Installation & Maintenance Manual
Type C Straight Line Wiper - Inside Motor
With
Series 8000 Network Control System
Issue 3

WARNING: A suitably qualified person should perform all installation and maintenance. All electrical wiring should be carried out in accordance with relevant regulations. Ensure all products are correctly earthed and all connections are made in accordance with the wiring diagram. Non-compliance may result in damage, malfunction or personal injury. Before commencing any installation or maintenance work, ensure that the electrical supply is disconnected.

Index

GENERAL INFORMATION AND SAFETY SUMMARY

As we will have no influence on the installation of complete windscreen wiper systems if installation is to be carried out by the customer, we are unable to accept liability for installation errors.

If you require any additional information or any special problems arise which the installation/maintenance instructions do not treat in sufficient detail please contact Customer Service at B. Hepworth and Co Ltd directly.

Safety Precautions

CAUTION! BEWARE OF INJURY!

BEFORE WORKING ON THE WIPER SYSTEM, OBSERVE THE FOLLOWING REMARKS WITHOUT FAIL!

Most wiper motors have a park setting, which permits them to default to the parked position if connected to the vessel electrical system, even when the wiper is switched off. FOR THIS REASON, AT THIS POINT IN TIME, NEITHER MAY THE WIPER ARM BE MOUNTED, NOR MAY ANY PERSON HAVE HANDS, FINGERS, ETC ANYWHERE NEAR THE WIPER SYSTEM. Even small wiper motors can neither be braked nor stopped by hand.

NEVER REACH INTO THE AREA OF THE DRIVE BELT WHEN THE SYSTEM IS RUNNING!

When putting into service (i.e. when connecting the wiper motor to the vessel electrical system, even if the wiper switch is in the off position), never leave any loose items such as screwdrivers in the area of the wiper system, as flying objects could lead to injury.

Please ensure the equipment is handled with care. Do not drop or bang the equipment down on a hard surface taking extra care around the area where the motor shaft is situated. Do not hammer the motor shaft when installing the equipment, as this will cause the motor gear plate to deform causing premature failure of the unit.

Introduction

The Windscreen Wiper system utilised is detailed on the following pages. The primary components that form the Windscreen Wiper System are the wiper case assembly and motor, the wiper arm assemblies and the wiper blades.

TYPE C WIPER DESCRIPTION AND SPECIFICATION

The 'Type C' is a Heavy Duty Straight Line Wiper with an electric motor mounted internally. The wiper can be mounted either above or below the window. The motor can be positioned at either end simply by reversing the front cover of the wiper case.

All electric motors incorporate a worm reduction gearbox. Windings are to Class F insulation.

The DC motor option is suitable for single speed operation. Complies with the EMC Directive according to the following: EN 60945:2002

The AC 1-phase motor option is single speed operation. Complies with the EMC Directive according to the following: EN 60945:2002

The standard AC 3-phase motor option is for either 1 or 2 speed operation. Complies with the EMC Directive according to the following: EN 60945:2002

The variable frequency AC 3-phase motor option is for 3 speed operation and must be used with the 8000 Series Controller. Complies with the EMC Directive according to the following: EN 60945:2002

Motor Specifications

Motor	Type	Nominal Voltage	Full load current at 50/60 Hz	Fusing Value 50/60 Hz	Speed	Compass Safe Distance	Protection Rating
PM3M	Permanent Magnet	24V DC	4.5 A	6.0 A	1.4 m/s	2.4 m	IP54
PM3M (L)	Permanent Magnet	24V DC	4.5 A	6.0 A	0.7 m/s	2.4 m	IP54
PM5M	Permanent Magnet	24V DC	7.1 A	10.0 A	1.4 m/s	3.0 m	IP54
PARV65	1 Phase Induction	115 V	2.3/2.6 A	2.5/3.15 A	1.4 m/s	0.5 m	IP20
PARV65L	1 Phase Induction	115 V	1.5/1.6 A	2.5/3.15 A	0.7 m/s	0.5 m	IP20
PARV64-T	1 Phase Induction	230 V	1.2/1.6 A	2.5/3.15 A	1.4 m/s	0.5 m	IP20
PARV64L	1 Phase Induction	230 V	0.75/0.95 A	1.0/1.6 A	0.7 m/s	0.5 m	IP20
PARV61	3 Phase Induction	115V AC	1.3/1.1 A	2.0/1.6 A	0.7/1.4 m/s	0.5 m	IP20
PARV62D+	3 Phase Induction	220V AC	0.6/0.6 A	1.0/1.0 A	0.7/1.4 m/s	0.5 m	IP20
PARV81	3 Phase Induction	115V AC	1.5 A	8000 Controller	0.7/1.1/1.4	0.5 m	IP20
PARV82	3 Phase Induction	220V AC	1.1 A	8000 Controller	0.7/1.1/1.4	0.5 m	IP20

