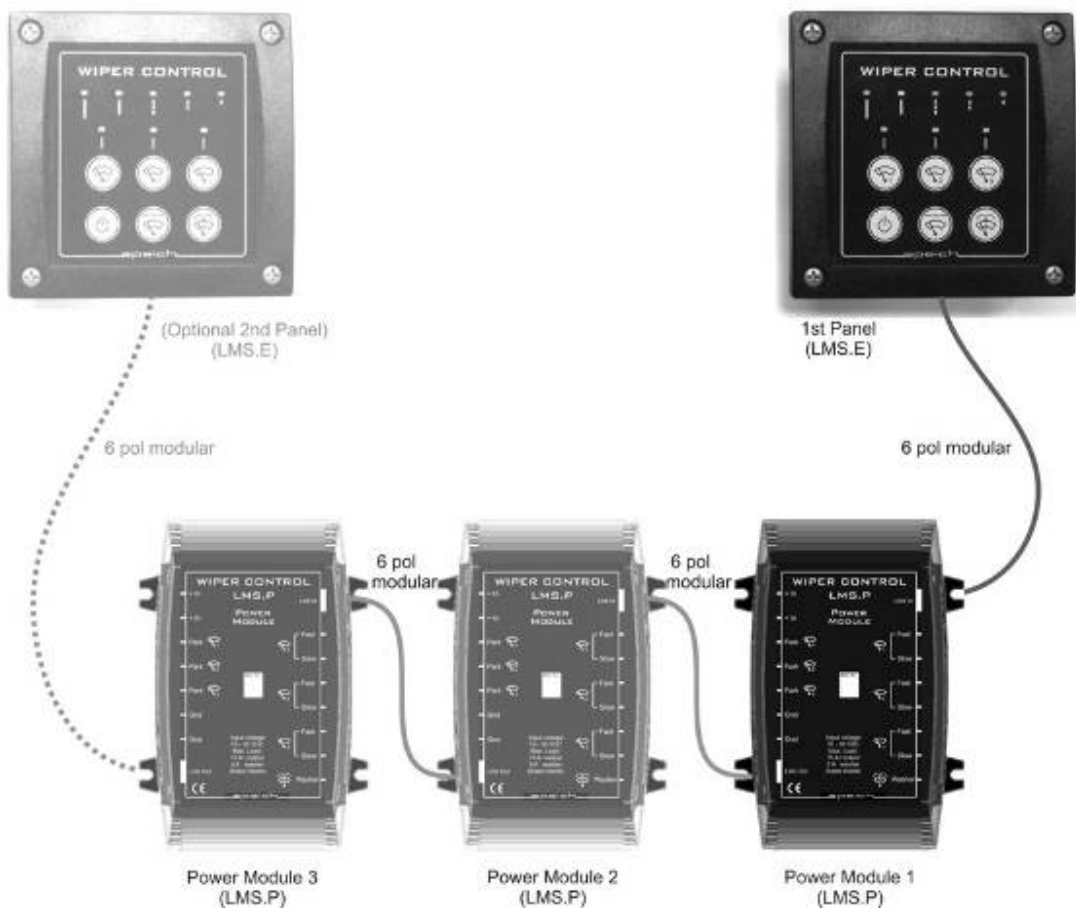


Modular Wiper Control

LMS

Installation and operation manual



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CONTENT:

1 PRODUCT DESCRIPTION	4
1.1 Package content	4
2 OPERATION	5
2.1 Explanation wipe program led bar display (yellow)	5
2.2 Explanation group-status led bar display (green)	5
2.3 Group switches	6
2.4 On/Off switch	6
2.5 Wipe program switch	6
2.6 Washer program switch	6
2.7 One or two panels	6
3 FUNCTION POWER MODULE.....	7
3.1 Explanation of the power module	7
3.2 Protections	7
3.3 Park terminals	7
3.4 High speed terminal	7
3.5 Low speed terminal	8
3.6 Washer terminal	8
3.7 + In terminal	8
3.8 Gnd terminal	8
3.9 Link connectors (modular Rj12)	8
4 INSTALLATION	9
4.1 Installation Power Module	9
4.2 Installation control panel(s)	10
4.3 System initialization	11
5 DIMENSIONS	12
6 CONNECTION DIAGRAMS.....	13
7 TROUBLESHOOTING	17
8 TECHNICAL INFORMATION	18
8.1 Technical specifications of the power module	18
8.2 Technical specifications of the control panel	18
9 CE DECLARATION OF CONFIRMITY.....	19

1 PRODUCT DESCRIPTION

The modular wiper control system (LMS) consists of two basic components; The Power Module and the control panel. The modular system is very flexible because it can be expanded depending upon the number of wipers installed. The system can be expanded to a maximum of 3 power modules (max.9 wipers) and two control panels.

The modular wiper control is developed for “heavy duty” wiper motors, the Speich LP type motor. Also smaller wiper motors can be installed, if they are equipped with one speed and self parking function or two speeds and self parking function.

The system contains an intelligent washer program and a total of five wipe programs. The washer program will pre-wash the windscreens, wash and wipe and then wipe three times to dry up the windscreens. The five wipe programs are:

- High speed synchronized;
- Low speed synchronized;
- Low speed, interval 2.5 sec;
- Low speed, interval 5.0 sec;
- Low speed, interval 10 sec;

The wiper movement is synchronized at all speeds!

For the power control of the system ‘solid-state’ switching techniques are used. This means there are no moving parts and therefore no noise is coming from the electronics. Also there is no wear and tear of relays, which will increase the expected lifespan of the electronics used for the Modular wiper control.

