

# Heavy Duty Straight Line Wipers **THOR Control System**

USER MANUAL

Version 1-2025

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# Straight line wipers

## **1** Introduction

### **1.1** Purpose of manual

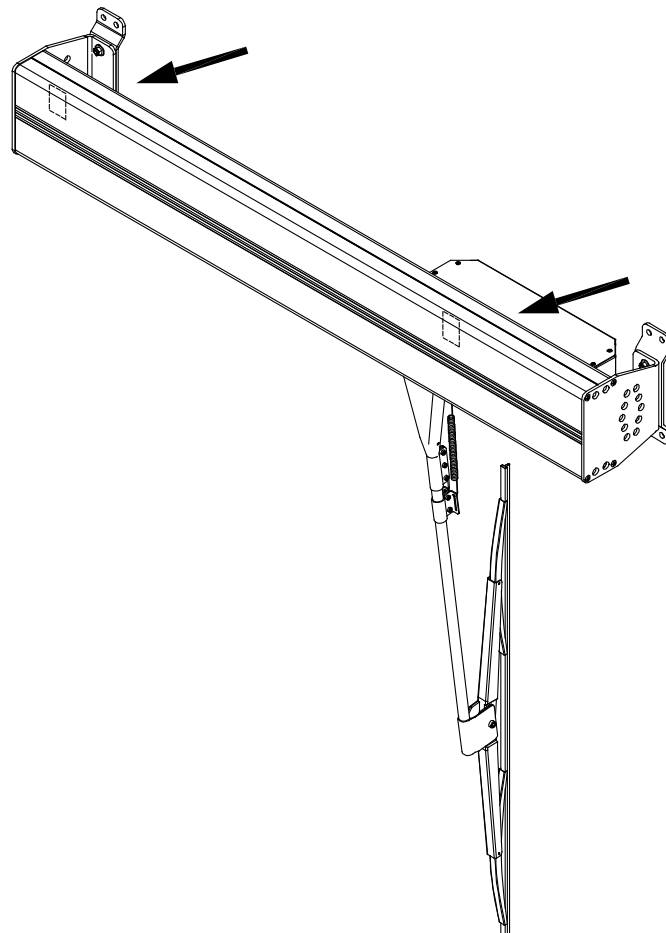
The purpose of this manual is to provide guidance for installation and operation of Decca Straight Line Wipers controlled with the Thor Control system, as supplied by Exalto Decca Wiper Systems AS.

The manual is intended to give technical information to understand the functions and features of the Exalto Decca Wiper Systems and to be able to operate the system, together with installation, commissioning and maintenance information.

The manual shall also be used as a textbook for training of crew, and should be read and understood before operation of the wiper system.

## 1.2 Marking of Equipment

The wiper unit is identified with a label positioned on the back side of the wiper casing. An additional, similar label is positioned in a more protected location behind the wiper motor cover.



*Figure 1 - Label Locations on wiper unit*

The product label contains a serial number and technical information about the wiper unit. For service and spare part orders, always refer to the information listed on the product label.

### 1.3 Symbols



The **NOTE** symbol gives clarifying information or special instructions which are crucial for the equipment or to the operation performed.



The **WARNING** symbol gives clarifying information or special instructions where personal injuries or damage to the equipment can occur.

### 1.4 Common abbreviations

<i>Abbreviation</i>		<i>Explanation</i>
mm	-	millimetres
"	-	inches
kg	-	kilogram
ECU	-	Electronic Control Unit

## 2 Introduction

### 2.1 General description

Modern shipbuilding takes full account of visibility requirements. Larger wheelhouses with an omnidirectional view are part of this trend. As a result, there is an increase in window area that must be kept clear in all weather conditions. Decca straight line wipers are designed to meet these demands with reliable and efficient operation in heavy rain, storm conditions, sleet and even snow.

With unique technical design features and built with only high quality materials, Decca wipers provide a reliable wiper operation in extreme weather conditions.

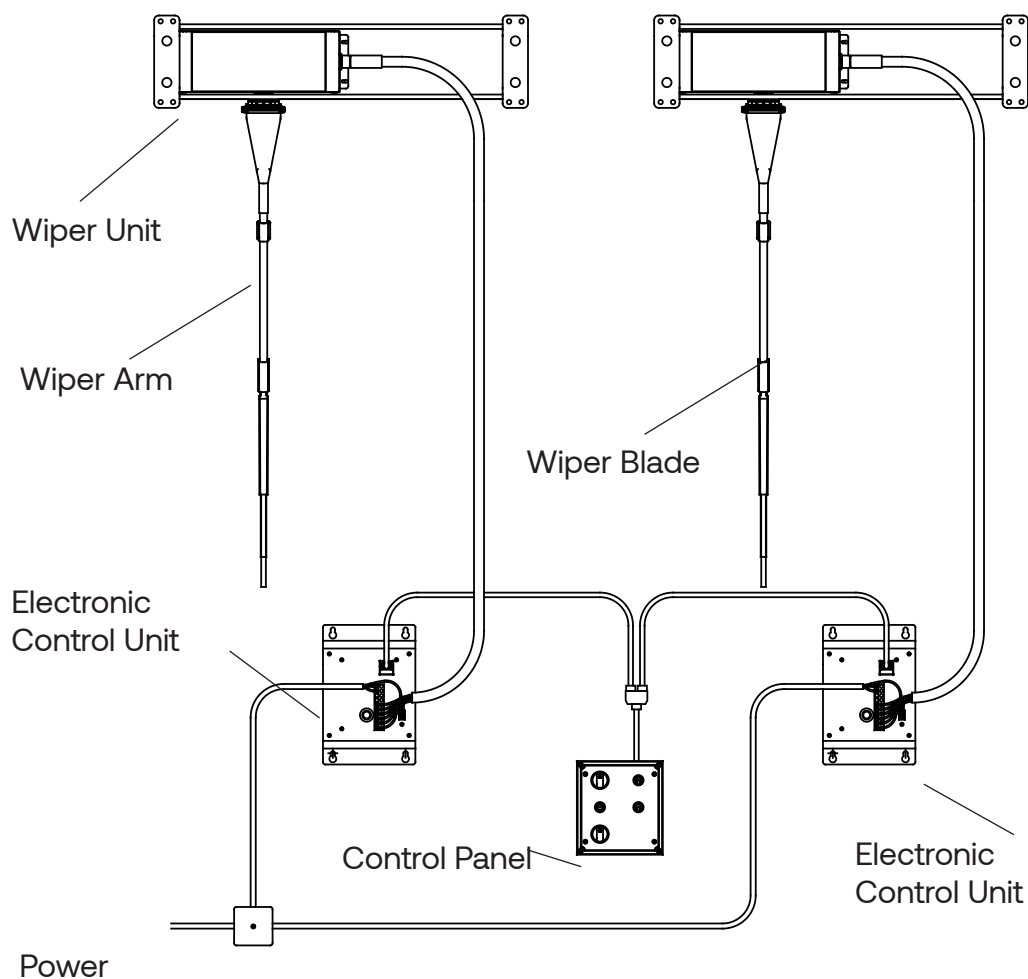


Figure 2 - Example of 2 wiper, 1 group wiper system

### 3 Main data

#### 3.1 Dimensions

The wiper units are delivered in 50mm (1,96") increment stroke lengths ranging from 450mm (16,69") to 3000mm (118,11"). The wiper blades range from 450mm (19.68") to 1000mm (39.37"), and the wiper arm length can be adjusted to fit the window on site.