For protection it is recommended that the wiper system have fuses fitted. The fuses will not blow in normal conditions, however if the wiper is jammed, then the fuses are designed to blow before the motor is damaged. Each wiper requires its own fuse. Fuse values shown above**.**

Compass safe distances, BSH (Germany) certified, have the values shown above. The distance quoted is the maximum figure for '*Magnet-Regelkompass'*.

Drive shaft lengths are optional. These are available in standard and gas tight versions. The standard length is 84 mm. Other lengths available are 35mm, 140mm, 200mm and 220mm. The Certificate of Conformity will advise which option has been fitted.

Spray nozzles & water connections

A fresh water supply can be plumbed directly to the wiper into a 6mm overall diameter compression fitting. On stroke lengths below 1015mm, 1 nozzle is fitted, above 1015mm, 2 nozzles are fitted at ¼ stroke + 137mm from either end. The installer needs to provide pressurised water supply and the interconnecting plumbing. When the wash option is installed, the maximum pressure for the system is 8 bar or 118 PSI and the minimum pressure for adequate spray reach is 1 bar or 15 PSI. Example flow rates for a single spray jet are shown below.

Water System Pressure And Flow Rates

Pressure		Flow rate	
Bar	**Psi**	**Litres/min**	**Gallons/min**
1.0	15	0.95	0.20
1.5	22	1.20	0.25
2.0	29	1.40	0.30
3.0	44	1.75	0.40

De-icing Heaters

Optional de-icing heaters may be fitted inside the wiper case to ensure effective operation in cold conditions. Standard cable length is 2M. Optional lengths are 5M, 10M, 15M and 20M. Power consumption is according to the wiper stroke length, shown below.

Heater Power Ratings – Single Wipers

STROKE (mm)	STROKE (inch)	HEATER SIZE	WATTS (24VDC)	STROKE (mm)	STROKE (inch)	HEATER SIZE	WATTS (24VDC)
305 up to 430	12	1	97	1500 up to 1800	67	8	390 (186)
457 up to 735	24	2	135	1930 up to 2100	83	10	485 (150)
760 up to 1065	36	4	211	2260	89	12	574 (123)
1095 up to 1450	51	6	301 (238)				

Quoted Power is for nominal 115 or 230 Volts (bracketed values are for 24 Volts). For stroke lengths up to 1065 mm, power ratings are the same for all voltages.

Heater Power Ratings – Twin Wipers

OVERALL STROKE (mm)	STROKE (inch)	HEATER SIZE	WATTS (24VDC)	OVERALL STROKE (mm)	STROKE (inch)	HEATER SIZE	WATTS (24VDC)
585 up to 735	2 x 12	2	135	1855 up to 1800	2 x 37	10	485 (150)
789 up to 1041	2 x 16	4	211	2211 up to 2100	2 x 44	12	574 (123)
1091 up to 1445	2 x 22	6	301 (238)	2645 and above	2 x 53	14	663 (106)
1495 up to 1805	2 x 30	8	390 186)				

Quoted Power is for nominal 115 or 230 Volts (bracketed values are for 24 Volts). For stroke lengths up to 1041 mm, power ratings are the same for all voltages.

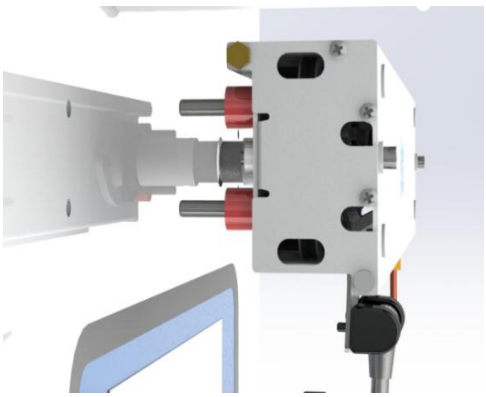
TYPE C WIPER INSTALLATION

CAUTION: Ensure that the correct wiper, blade and arms are selected for each window.