The modular wiper control system operates on a supply voltage between 10 – 30 V DC.

1.1 Package content

The package consists of:

- This manual;
- Wiper control, power module;
- Wiper control, control panel;
- Rj12 modular cable (5m);
- 4 stainless steel M4 bolts + nuts;
- 4 stainless steel screws.

2 OPERATION

The LMS system can be controlled by means of one or two installed control panels. In chapter 4 the installation of the modular system is explained.

2.1 Explanation wipe program led bar display (yellow)

The yellow wipe program led's show the active wipe program. When the 'high speed' program is active, the yellow led to the left is on. The functions of the yellow led's: (from left to right)

- High speed synchronized
- Low speed synchronized
- Low speed, interval 2.5 sec
- Low speed, interval 5.0 sec
- Low speed, interval 10 sec

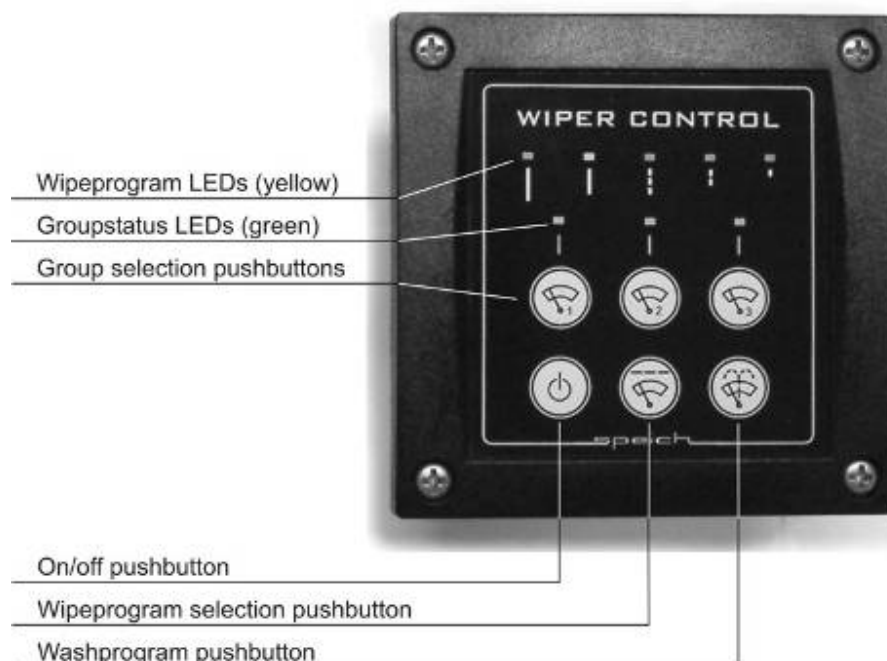
When the washer program is activated these yellow led's will indicate this by a "running light"
If a "low liquid level" switch is connected to the

control panel and a low liquid level is detected when the washer program is started, all yellow led's will flash for 5 sec. and a signal can be heard. After this the active program is indicated again.

2.2 Explanation group-status led bar display (green)

The green group status led's does indicate the active wiper group(s) and also the power module status. (The status is only indicated when the power module is installed)

When one of the power modules in the system detects low battery voltage, wiper motor malfunction or even a faulty connection, the green led - with the same module number - will flash for 5 sec. This is repeated until the fault is removed from the power module. In case of a faulty connection, the system must be disconnected from the batteries during repair.



Picture 2.1: 'Front view control panel'

2.3 Group switches

With the 3 group switches the corresponding groups can be switched on and off. The green led's above the numbered switches indicate the active wiper group(s).

2.4 On/Off switch

With this switch the system can be switched on and off. If the washer program is running when this switch is operated, the washer program will be terminated.

2.5 Wipe program switch

When this switch is operated repeatedly, the desired wipe program can be activated. The active wipe program is indicated by one of the yellow wipe program led's.

2.6 Washer program switch

When the system is off and the washer program is activated by pressing the washer program switch, the system will start a wash and wipe program. The program executes a pre-wash then wash and wipe and concludes with three wipe movements to dry up the windscreens.

When the system is on and the washer program is activated, the system will wash and wipe three wipe movements.

2.7 One or two panels

The modular wiper control system is installed with a minimum of 1 control panel, following the installation directions in chapter 4.

A 2nd control panel enables the user to control from another position.

In case 2 panels are installed in the correct way, the functionality of both panels will

automatically be the same. Please follow the installation directions in chapter 4.

3 FUNCTION POWER MODULE

The function of the power module is handled in this chapter. The installation of the power module is explained in chapter 4.

3.1 Explanation of the power module

The supply voltage of the system coming from the batteries is connected to the power module(s). The module detects the nominal supply voltage 12 / 24 V at initialization. All wiper motors and washer pumps or valves must have to operate with the same nominal voltage 12 / 24 V

The control panel is connected to the first power module with a 6 pole RJ12/RJ12 cable of 5 meters. All information about the active programs or failures is displayed on the control panel. The power modules are also controlled from the control panel.

3.2 Protections

Inside the power module a number of blade fuses are positioned. All outputs are protected by a 10A ATO blade fuse and the washer

output is protected by a 5A ATO blade fuse. If a fuse must be replaced after an overload of any kind, one of the plastic side panels can be removed by an experienced person. After removing the side panel the front plate can be removed to be able to reach the fuses. (see picture 6.5: 'Internal fuses power module')

3.3 Park terminals

The park connection of the wiper motor has to be connected to the park connection on the power module

3.4 High speed terminal

The high speed output must be connected to the high speed connection of the wiper motor. For when the wiper motor has got two speeds.