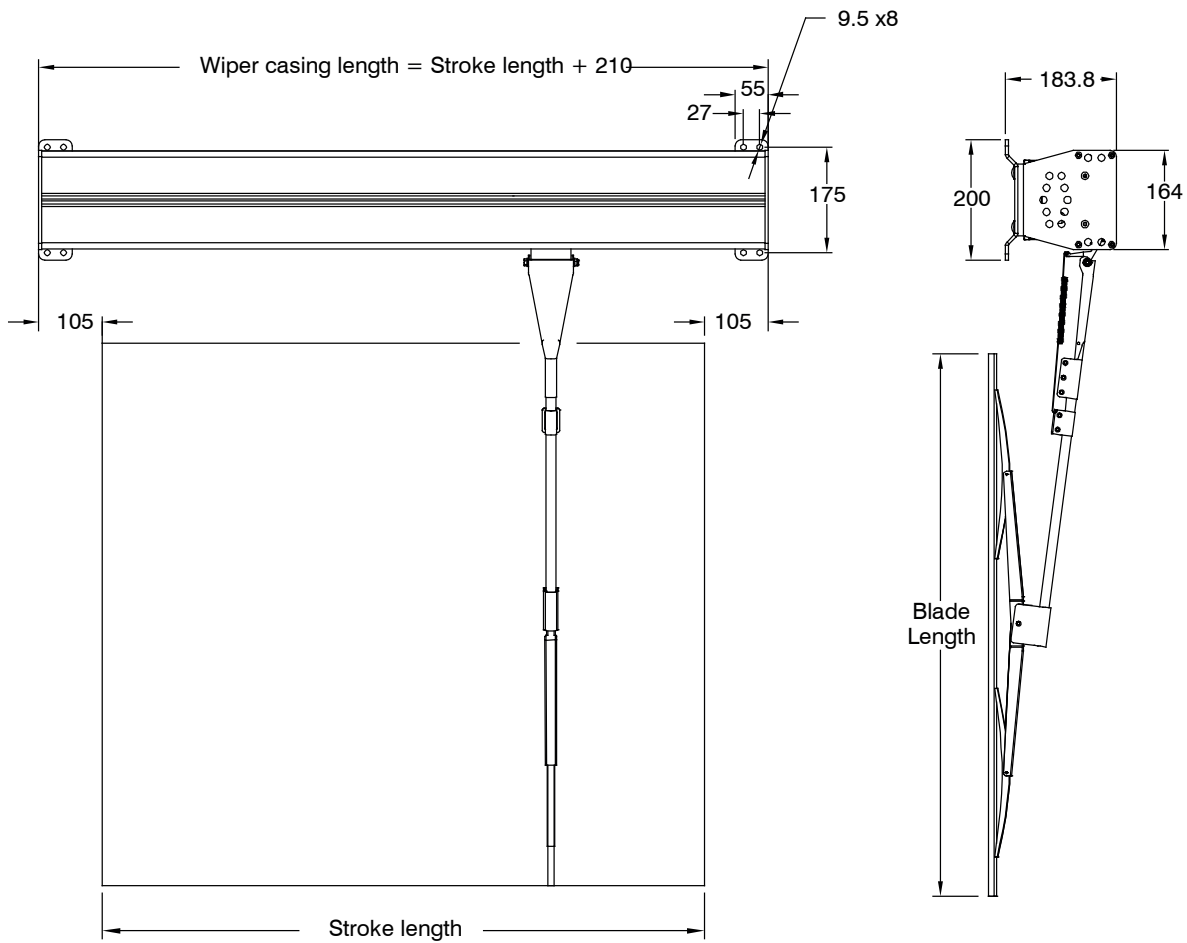


Figure 3 - Wiper Unit Dimensions (all measurements in mm)



The Thor Control Panel is available in five versions, featuring control of one to five wiper groups. See figure below for physical dimensions.

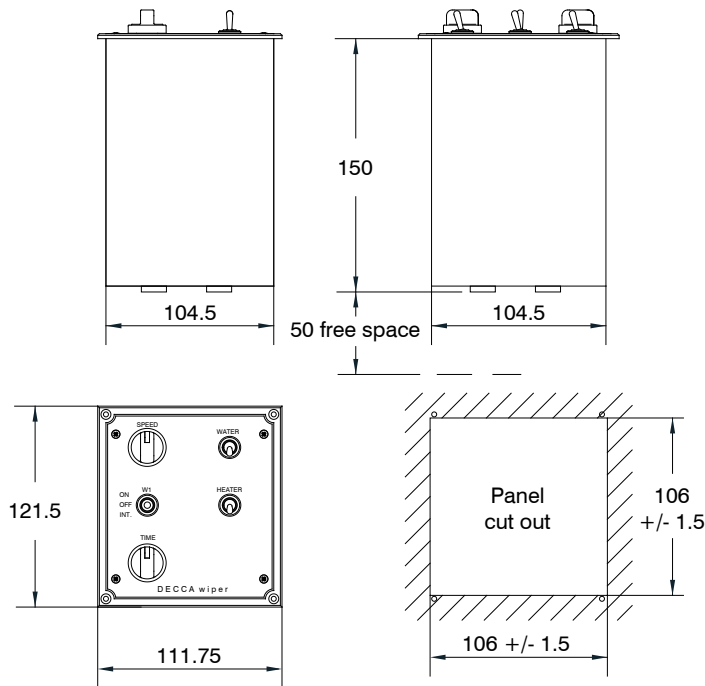


Figure 4 - Control Panel 12170 series dimensions - Thor Control with ECU (all measurements in mm)

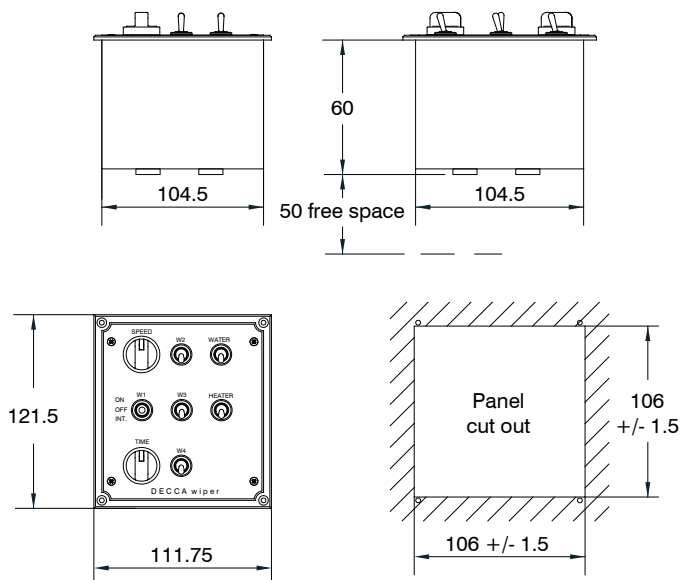


Figure 5 - Control Panel 12160 series dimensions - Thor Control with Group Control (all measurements in mm)

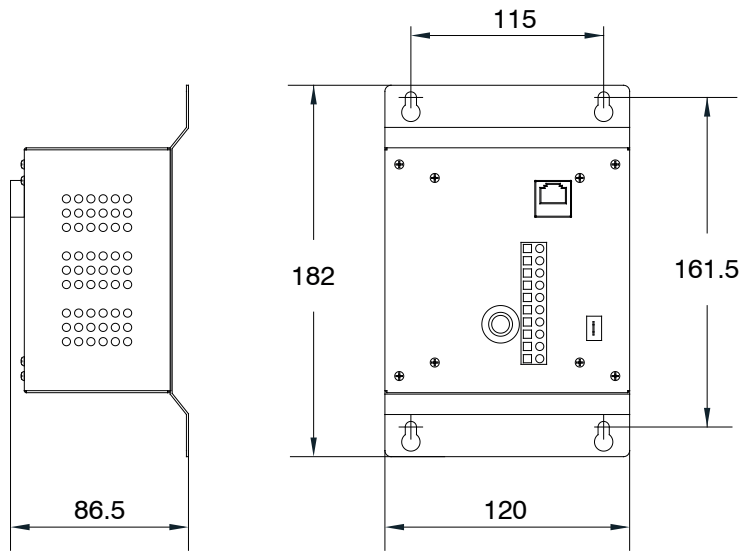


Figure 6 - Electronic Control Unit (all measurements in mm)

### 3.2 Technical data

#### 3.2.1 Power supply

Power supply voltages: 110VAC Single Phase, 220VAC Single Phase or 24V DC

#### 3.2.2 Power consumption

Power consumption: 90W for motor and 75W for heater element  
 Heater elements are equipped on 110VAC and 220VAC systems and optional on 24VDC systems

#### 3.2.3 Weights

Wiper Unit (Single wiper 450mm stroke):	11,0kg	(24,2lb)	<del>(32,0oz)</del>
Additional weight pr. 100mm stroke:	0,5kg	(1,1lb)	(17,6oz)
Control Panel 12170:	1,5kg	(3,3lb)	(52,8oz)
Control Panel 12160:	0,5kg	(1,1lb)	(17,6oz)
Electronic Control Unit (ECU):	1,0kg	(2,2lb)	(35,2oz)