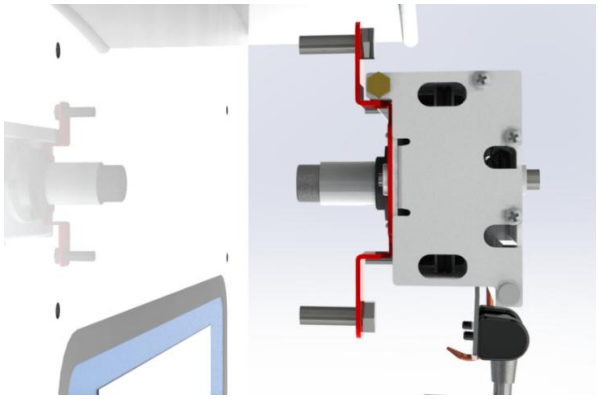
CAUTION: Before drilling, ensure that there are no obstructions / hazards at the chosen mounting position. The main frame should be mounted on a flat surface that will not bend or twist the casing, as this will prevent correct operation of the wiper.

CAUTION: Where more than one wiper unit is to be mounted close together, allow a distance of 70mm minimum between the wiper units.

Stud or bracket mounting



Stud Mounting



Bracket Mounting

1. Locate the self-adhesive template in the correct mounting position on the outside of bulkhead

   NOTE: For motors mounted at the opposite end, the template should be inverted.

2. Drill the wiper 2 off fixing holes (11 mm diameter) and the drive shaft housing hole (57mm diameter).

3. Hold the wiper casing in the required position and mark-out the remaining fixing holes, or calculate their position from the drawing i.e. stroke length plus 266 mm.

4. Drill the remaining wiper fixing & cable holes for the heater and park sensor, ensuring that all holes are circular and carefully de-burred. Treat bare metal to prevent corrosion.

5. Fit the wiper case into position and secure with M10 bolts. Ensure that the bolts are sealed where they pass through the bulkhead.

6. Push the drive shaft seals into place. It is advisable to use a suitable sealant to prevent water ingress.

7. Using the supplied M6 x 10mm screws, secure the blade arm to the carriage plate.

CAUTION: Ensure the correct length screws are used, as supplied. Longer screws will cause the carriage assembly to jam.

8. Bolt the front case to the back case using the 2 off M8 bolts fitted.

9. If necessary, slacken the screws on the blade attachment clip, move the blade up or down for optimum position and then retighten screws.

10. Move the blade assembly over its full stroke and check that there is no restriction to movement (the motor will offer some resistance, but should not jam the wiper). Investigate

and rectify any restrictions. If necessary adjust the blade up or down on the arm to avoid the window frame.

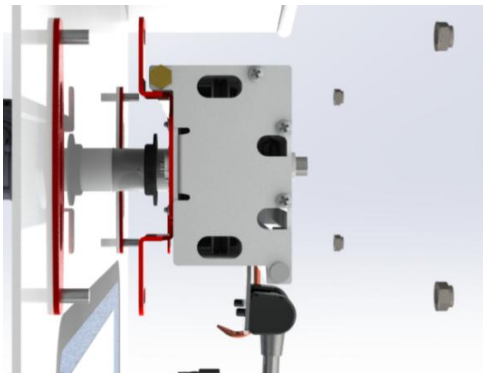
11. Pass the cables through the bulkhead, leaving sufficient spare cable to allow the front assembly to be lifted away from the rear case during the maintenance period. Ensure the wiper is correctly earthed.

    NOTE: If a heater is fitted pass the heater cable through the bulkhead, leaving a loop as required, and seal.

12. Ensure that wherever the cable passes through the bulkhead a suitable cable gland or seal is used to prevent water ingress and cable chaffing.

13. Fit the motor to the drive shaft.

Universal bracket mounting



Universal Bracket Mounting

1. Carefully mark the position of the drive shaft housing hole and 2 (3 for longer wipers) universal carrier plates.

2. Drill the drive shaft housing hole (57mm diameter).

3. Prepare the bulkhead and universal carrier plates carefully and weld the 2 (or 3 for longer wipers) universal mounting brackets into position. Treat bare metal to prevent corrosion.