CAUTION!

Do not exchange the 'slow' and the 'fast' connections.



Picture 3.2: 'Power module front view'

3.5 Low speed terminal

The low speed connection of the power module has to be connected to the low speed connection on the wiper motor.

CAUTION!

Do not exchange the 'slow' and the 'fast' connections.

3.6 Washer terminal

The washer pump / valve can be connected to the washer terminal.

3.7 + In terminal

The power supply + has to be connected to one of the two + in terminals. These terminals are internally connected to each other. The second + in terminal can be connected to the next power module.

3.8 Gnd terminal

The ground of the power supply has to be connected to one of the two gnd terminals. These two gnd terminals are internally connected to each other. The second gnd terminal can be connected to the next power module.

3.9 Link connectors (modular Rj12)

The link in and out connectors can be used to connect the control panel and the power modules. This is a standard 6-pole RJ12 connector.

4 INSTALLATION

Make sure the batteries are disconnected before installation of the system. Also make sure the nominal voltage of all wiper motors, valves and pumps are the same as the nominal battery voltage 12 / 24 V. Use proper wiring with sufficient copper diameter to prevent malfunction of the system in normal operation. Use quality tools to make the crimp connections to the wiring. Only use wiper motors of the same brand and type to ensure a smooth operation of the system.

Note:

When wiper motors are very cold or have not been used for a long period of time, synchronization of the wipers may not work for several wiper movements. After a short period the movement of all wipers should be synchronized.

Safety measures:

- Use wiring with sufficient copper diameter;
- Install the system in a dry and well ventilated space;
- NEVER use the system on locations where any danger of explosions exists;
- Use the connections and protections according to the appropriate regulations;
- Make sure the system is installed with a main fuse in the supply line;
- Check the wiring and connections at least once a year and replace doubtful wiring immediately;
- The manufacturer of this product does not accept any responsibility for damage of any kind, caused by the use of the product.

4.1 Installation Power Module

Mount the power module on a flat and solid base. Make very sure all connections are made properly and only use quality tools.

4.1.1 Connect the supply voltage

Make sure the supply current from the batteries is transferred to the system through wiring with sufficient copper diameter. The starting currents of the wiper motors can run up to 35 Amps. each. Use the same diameter for the + and – battery connection. Connect + battery 12 / 24 V to 1 of the + connections on the power module and connect the ground of the battery to 1 of the ground terminals (GND) of the power module

The 2nd + and GND terminals on the power modules can be used to connect the next power module to the batteries, without the need of extra wiring coming from the batteries.

4.1.2 Connect the wiper motors

Up to 3 wiper motors can be connected to a single power module. The modular wiper control is developed for “heavy duty” wiper motors, the Speich LP type motor. Also smaller wiper motors can be installed, if they are equipped with one speed and self parking function or two speeds and self parking function. When use of the high speed function of some wiper motors is not advisable, simply do not connect this wire to the power module.

Connect the self parking or “park” wire of wiper motor 1 to the park 1 terminal on the power module. (see Picture 6.3: *Wiper motor 1 connections to the power module.*) Connect the high speed or “fast” wire of wiper motor 1 to the fast 1 terminal on the power module. Connect the low speed or “slow” wire of wiper

motor 1 to the slow 1 terminal on the power module. Connect wiper motor 2 and 3 in the same order. The ground terminal of each wiper motor must be connected to a common ground terminal in the installation.

4.1.3 Connect the washer pump or valve

A water pump or electric mechanical valve can be connected to the washer output on the power module. This output can supply a continuous current of 5A max. The ground terminal of the water pump or valve must be connected to a common ground terminal in the installation.

(see Picture 6.4: 'Washer connection')

4.1.4 Power modules 'linked'

A maximum of 3 power modules can be linked in the modular wiper control system. A 5 meter RJ12/RJ12 6pole cable is supplied for the link between all power modules and control panel(s). The connections are indicated in picture 6.1: 'Possible configurations' and in picture 6.2: 'Example of supply voltage connection'. It is very important to follow the "link in" and "link out" directions accurately.

Control panel 1 - Power module 1:

Connect a RJ12/RJ12 cable between 'Link' on control panel 1 and 'Link in' on power module 1.

Power module 1- Power module 2:

Connect a RJ12/RJ12 cable between 'Link out' on power module 1 and 'Link in' on power module 1.

Power module 2- Power module 3:

Connect a RJ12/RJ12 cable between 'Link out' on power module 2 and 'Link in' on power module 3.

Power module 3 – Control panel 2:

Connect a RJ12/RJ12 cable between 'Link out' on power module 3 and 'Link' on control panel 2.

All supplied RJ12/RJ12 cables are 1:1 pre-wired and 5 meters long. If necessary the cable can be shortened. The advised maximum cable length is 10 meters.

4.2 Installation control panel(s)

Install the control panel(s) on a suitable position. The diameter for mounting hole of the panel is 75mm. Mount the panel with the screws or bolts supplied with the modular wiper control system. Remove the panel on the back of the control panel housing and connect the cables.