## 4 Technical description

### 4.1 Functional description

#### 4.1.1 Wiper Unit

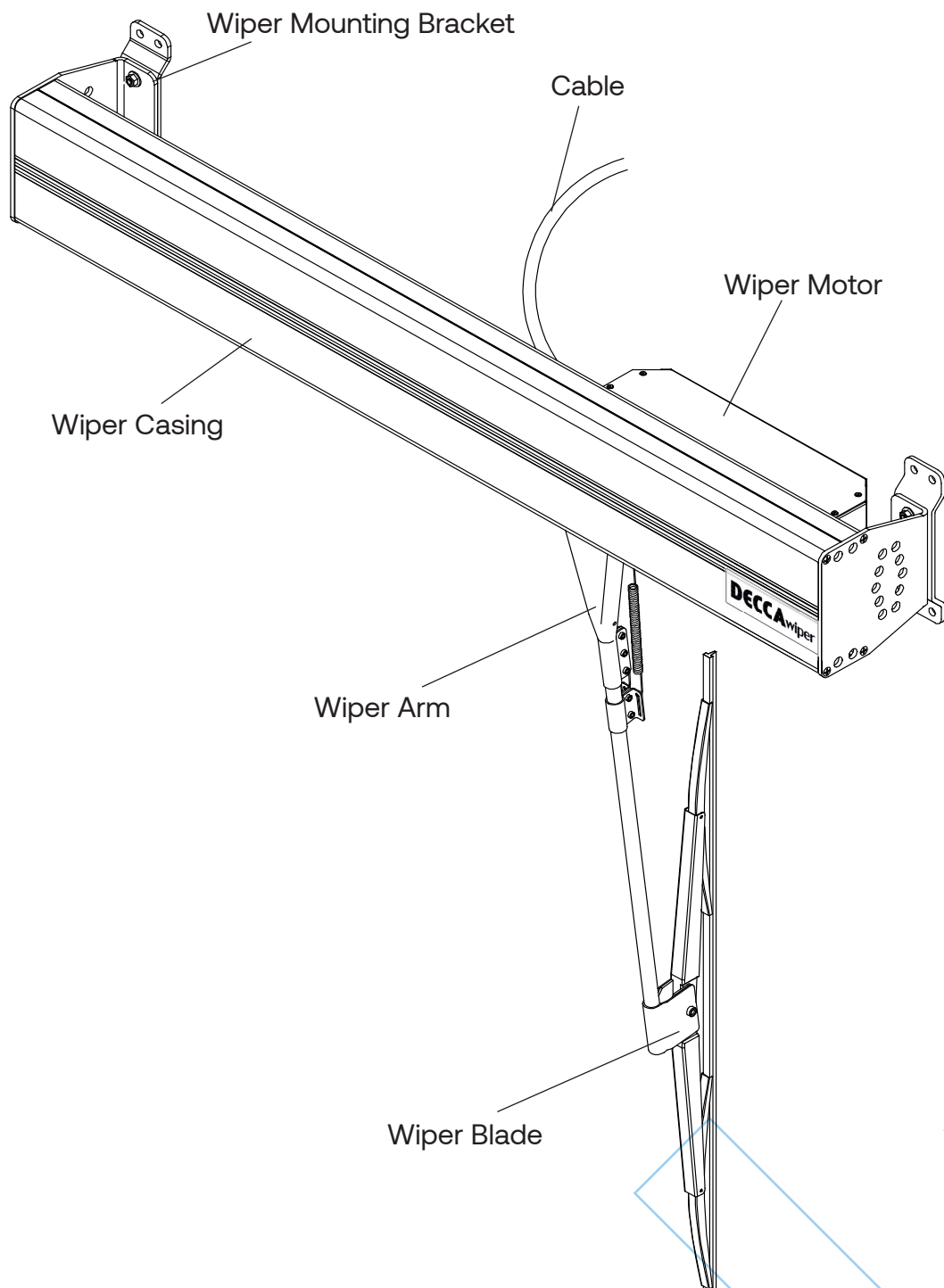


Figure 7 - Wiper Unit

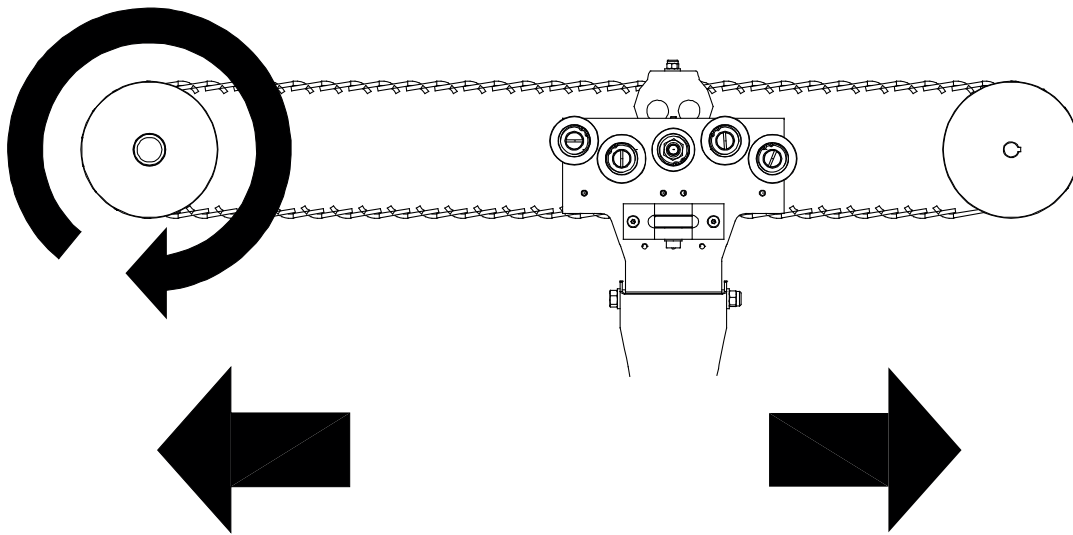


Figure 8 - Wiper Function - as viewed from front of wiper unit

#### 4.1.2 Wiper Arms

The arm is supplied in full length, and is cut to appropriate length on site. The three M4 DIN912 bolts on the upper part of the arm assembly secure the arm in correct position. This mechanism allows +/- 30mm fine adjustment of the arm length.

The wiper arm features step less spring tension adjustment by means of two springs and a spring tension clamp that is secured by two M4 DIN912 bolts.

The spring tension clamp should be positioned so that the wiper blade is pressed against the window with a force of approximately 2 kg (4 lb). See figure 9 for practical advice on spring tension adjustment.

Tension Springs

Spring Tension Clamp

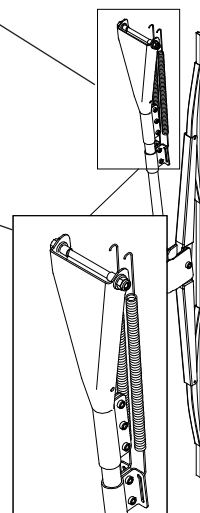
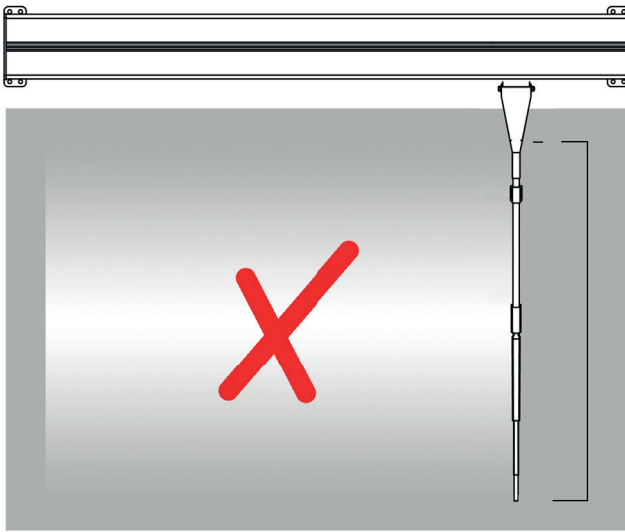
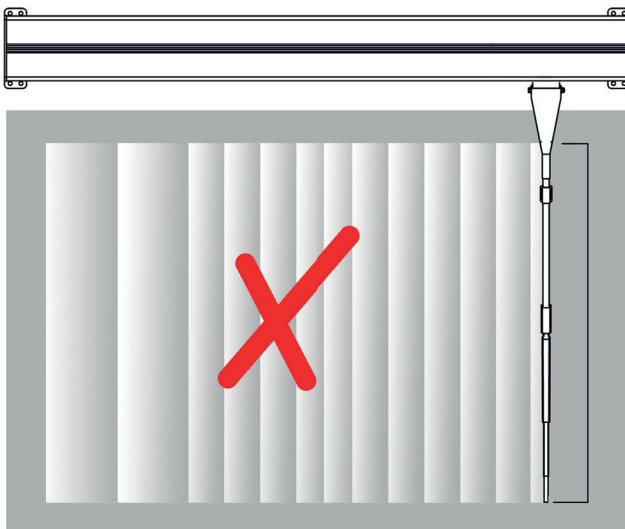


Figure 9 - Wiper Arm



Tension too low



Tension too high



Tension correctly adjusted

Figure 10 - Wiper Tension Adjustment

### 4.1.3 Thor Control Panels

The wiper system is operated from the control panel, typically mounted with good access from the operator's position. From the control panel the wiper/groups are switched on and off, and the wiper speed and intermittent settings are adjusted. Optionally the Thor control panel can be supplied for operation of water spray and air purge. AC powered versions are also supplied for control of heated wiper casings.

The Thor control panel is available in two different versions, the 12170 series with integrated ECU (Electronic Control Unit) for control of a single wiper and the 12160 series with separate ECU for control of several wipers in one or more groups.

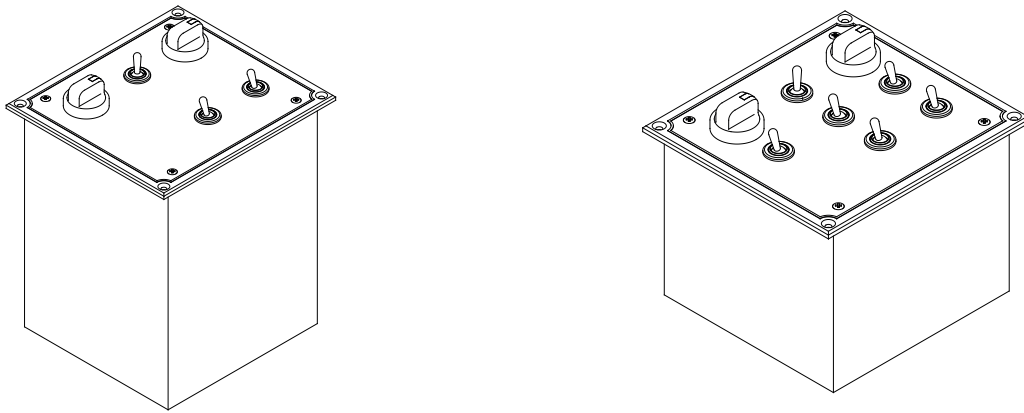


Figure 11 - Thor Control Panel 12170 series (left) and 12160 series (right)

