4);
- fasten the nut on the pin not too tight (for 233 BD max. 9.78 Nm / 7.21 ft.lbs), to prevent damage of the plastic spacer;
- run the motor briefly to park it;
- move the disc to the desired park position (see the text below).

**Adjusting the park position**
- place the disc on the shaft, parking right or left (see the drawing in paragraph 3.4 and on the next page for reference);
- place the disc in such a way that the connection lever forms an almost straight line with the pin and the central hole of the disc (see the drawing below);
- tighten the disc well using a the nut;
- mount the wiper-motor assembly;
• adjust the wiper arm to the correct length, if necessary.

5.4 Rough determination of wipe arc and wiper blade

With this method the wipe arc and the wiper blade length can roughly be determined. Please contact your vendor to calculate your configuration more accurately.

• Determine length of pantograph arm (L): \( L = E + D \)
• get the maximum wiped area width (W): \( W = \pm 0.9 \times GW \)
• find the intersection of L en W in the diagram below;
• the wipe arc-line closest to the intersection, shows the wipe arc;

![Diagram of wiper arm and components](image_url)
• find in the table below the vertical displacement of the blade (H);

<table>
<thead>
<tr>
<th>Wipe arc</th>
<th>Vertical displacement of the blade (H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units in mm</td>
<td>300</td>
</tr>
<tr>
<td>40°</td>
<td>19</td>
</tr>
<tr>
<td>45°</td>
<td>23</td>
</tr>
<tr>
<td>50°</td>
<td>26</td>
</tr>
<tr>
<td>55°</td>
<td>34</td>
</tr>
<tr>
<td>60°</td>
<td>40</td>
</tr>
<tr>
<td>65°</td>
<td>47</td>
</tr>
<tr>
<td>70°</td>
<td>55</td>
</tr>
<tr>
<td>75°</td>
<td>62</td>
</tr>
<tr>
<td>80°</td>
<td>70</td>
</tr>
<tr>
<td>85°</td>
<td>79</td>
</tr>
<tr>
<td>90°</td>
<td>86</td>
</tr>
</tbody>
</table>

• Now the wiper blade length can be calculated:

\[ \text{Length of wiper blade} = 0.9 \times 2 \times (E - H) \]

5.5 Disassembly and assembly

Prevent injuries when disassembling: disconnect the wiper from the power supply. Keep all necessary tools within reach and remember the chapter on safety. Provide well protected packaging, if you're going to stock or transport the wiper assembly.

5.5.1 Removing the wiper assembly from the bulkhead

1. Disconnect all the electric connections of the wiper.
2. Remove the wiper arms.
3. Remove the nuts (19, 12, 21) and plates (16, 17) on the outside.
4. Remove the wiper from the holes in the bulkhead.
5. If you want to replace the wiper, follow chapter 3.

5.5.2 Disassembling the wipe arc disc

1. Disconnect all the electric connections of the wiper.
2. Remove the wiper from the bulkhead; (see 5.5.1).
3. Unscrew the nut (5) on the motor shaft and remove the disc (4).
4. For adjusting the wipe arc and replacing, follow section 5.3.

5.5.3 Removing the motor from the wiper assembly

1. Disconnect all the electric connections of the wiper.
2. Remove the wiper-arm
3. Disassemble the wipe arc disc (4) (see 5.5.2).
4. Unscrew the motor and remove it.
5. When replacing, screw the motor on the housing. Follow section 5.3 to install the wipe arc disc in the correct park position.
6 Troubleshooting

In this chapter, several malfunctions are mentioned combined with possible causes. Please leave servicing to qualified mechanics.

6.1 Wiper does not work after switching on

- Possible causes:
  1. Wiper switch is not working properly.
  2. Burned or incorrectly sized fuse.
  3. Electrical connections are wired incorrectly or might be damaged.
  4. The wiper motor has failed.

- Solutions:
  1. Test and replace it. Check if the current is (and keeps being) too high.
  2. (See solution 1).
  3. Measure the voltage across the motor and check all connections if there is none.
  4. Replace the motor and check for drag or a high current.

6.2 Wiped area or park position is not correct

- Possible causes:
  1. The wiper arms were placed without parking the motor first.
  2. The wipe arc is set wrong or changed due to high loads (e.g. spring pressure of arms too high, drag).
  3. The wires are connected incorrectly.

- Solutions:
  1. Remove the wiper arms. Run the motor shortly to park it and re-install the arms according to chapter 3.
  2. Determine the wipe arc if needed (see section 5.4) and set the wipe arc again (see chapter 5.3).
  3. Check and reconnect the wiring (see the scheme in section 3.3).

6.3 Motor runs, but arms do not move

- Possible causes:
  1. Mechanical joints are loose.
  2. Parts are broken.
  3. Grooves of shafts are worn.