4. Drill the remaining wiper fixing & cable holes for the heater and park sensor, ensuring that all holes are circular and carefully de-burred. Treat bare metal to prevent corrosion.

5. Fit the wiper case into position and secure with supplied M10 washers and nuts.

6. Push the drive shaft seals into place. It is advisable to use a suitable sealant to prevent water ingress.

7. Using the supplied M6 x 10mm screws, secure the blade arm to the carriage plate.

CAUTION: Ensure the correct length screws are used, as supplied. Longer screws will cause the carriage assembly to jam.

8. Bolt the front case to the back case using the 2 off M8 bolts fitted.

9. If necessary, slacken the screws on the blade attachment clip, move the blade up or down for optimum position and then retighten screws.

10. Move the blade assembly over its full stroke and check that there is no restriction to movement (the motor will offer some resistance, but should not jam the wiper). Investigate and rectify any restrictions. If necessary adjust the blade up or down on the arm to avoid the window frame.

11. Pass the cables through the bulkhead, leaving sufficient spare cable to allow the front assembly to be lifted away from the rear case during the maintenance period. Ensure the wiper is correctly earthed.

    NOTE: If a heater is fitted pass the heater cable through the bulkhead, leaving a loop as required, and seal.

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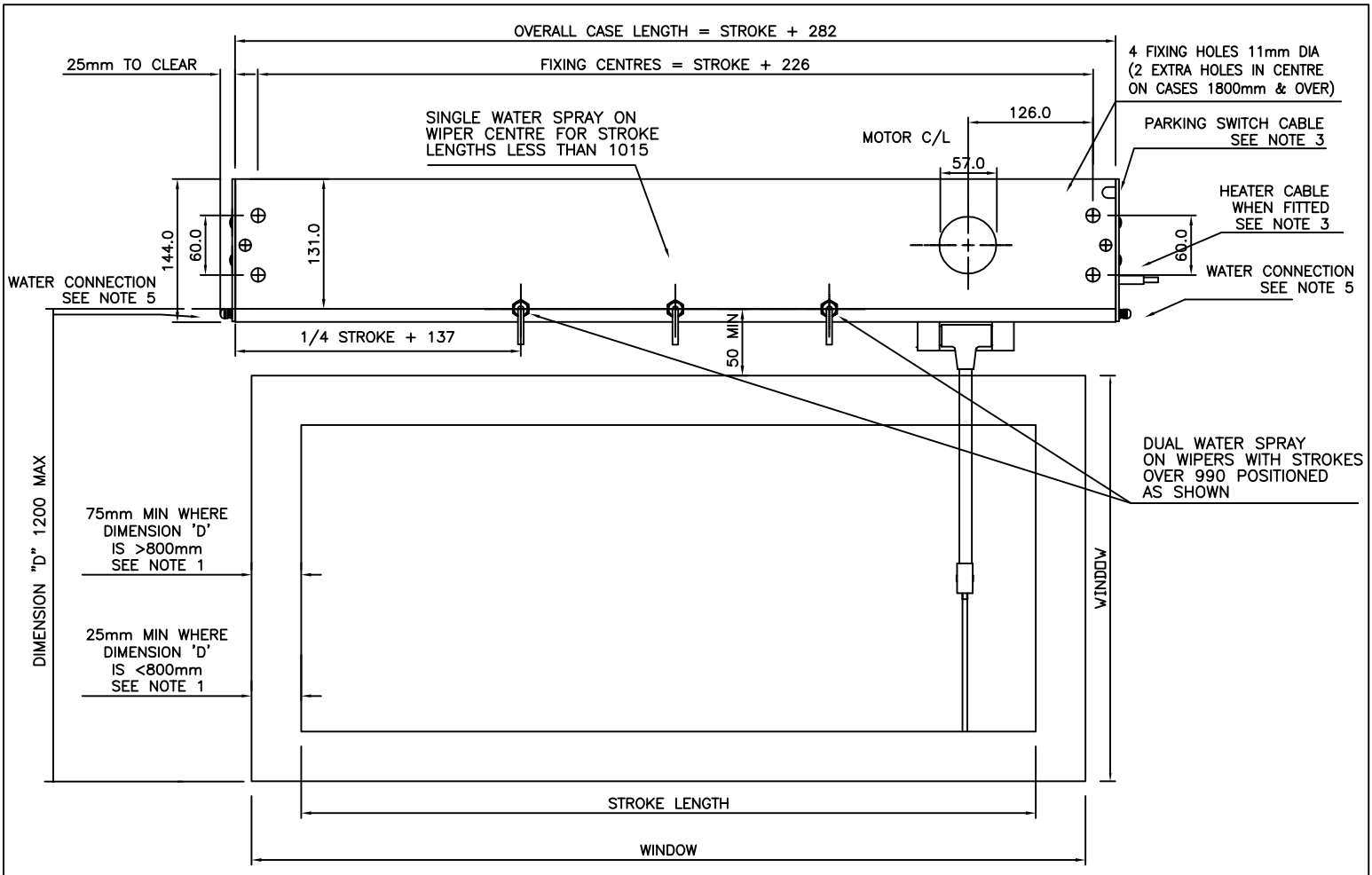