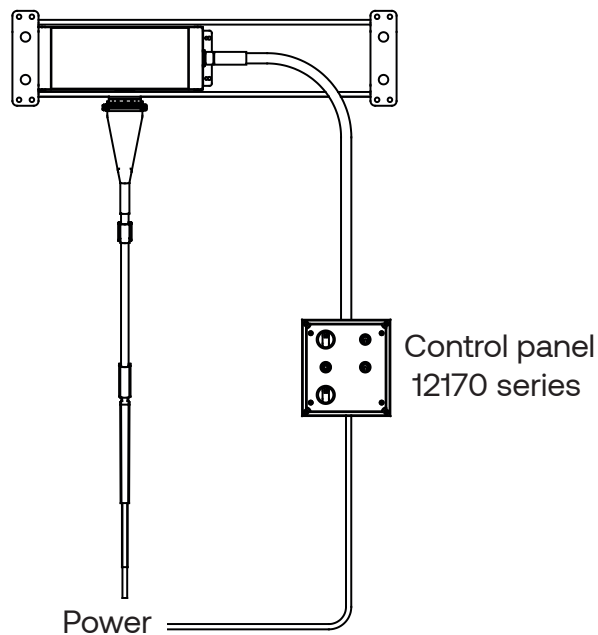


Figure 12 - Single Wiper and Control Panel

#### 4.1.4 Thor Electronic Control Unit (ECU)

When equipped with more than one wiper, each wiper is controlled by a separate electronic control unit (ECU). The ECU distributes control signals to the wiper and the optional water spray system, with input from the control panel.

The ECU has a protection grade IP20, and should be located in a well vented area where it is not exposed to excess dust or moisture. Allow at least 50mm free space on all sides.



The ECU should be placed where there is good access for future service. Placing the ECU above ceiling panels or below floor panels is therefore not recommended. Consult with your Decca supplier for practical advice and project specific solutions.

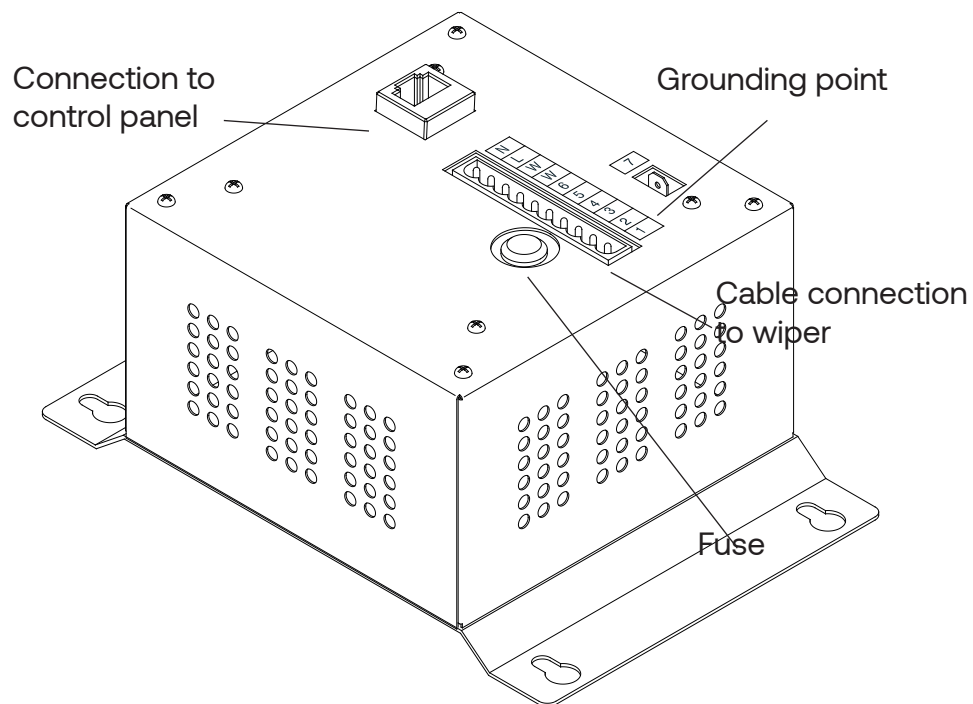


Figure 13 - Thor Electronic Control Unit 12157

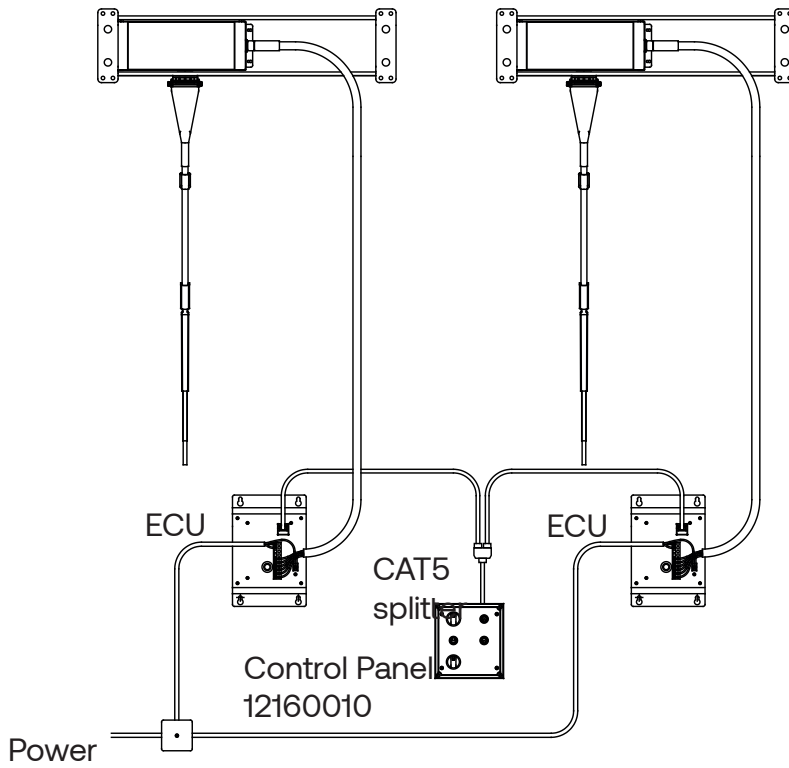


Figure 14 - Wipers/Groups operated in parallel

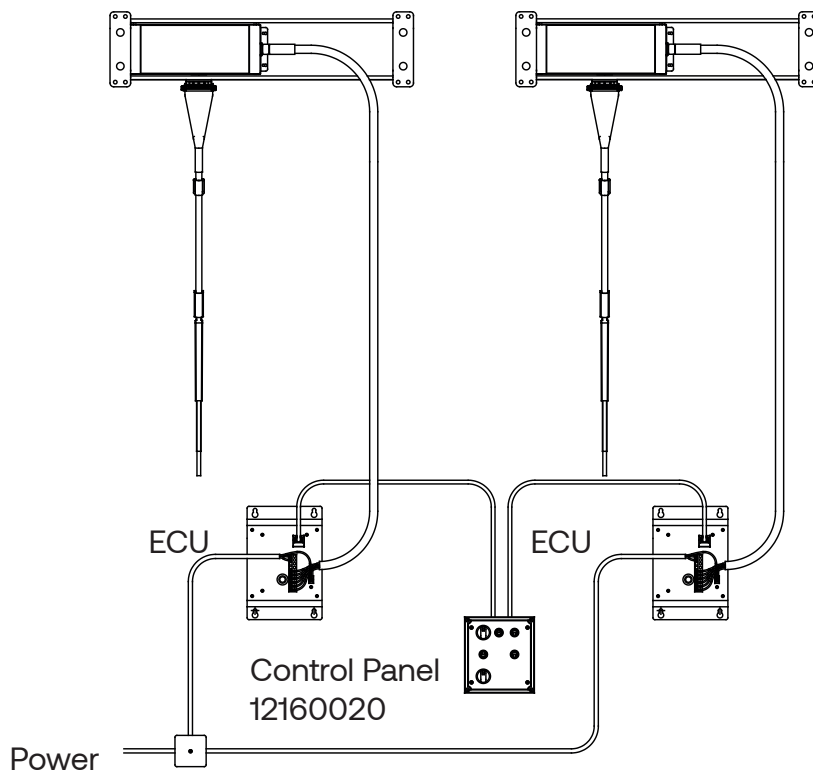


Figure 15 - Up to four Wipers/Groups, separate Operation



## 4.2 Typical installations

A standard wiper installation features a single arm wiper unit that is mounted above or below the window frame. See examples in figure 16.