4.2.1 One or two control panel installation

The system can be controlled with either one or two control panels. In larger installations or in case of 2 steering positions a 2nd control panel is installed. In case of only one control panel, no adjustments are made during installation. In case of 2 control panels, the 2nd control panel connected to "link out" of power module 1, 2 or 3, a jumper setting must be made. The jumper called "control panel" at the back of the electronics of the panel must be set to position 2. (Picture 6.6: 'Control panel connections')

4.2.2 Connect the control panel(s)

Control panel 1 is connected to "link in" of power module 1 with the RJ12/RJ12 cable. The cable is used for the communication between all modules of the modular wiper control system and also the supply voltage for the panel is drawn from it. The optional 2nd

control panel is connected to “link out” of power module 1, 2 or 3 (the last power module) with an RJ12/RJ12 cable. (Picture 6.6: *‘Control panel connections’*)

4.2.3 Connect the ‘low liquid level switch’

On the back of the electronics of the control panel a faston terminal for the low liquid level switch is positioned. Connect the “normally open” switch of the water tank to this terminal. Connect the other side of the switch to a common ground terminal in the installation.

When the washer program is activated on the control panel and the switch is closed because a low liquid level is detected, all yellow led’s will flash for 5 sec. and a signal can be heard. After this “low liquid level alarm” the active program is indicated again. (Picture 6.6: *‘Control panel connections’*)

4.2.4 Connect the “foot” switch

On the back of the electronics of the control panel a faston terminal for the “foot” switch or other external pushbutton switch is positioned. Connect the “normally open” switch to this terminal. Connect the other side of the switch to a common ground terminal in the installation. When the switch is operated when the system is off or when one of the interval programs is active, all connected wipers will have 1 wipe movements. After the last wiper movement the previously active program is indicated again. (Picture 6.6: *‘Control panel connections’*)

4.3 System initialization

When the supply voltage coming from the batteries is connected to the system, it will automatically detect the system voltage 12 / 24 V. Also a full automatic initialization of the

system will determine the amount of power modules (1 – 3) and control panels (1 – 2) have been connected in the modular wiper control system.

4.3.1 Group configuration option

The standard group configuration can be adapted after initialization. The group configuration option only works when more than 1 power module is connected to the system. This option enables the possibility to install the power modules closest to the wiper motors. Very long wiring can be prevented with this option. By pressing the wiper group 1 switch for more than 10 sec. the group configuration is changed. A signal confirms the change of this setting.

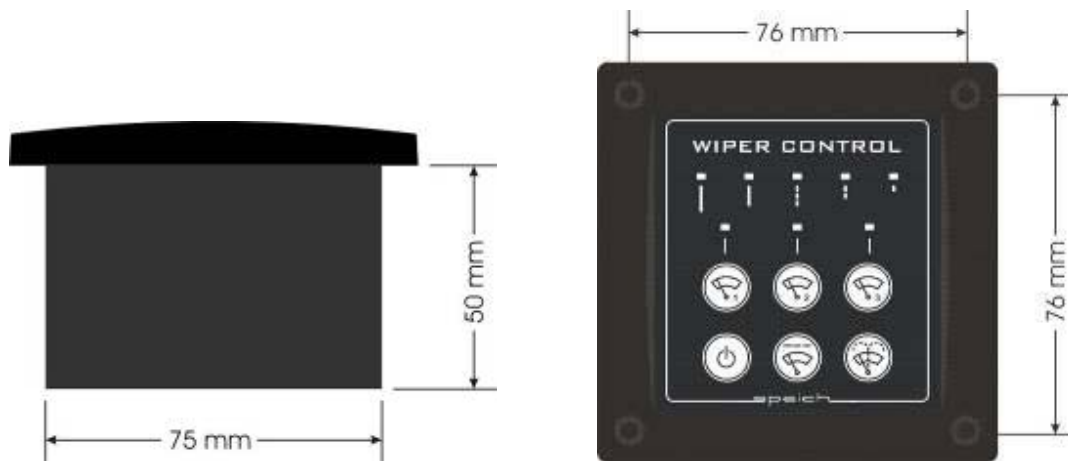
The standard group configuration is:

Each power module can control 3 wiper motors
Each power module controls a wiper motor in 3 different wiper groups, group 1, group 2 and group. The wiper groups are activated and deactivated with the group switches on the control panel. (Picture 6.7: *‘group configuration’*)

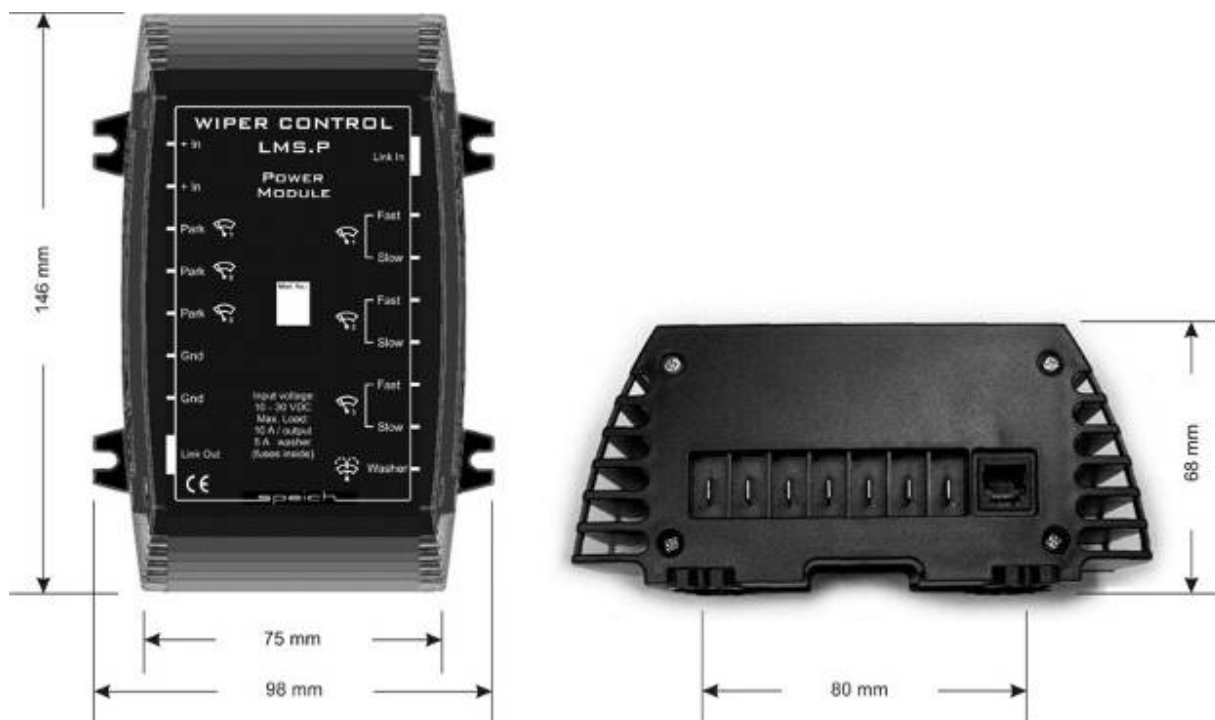
The optional group configuration is:

Each power module controls all wiper motors of the same group. This means; power module 1 controls all wiper motors of group 1, activated or deactivated by the group 1 switch on the control panel. Group 1 can now control for example the complete starboard side of the installation, group 2 the centre and group 3 the port side. This way the power modules are installed nearest to the wiper motors. (Picture 6.7: *‘group configuration’*)

5 DIMENSIONS



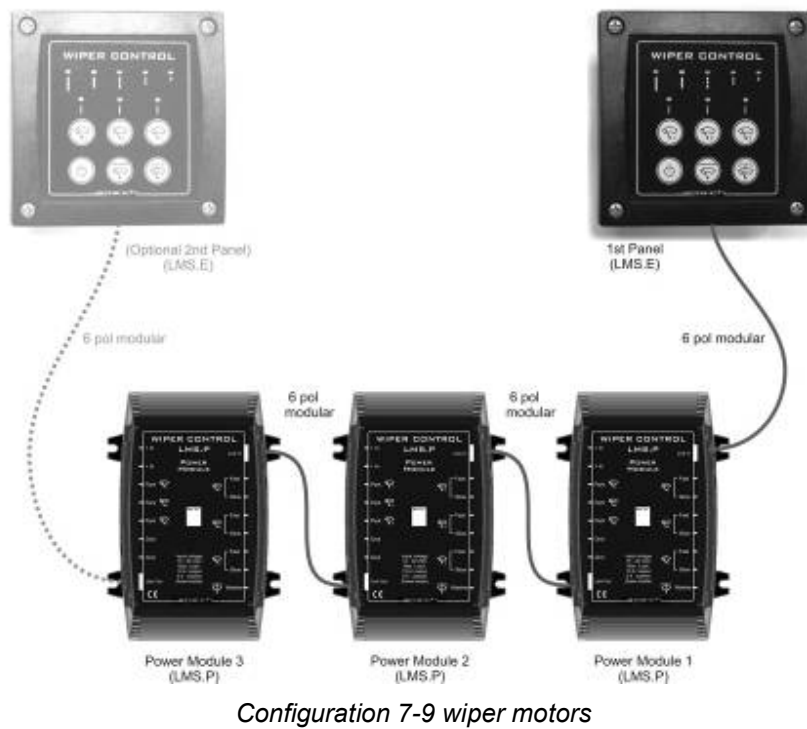
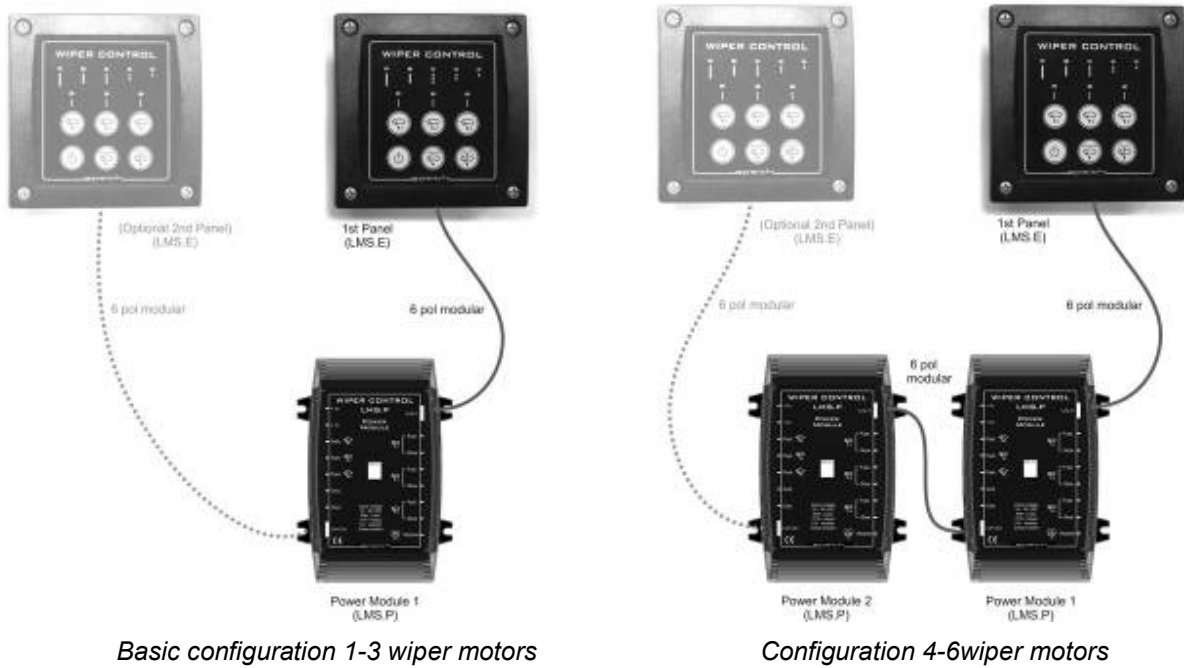
Picture 5.1: 'Dimensions control panel'