- Solutions:
  1. Check if the arms are well fastened. If not, open the housing (follow chapter 5) and check all joints and parts to see if they are loose, broken or worn.
7 Declaration of conformity

MANUFACTURER’S DECLARATION
In accordance to Appendix II sub B of Directive 89/392/EEG (Machines)

Exalto B.V.
Nijverheidsstraat 12
3371 XE Hardinxveld-Giessendam
The Netherlands
☎ +31 (0)184-61.58.00
Fax: +31 (0)184-61.40.45

hereby declares that

**Exalto windshield wiper type 233 BD**

… is intended to be built into another machine or as a component, or is to be integrated with other machines to a machine where Directive 89/392/EEG applies to;

… **does not** fully comply to the requirements of mentioned Directive;

… complies to the following harmonised standards:

*Pleasure yachts*

…and declares that the sub-assembly in question shall not be set into operation until the complete machine, into which the sub-assembly is fitted, shall be complete and conforms to all aspects of Directive 89/392/EEG.

Hardinxveld-Giessendam
3-26-2012 (m-d-y)
## Parts list

<table>
<thead>
<tr>
<th>No</th>
<th>Qua</th>
<th>Part</th>
<th>Dimensions</th>
<th>Cat. no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Motor 12 V 23 Nm</td>
<td>180x105x85</td>
<td>2100.2312</td>
</tr>
<tr>
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<td></td>
<td>Motor 24 V 23 Nm</td>
<td>180x105x85</td>
<td>2100.2324</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>Socket screw s.s. countersunk (DIN 965)</td>
<td>M6x35</td>
<td>2100.055</td>
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<td>3</td>
<td>1</td>
<td>Wiper housing motor side</td>
<td>180x96x22</td>
<td>2100.902</td>
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<tr>
<td>4</td>
<td>3</td>
<td>Socket screw s.s. countersunk (DIN 965)</td>
<td>M6x16</td>
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<td>5</td>
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<td>Arc disc</td>
<td>&amp;70x5</td>
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<td>6</td>
<td>1</td>
<td>Nut s.s. (DIN 934)</td>
<td>M8</td>
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<td>Linking pin</td>
<td>M8x26</td>
<td>2100.920</td>
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<tr>
<td>8</td>
<td>1</td>
<td>Spindle + spindle lever</td>
<td>Ø12x102</td>
<td>2100.364</td>
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<td></td>
<td></td>
<td>Spindle + spindle lever</td>
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<td>Spindle + spindle lever</td>
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<td>Spindle + spindle lever</td>
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<td>Spindle + spindle lever</td>
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<td>9</td>
<td>1+1</td>
<td>Filling bushing plastic</td>
<td>&amp;13x14</td>
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<tr>
<td>10</td>
<td>1</td>
<td>Linking lever</td>
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<td>11</td>
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<td>Nut s.s. flat</td>
<td>M10</td>
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<td>11</td>
<td>2</td>
<td>Circlip</td>
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<td>12</td>
<td>2</td>
<td>Bearing shell nut s.s.</td>
<td>M20</td>
<td>2100.350</td>
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<td>13</td>
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<td>Ring s.s.</td>
<td>18x12x1</td>
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<td>Bearing shell complete bulkhead 20 mm</td>
<td>M20x65</td>
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<td>Bearing shell complete bulkhead 55 mm</td>
<td>M20x100</td>
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<td>Bearing shell complete bulkhead 100 mm</td>
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<td>Bearing shell complete bulkhead 125 mm</td>
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<td>Locking ring</td>
<td>&amp;12x4</td>
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<td>2</td>
<td>Rubber locking plate</td>
<td>82x35x3</td>
<td>2100.490</td>
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<td>S.s. locking plate</td>
<td>82x35x3</td>
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<td>18</td>
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<tr>
<td>19</td>
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<td>Nyloc nut s.s.</td>
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<td>2100.071</td>
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<td>Wiper housing drive shaft side</td>
<td>180x96x22</td>
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<tr>
<td>21</td>
<td>1</td>
<td>Support spindle bulkhead 20 mm</td>
<td>M8x70</td>
<td>2100.446</td>
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<td>Support spindle bulkhead 100 mm</td>
<td>M8x155</td>
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<td>Support spindle bulkhead 125 mm</td>
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<td>Support spindle nut s.s.</td>
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<td>2100.460</td>
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<td>23</td>
<td>-</td>
<td><em>Not used in this model</em></td>
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<td>-</td>
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</tbody>
</table>
9 Exploded views

9.1 Assembly overview
9.2 *Internal wiring diagram*

The following diagram explains the way the wiper motor works.

<table>
<thead>
<tr>
<th>Function</th>
<th>Polarity</th>
<th>Motor code</th>
<th>Switch code</th>
<th>Cable 12/24V</th>
</tr>
</thead>
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<tr>
<td>high speed</td>
<td>+</td>
<td>53b</td>
<td>H</td>
<td>white</td>
</tr>
<tr>
<td>low speed</td>
<td>+</td>
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<tr>
<td>earth</td>
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<td>common leg</td>
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<td>53e</td>
<td>P</td>
<td>blue</td>
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<tr>
<td>Self parking</td>
<td>+</td>
<td>53a</td>
<td>B</td>
<td>red</td>
</tr>
</tbody>
</table>