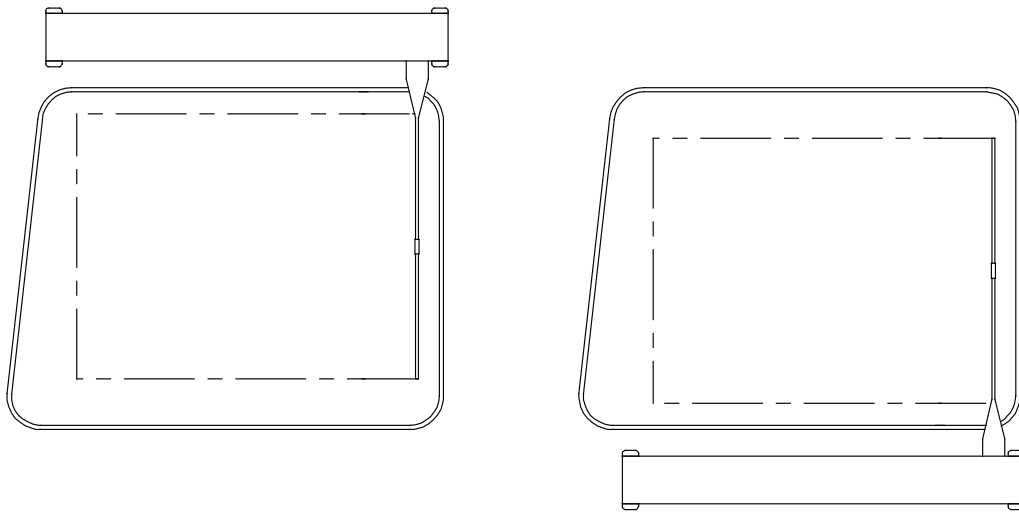


Figure 16 - Single Wiper Installation Layouts

Taller windows require two wipers to ensure maximum visibility, where one wiper unit covers the upper part and the other covers the lower part of the window. See example in figure 17, left side. Optionally, the wiper unit can be supplied with two wiper arms. The dual arm wiper unit can either be configured to cover one large window, or two smaller adjacent windows. See examples in figure 17, right side.

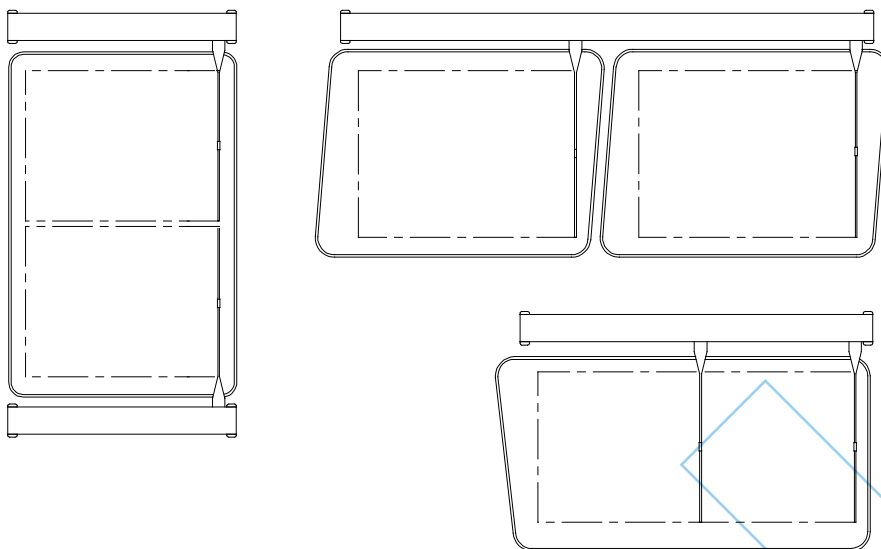


Figure 17 - Dual Wiper Installation Layouts

### 4.3 Water Spray System (option)

Decca wipers can be equipped with an optional water spray system that consists of 12mm OD piping and nozzles, all in stainless steel (316L). The water spray system can be installed onto the wiper mounting brackets, or directly onto the bulkhead.

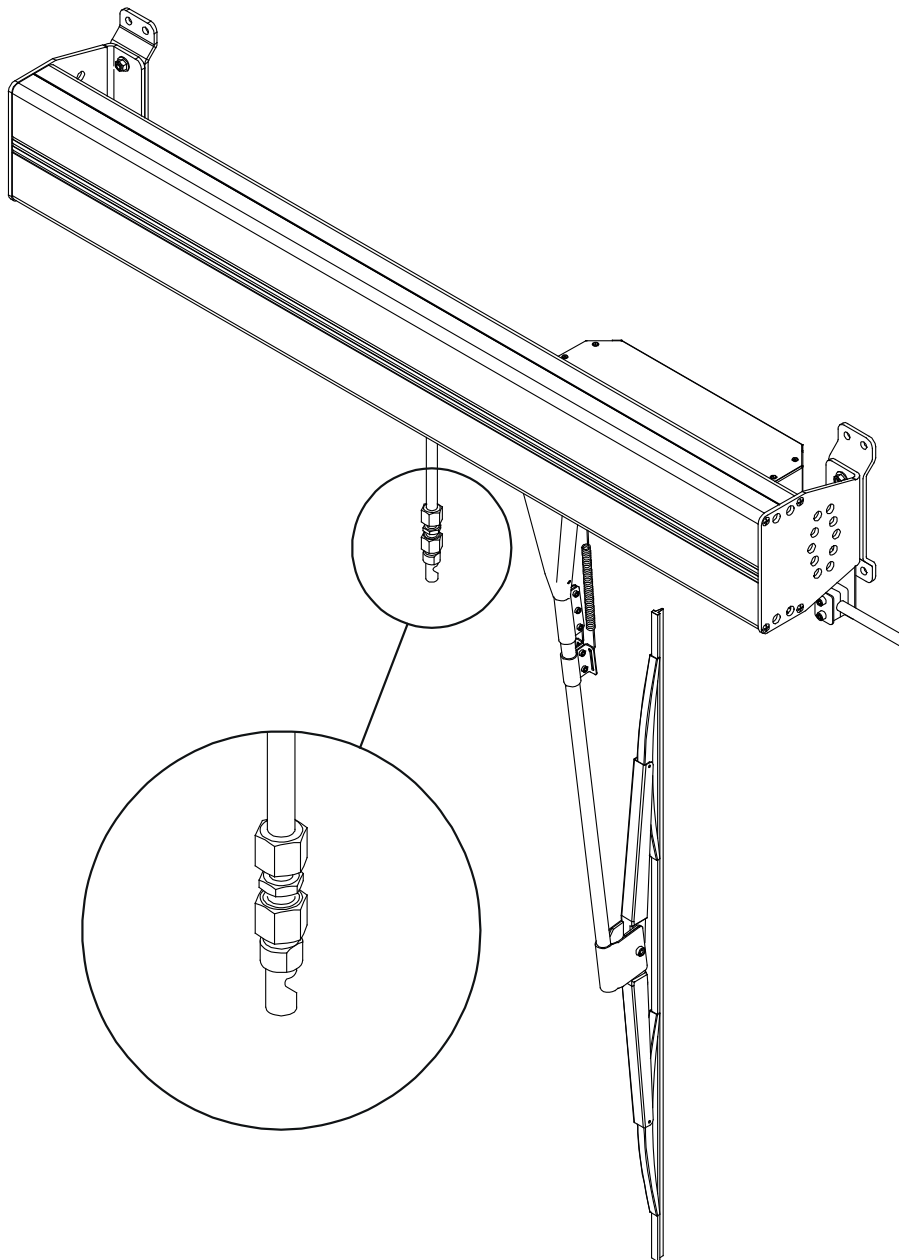


Figure 18 - Water Spray System

### 4.3.1 Air Purge System

To prevent trapped water from freezing inside the water spray piping at sub zero temperatures, the Decca wipers can be equipped with an air purge system. The system comprises two solenoid valves and an electronic valve controller with a programmable timer function. Air is supplied from the ship's compressed air system.