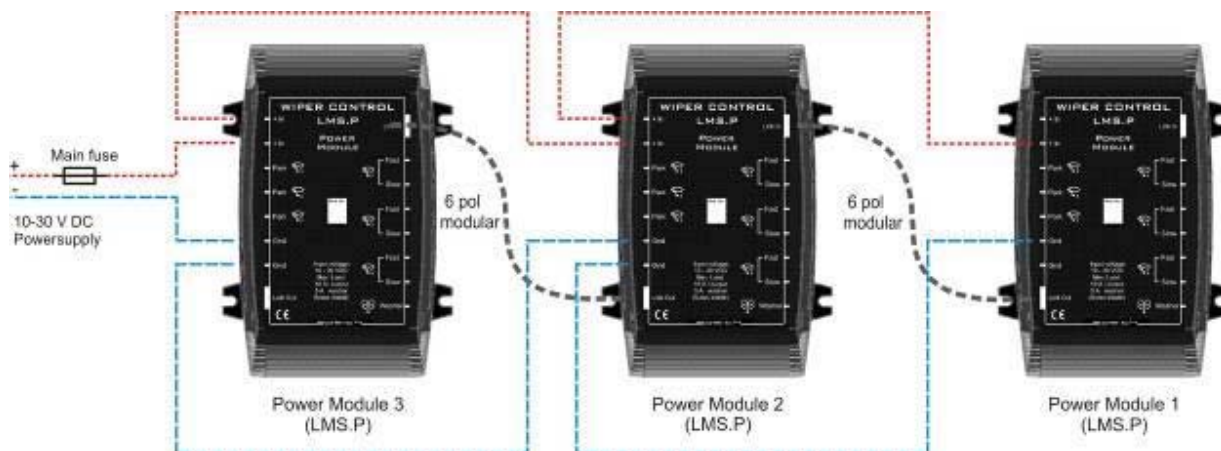
Picture 5.2: 'Dimensions power module'

6 CONNECTION DIAGRAMS

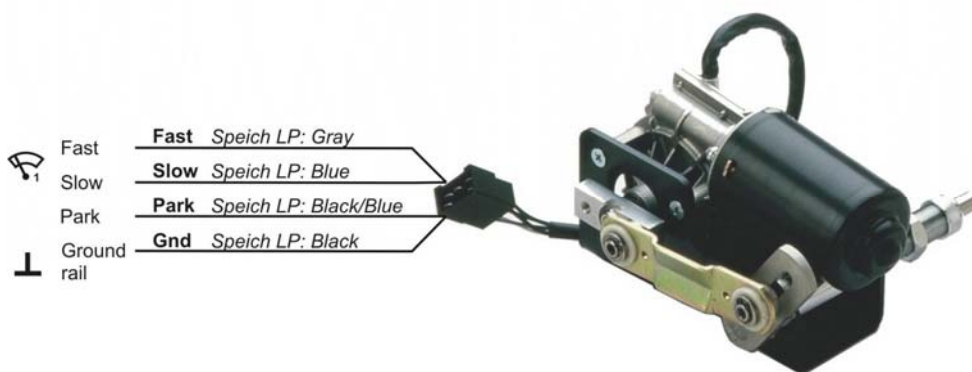
A 2nd control panel is possible in any configuration, with 1, 2 or 3 power modules.



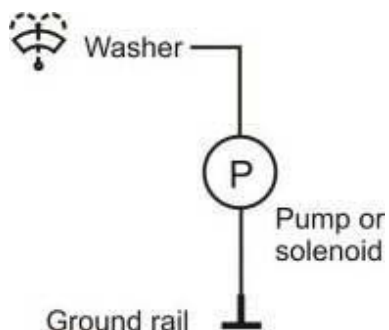
Picture 6.1: 'Possible configurations'