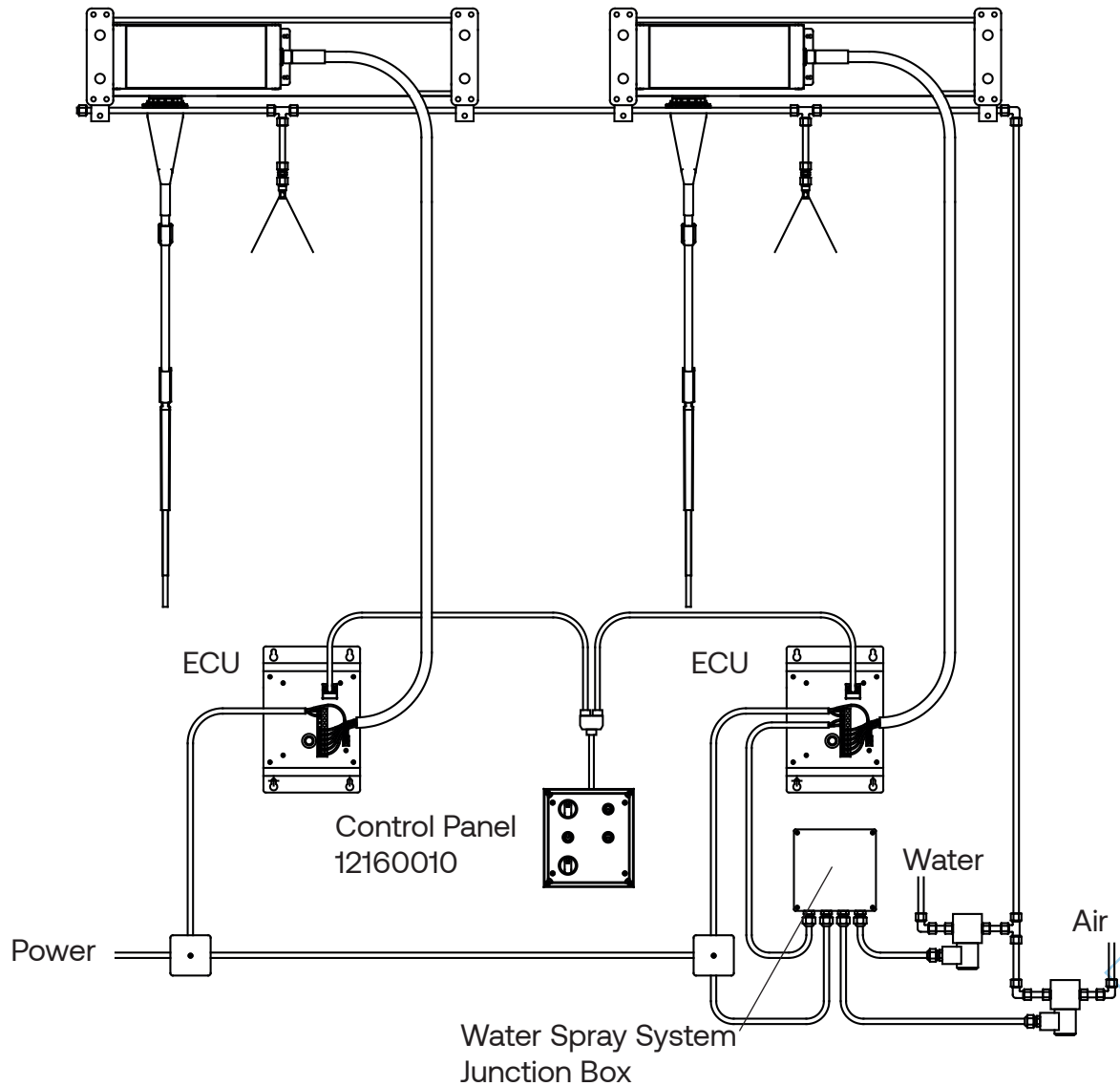


Figure 19 - Water Spray System with Air Purge

## 5 Installation procedure

### 5.1 Location of Wiper unit brackets

The wiper unit is equipped with two fixing brackets. The brackets can either be welded or bolted to the bulkhead. Note that the standard brackets are made of aluminium, but mild steel brackets can be ordered as an option.

Check the distance between the mounting holes on the end covers of the wiper unit compared with measurements given in Figure 20.

The wiper casing should be placed as close to the window frame as possible. Please consult your Decca supplier for project specific CAD drawings.

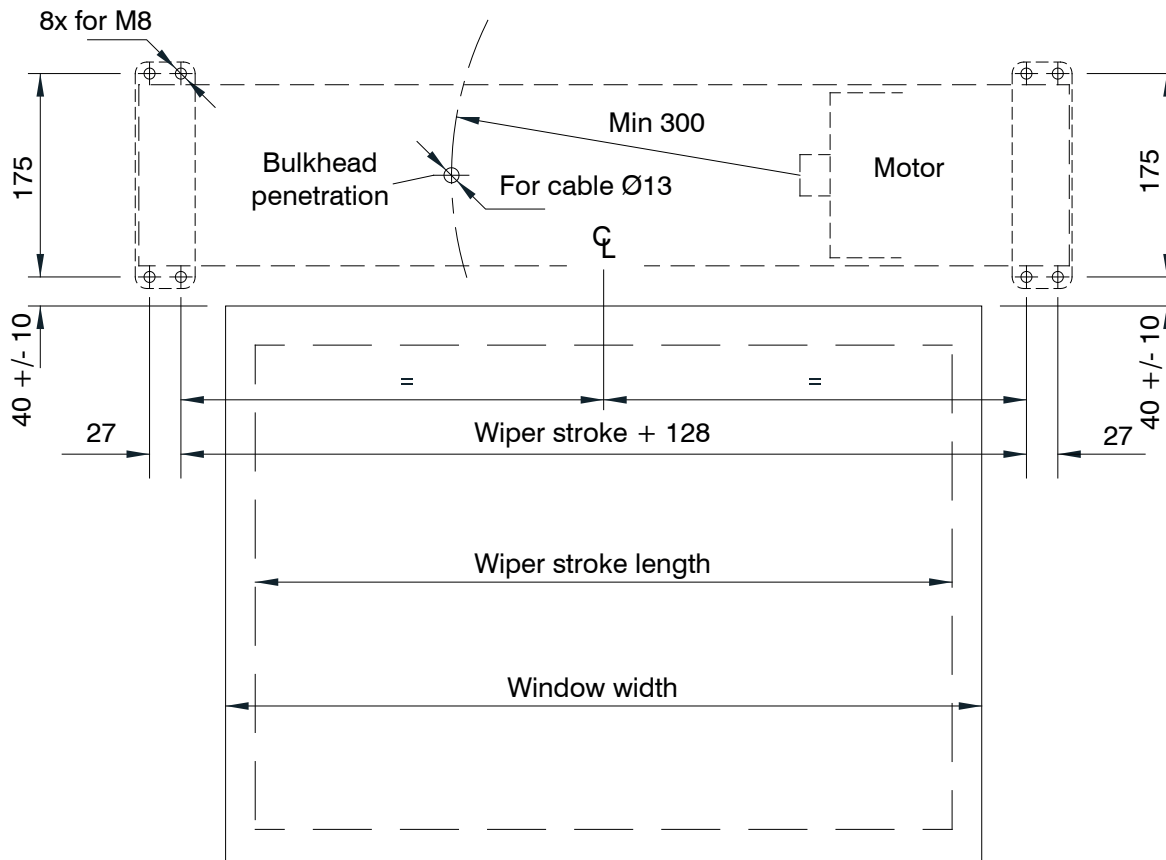


Figure 20 - Wiper Unit Footprint (all measurements in mm)

## 5.2 Bulkhead penetration

It is important to minimize the tension on the cable and the connector. In order to obtain an optimal location of the bulkhead penetration the hole should be drilled according to the dimension given in figure 20. The cable has an OD of 13mm. The cable gland for bulkhead penetration is not supplied, and must therefore be sourced by installer.



**Avoid sharp bends or edges, the minimum cable bending radius is 75mm. Protect the connectors from water during installation.**

## 5.3 Wiper Casing

The wiper unit is mounted to the brackets after installation of cable. The wiper unit is bolted to the brackets using carriage bolts for easy fitting and removal, secured with washers and self locking nuts.

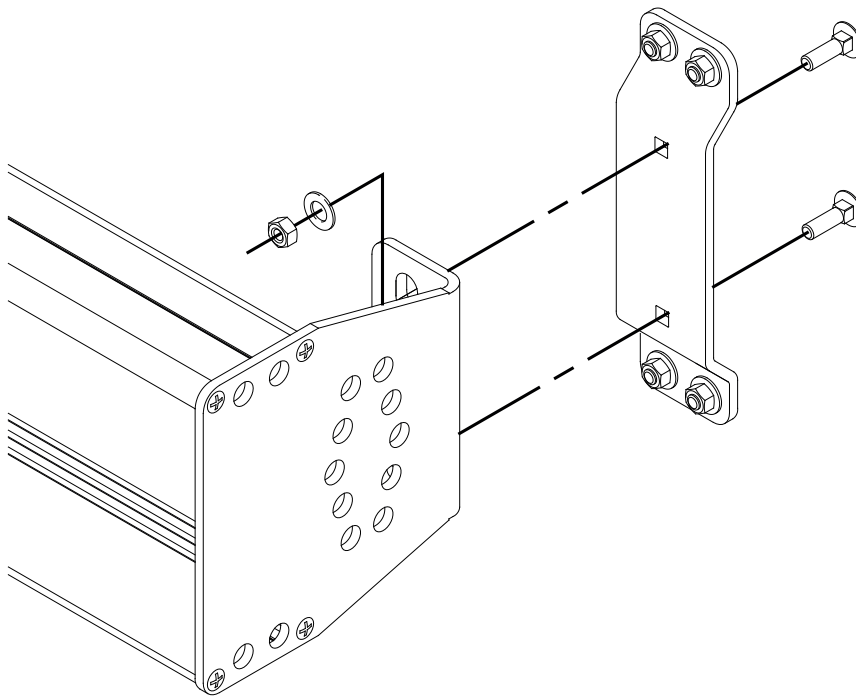


Figure 21 - Wiper Casing Mounting

## 5.4 Cable connections

### 5.4.1 Wiper Unit Cable Connector

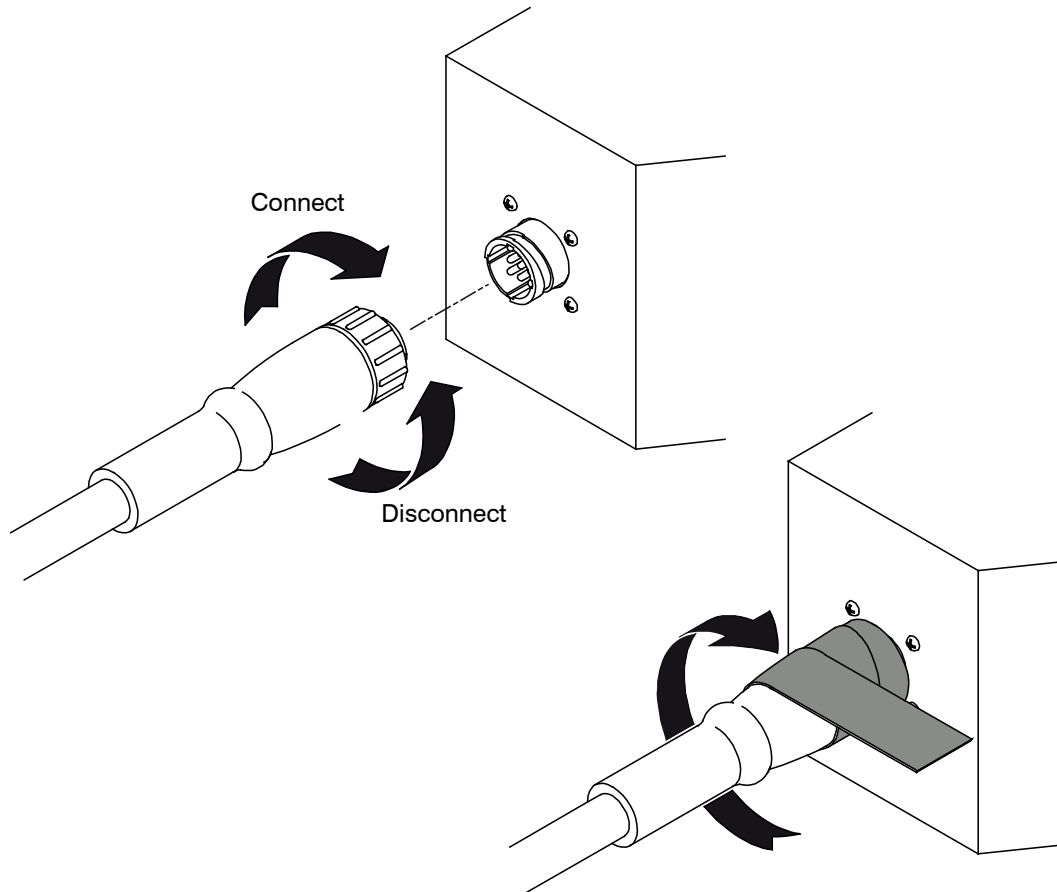


Figure 22 - Cable Connection

Rotate the cable connector to enter the guides in the mating connector. Secure by twisting the outer lock ring clockwise until it clicks into locked position. To form a waterproof connection, tape the connection with self-healing tape: Scotch® Professional Grade Silicone Rubber Tape #70, or similar.



**Always make sure that power is switched off before doing any kind of maintenance to the electric circuits**



**The cable connector should only be twisted by hand. Use of tools and excessive force will damage the connector**

### 5.4.2 Electronic Control Unit (ECU) Cable Connection

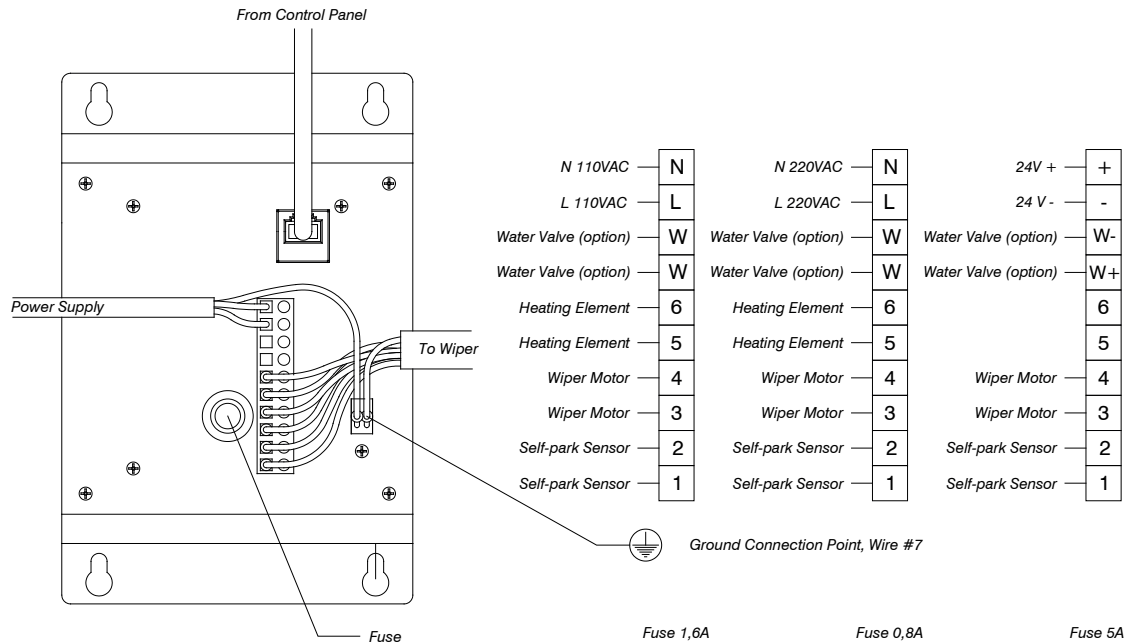


Figure 23 - ECU Cable Connections



**Wires #1 to #7 are already connected to different functions inside the wiper unit, and should be connected to the ECU according to the illustration above to function properly.**

Cut the cable from the wiper unit to a suitable length, and remove 50 to 100mm of the cable sheath, armour and bedding. The wiper cable contains four pairs, and each pair is marked with their respective pair number. Remove the plastic coated aluminium tape and separate the pair screens from conductors. Notice that the wires is marked with numbers 1 to 8. Cable #8 is not used for this application, and can therefore safely be removed.

### 5.4.3 Wiper Control Panel

The 12170 series wiper control panel is connected directly to the to the wiper/wiper group with a termination like that of the ECU.

The 12160 series wiper control panel is connected to the ECU through a CAT5 FTP data communication cable.

### 5.4.4 Water spray system junction box wiring

The optional water spray/air purge system is connected to the ECU via a junction box. The signal and power distribution are connected as illustrated below.

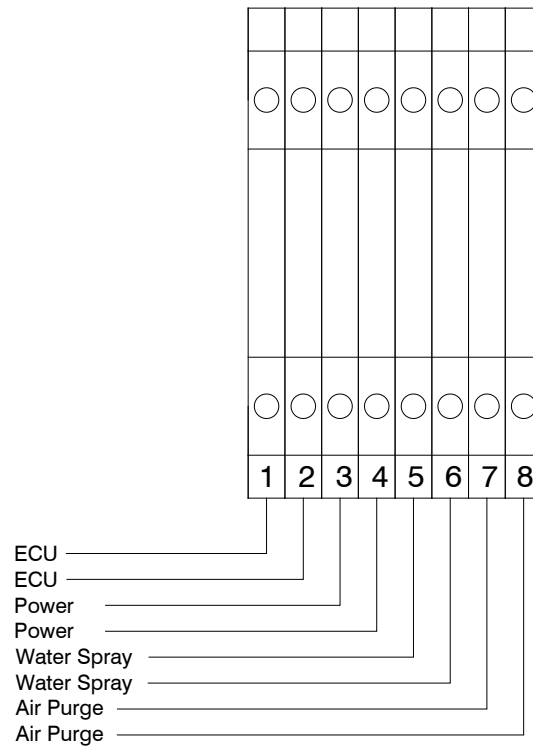


Figure 24 - Water spray system junction box wiring



**Always make sure that power is switched off before doing any kind of maintenance to the electric circuits.**



## 6 System Operation

### 6.1 Wiper Control Panel

The wiper(s) are controlled from the control panel which has a number of toggle switches in addition to two analog controls. The toggle switches control individual wipers or wiper groups, from one up to five. The switches are marked **W1** up to **W4**.

In position **ON** (switch up) the wiper/wiper group is running continuously.  
In position **INT** (switch down) the wiper/wiper group is running in intermittent mode.

The analog adjustment **SPEED** controls the wiper speed. Rotate clockwise to increase the speed.

The analog adjustment **TIME** controls the intermittent time between each wiper stroke. Rotate clockwise to decrease the time delay.

The two position toggle switch **HEATER** activates the de-icing heater element in each wiper casing when switched in up position.

The spring return toggle switch **WATER** activates the water flushing when switched in up position. The water solenoid valve is open for as long as the **WATER** switch is held in up position.

If the Decca Air Purge module (OPTION) is installed, the solenoid valve for compressed air will automatically open for 30 seconds upon release of the **WATER** switch (see chapter 4.3.1 Air Purge System).