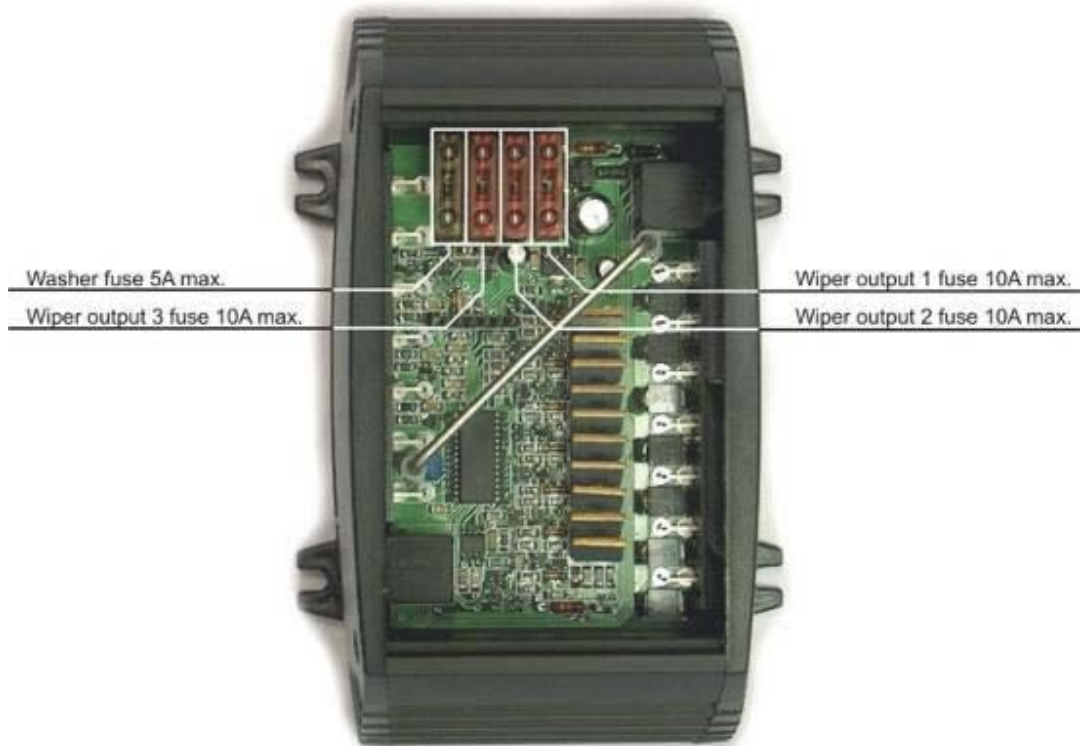
Picture 6.2: 'Example of the supply voltage connection'



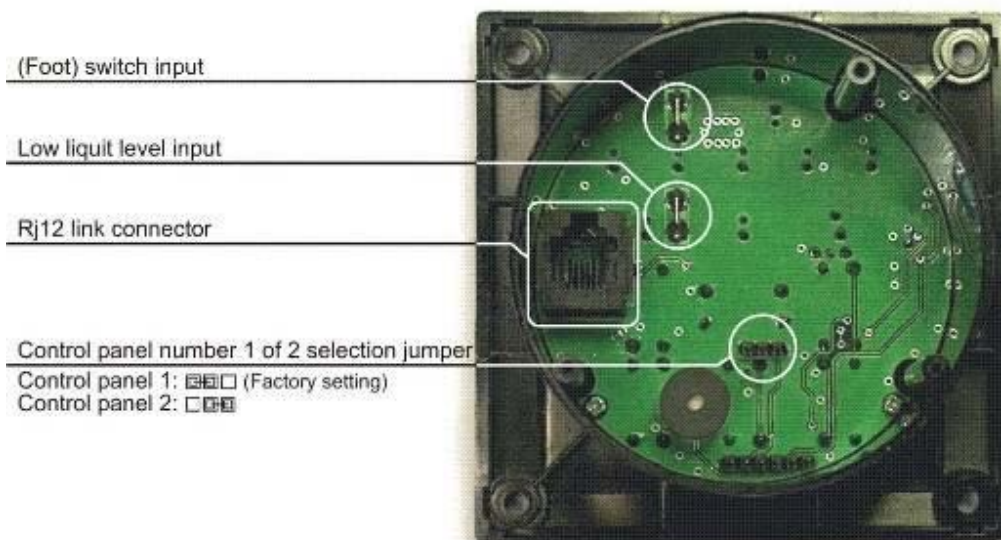
Picture 6.3: 'Wiper motor 1 connections to the power module. (motor 2 & 3 connections are similar)'



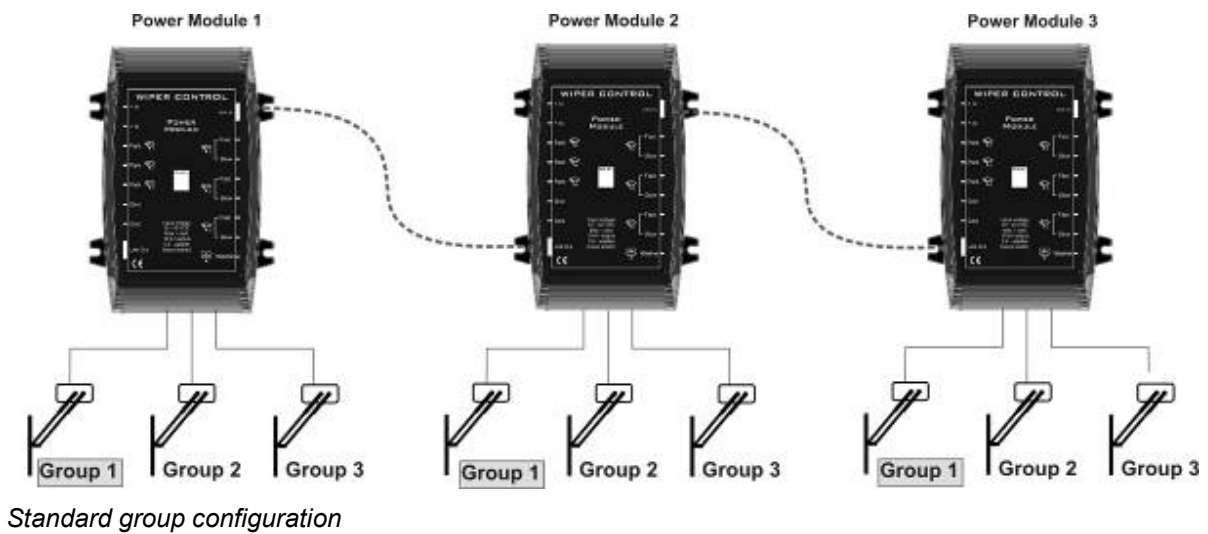
Picture 6.4: 'Washer connection'