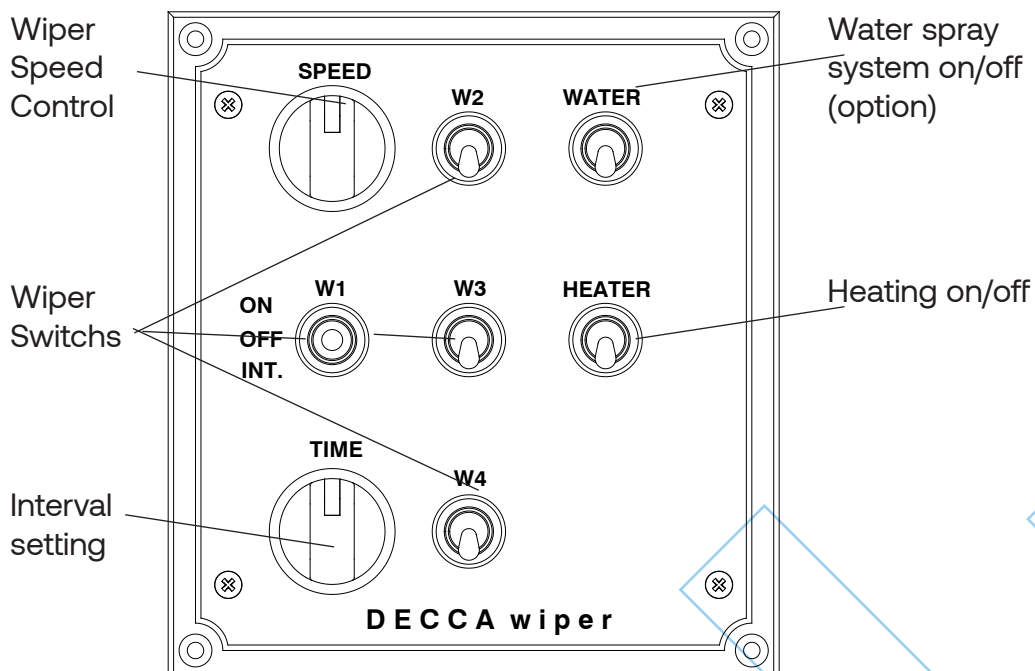


Figure 25 - Wiper Control Panel

## 7 Spare Parts

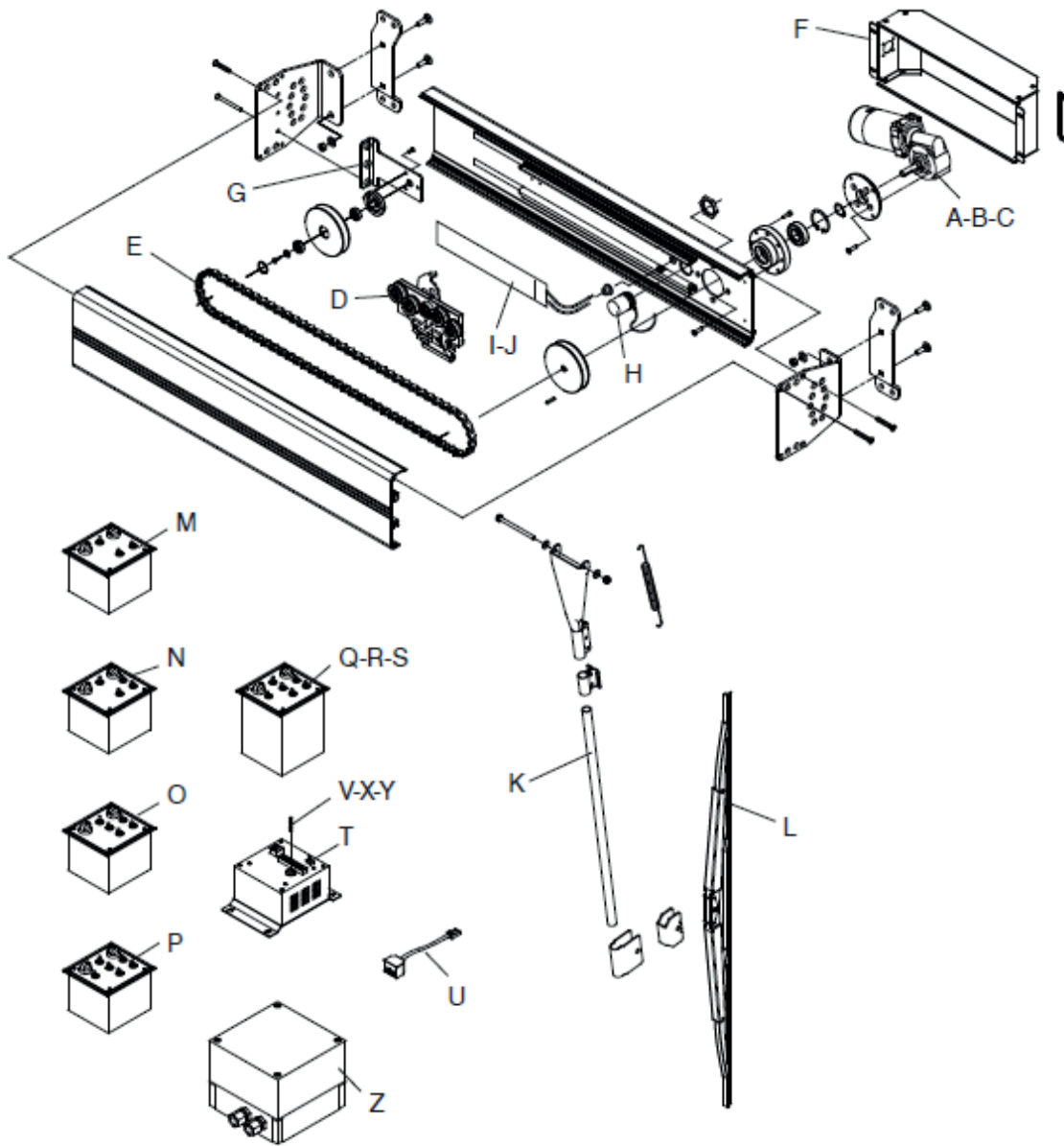


Figure 26 - Spare Parts

Identification	Description	Remarks	Decca No.
	<b>Wiper Unit</b>		
A	Motor Complete PM4 220VAC		81000141
B	Motor Complete PM5 110VAC		81000132
C	Motor Complete PM5 24VDC		81000133
D	Carriage Standard Complete		81000001
E	Drive belt A-profile	Sold by meters	10570105
F	Motorcover With Plug		81000005
G	Drive Belt Tension Bracket		81000022
H	Parksensor NBN15-30GM40-ZO/ 088214	220V and 110V	50102001
I	Heater tape 250mm single 50W 220VAC		50103111
J	Heater tape 250mm single 50W 110VAC		50103112
	Heater tape 250mm single 50W 24VDC		50103113
	<b>Wiper Arms and Blades</b>		
K	Wiper Arm (50-70cm blade)max L-arm=730mm		81000007
K1	Wiper Arm (80-120cm blade)max L-arm=730mm		81000008
	Wiper Wiper arm XL, adjustable - max L-arm=880mm		81000025
L1	Wiper Blade 500 mm		10500500
L2	Wiper Blade 600mm		10500600
L3	Wiper Blade 700 mm		10500700
L4	Wiper Blade 800mm (16 mm fixing)		10500800
L4.1	Wiper Blade 800mm (21 mm fixing)		10500801
L5	Wiper Blade 900mm		10500901
L6	Wiper Blade 1000mm		10501001
	Wiper Blade 1200mm		10501201
	All blades: Min. 400mm to Max. 1200 mm		
	16 mm fixing from 400mm to 800mm blades		
	21 mm fixing from 800 mm blades and up		
	<b>Control Panels</b>		
M	Thor Control Panel for 1 Group		12160010
N	Thor Control Panel for 2 Group		12160020
O	Thor Control Panel for 3 Groups		12160030
P	Thor Control Panel for 4 Groups		12160040
	Thor Control Panel for 5 Groups		12160050
Q	Thor Control Panel with ECU 220VAC		12170001
R	Thor Control Panel with ECU 110VAC		12170002
S	Thor Control Panel with ECU 24VDC		12170003
	Thor control panel with ECU is no longer produced.		
	Panel and ECU are sold seperately.		
	<b>Electronic Control Unit</b>		
T1	Thor Power Supply Unit 220VAC		12157001
T2	Thor Power Supply Unit 110VAC		12157002
T3	Thor Power Supply Unit 24VDC		12157003
	<b>Other parts</b>		
U	Patch splitter 1xRJ45F - 2xRJ45F		50400001
V	Fuse TR5 1,25A Time Delay, 220VAC		50508012
X	Fuse TR5 1,6A Time Delay, 110VAC		50508008
Y	Fuse TR5 5A Time Delay, 24VDC		50508013
Z1	Thor Air Purge module 220VAC		12233001
Z2	Thor Air Purge module 24VDC		12233003
	Thor Air Purge module 110VAC		12233012
	Cable w/connector 5 MTR		81000205
	Cable w/connector 10 MTR		81000210
	Cables W Conn. can be delivered in tailored lengths		

## 8 Warranty

Standard warranty is 12 month from delivery from shipyard to ship owner, or 24 months from delivery to shipyard, whichever comes first.

Wiper blades are not covered by the warranty.

## 9 Trouble shooting

### Trouble shooting Thor module:

1. Turn off main fuse in cabinet and pull out plug from PSU before measuring
2. Test fuse TR5 on PSU.
3. Measure resistance on plug for wiper cable (not PSU) between:
 

Pin 1-2, normal 1,1-1,7 MOhm	Park sensor
Pin 3-4, normal 16-50 Ohm	Motor +/-
Pin 5-6, normal 150 Ohm-1 KOhm	Heater
4. Measure resistance between (Fluke can be used, however, merging is recommended):
 

Pin 3-4 and ground	Normal infinite
Pin 5-6 and ground	Normal infinite

### If all values are normal and Wiper does not RUN or PARK:

Motor card defect

### Resistance between Pin 1 and 2 lower than 10 MOhm (Wiper doesn't park):

Parking sensor defect

### Resistance between Pin 3 and Pin 4 lower or higher than 16 - 50 Ohm:

Motor defect

### Resistance between Pin 3 and Ground, Pin 4 and Ground, Pin 5 and Ground or Pin 6 and Ground is NOT infinite:

Plug on Wiper unit defect or wires inside motorcover are defect or water intrusion in motor or heater is defect.

## Contact

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