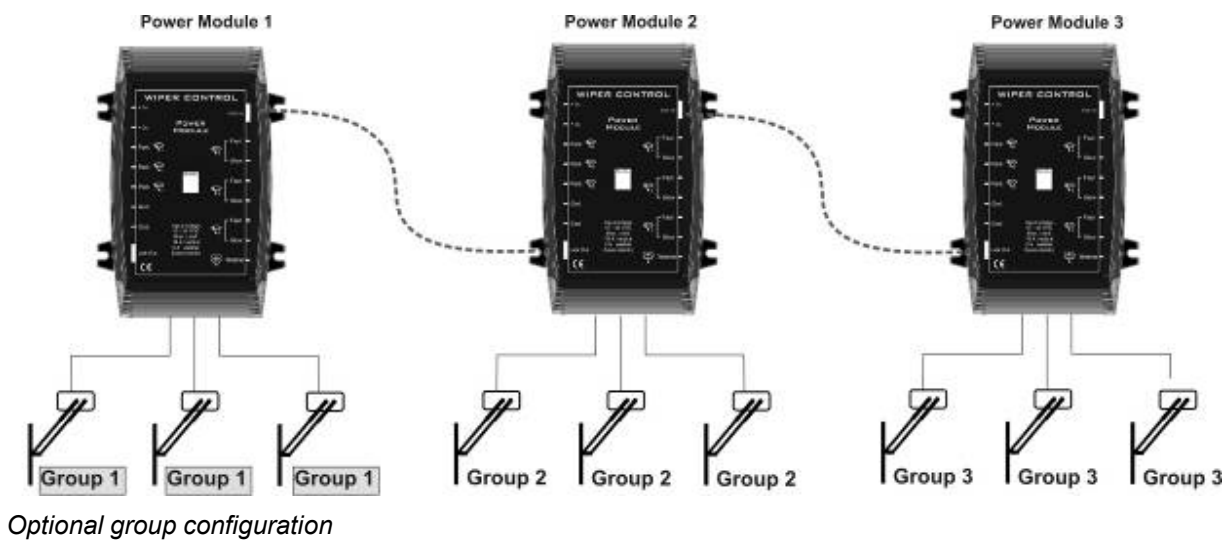
Picture 6.5: 'Internal fuses power module'



Picture 6.6: 'Control panel connections'



Standard group configuration



Optional group configuration

Picture 6.7: 'group configuration'
(is set when after installation 'group 1' button is pressed for 10 sec.)

7 TROUBLESHOOTING

Problem / Signal	Cause	Solve
- Led Group 1, 2 or 3 on the control panel blinks - Wipers do not move	Low battery / system voltage on power module 1, 2 or 3	Charge the system battery
- Led Group 1, 2 or 3 on the control panel blinks - Wipers do not move	Bad or loose wiring on power module 1, 2 or 3	Make the system power less and check the wiring and connections.
- one wiper stops moving	Bad wiring or loose contact	Make the system power less and check the wiring and connections.
- one wiper stops moving	Fuse has blown (wiper could be frozen to the window)	Check (replace) the defective fuse (chapter 3.2)
- washer does not work and no low liquid level signal.	Fuse may be defect, because of overload or short circuit.	Check (replace) the defective fuse (chapter 3.2)
- after installation the system does not operate, and system voltage is measured on the + in terminal(s).	Control panel modular cable connection or jumper setting could be wrong.	Check the RJ12 modular cable, is it connected to the right 'link' connector? Check the jumper setting inside the control panel. (chapter 4.2)

8 TECHNICAL INFORMATION

8.1 Technical specifications of the power module

Supply voltage	:	10 - 30 V DC
Stand by power consumption	:	< 0,2 W
Max. load / wiper output	:	10A cont. 20A int.
Max. load washer output	:	5A cont. 10A int.
Operating temperature	:	-10 to +60° C (+14 to +140° F)
Storage temperature	:	-40 to +70° C (-22 to +158° F)
Connections	:	Battery + and battery ground. 3 x self parking connection, fast and slow wiper motor connection, washer pump / valve connection 2 x modular cable RJ12/RJ12, L = 5 meters.
Protections wiper output	:	Blade fuse 10A (ATO)
Protections washer output	:	Blade fuse 5A (ATO)
Dimensions	:	146 x 67 x 97 mm (l x w x h)
Weight	:	415 gram.

8.2 Technical specifications of the control panel

Operating temperature	:	-10 to +60° C (+14 to +140° F)
Storage temperature	:	-40 to +70° C (-22 to +158° F)
Connections	:	modular cable RJ12/J12, L = 5 meters. Low liquid level input (switch to ground, N.O.) (Foot) switch input
Stand by power consumption	:	< 0,14 W
Type	:	IP.. dashboard housing
Drill hole size	:	Ø 75 mm
Dimensions	:	90 x 90 x 47 mm (h x w x d)
Weight	:	100 gram

9 CE DECLARATION OF CONFIRMITY



Manufacturer: LieMo electronics
Address: Lijnbaanstraat 1
9711 RT Groningen
The Netherlands

Declares that:

Product: Modular Wiper Control LMS

Is in conformity with the provision of the EEC directive EMC 89/336/EEG
and amendments 92/31/EEG and 93/68/EEG.

The following harmonized standards have been applied:

Emission:	EN 50081-1:1992
Immunity:	EN 50082-1:1992
Safety:	EN 60950-1:1992

Groningen,

A handwritten signature in black ink, appearing to read 'P. van der Molen', written over a horizontal line.

P. van der Molen
LieMo electronics

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