NOTES

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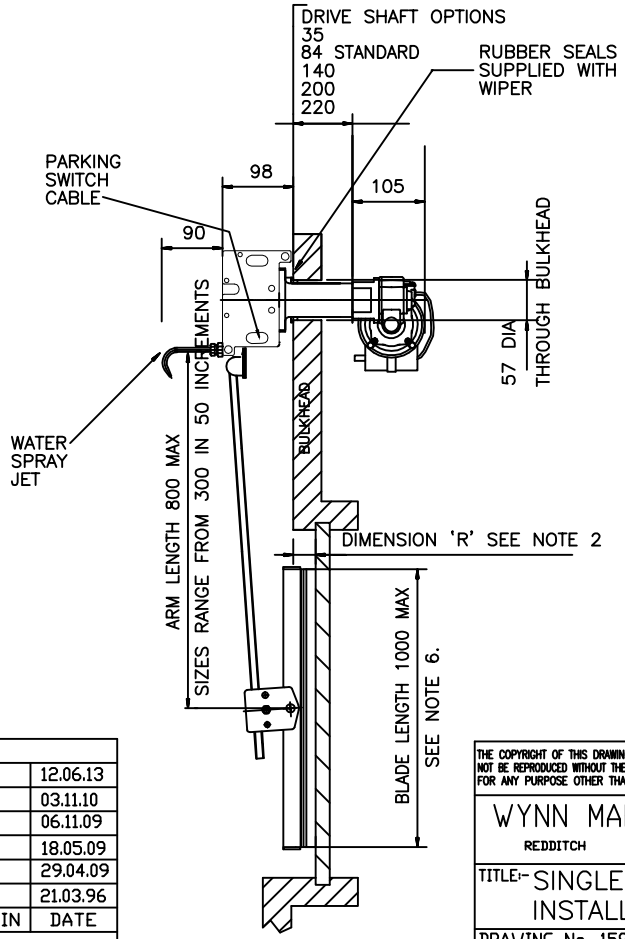
2. THE BLADE ARM MAY BE CRANKED WHERE DIMENSION "R" IS GREATER THAN 75.
3. OPTIONAL HEATER AND PARKING SWITCH STANDARD CABLE LENGTH 2 METRES. PARKING SWITCH POSITIONED AT MOTOR END WHEN FITTED.
4. THE HEATER AND PARK SWITCH CABLING TO RUN THROUGH THE BULKHEAD.
5. THE WATER CONNECTION BLANKING PLUG CAN BE FITTED AT EITHER END.
6. RIGID WIPER BLADE LENGTHS RANGE FROM 300 TO 800 AND ARTICULATED WIPER BLADE LENGTHS RANGE FROM 500 TO 1000 BOTH IN 50 INCREMENTS.
7. SEE MANUAL HEATER POWER RATINGS TABLE FOR STROKE OPTIONS AND HEATER DETAILS.
8. THE MOTOR CAN BE POSITIONED RADIALLY THROUGH 360 DEGREES AROUND THE DRIVE SHAFT CENTRE-LINE TO SUIT THE INSTALLATION. ENSURE THAT THE ACCESS SPACE AROUND THE MOTOR SHOWN ON THE DRAWING IS MAINTAINED.

ALL DIMENSIONS IN MM FOR REFERENCE ONLY



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WYNN MARINE LIMITED
REDDITCH ENGLAND

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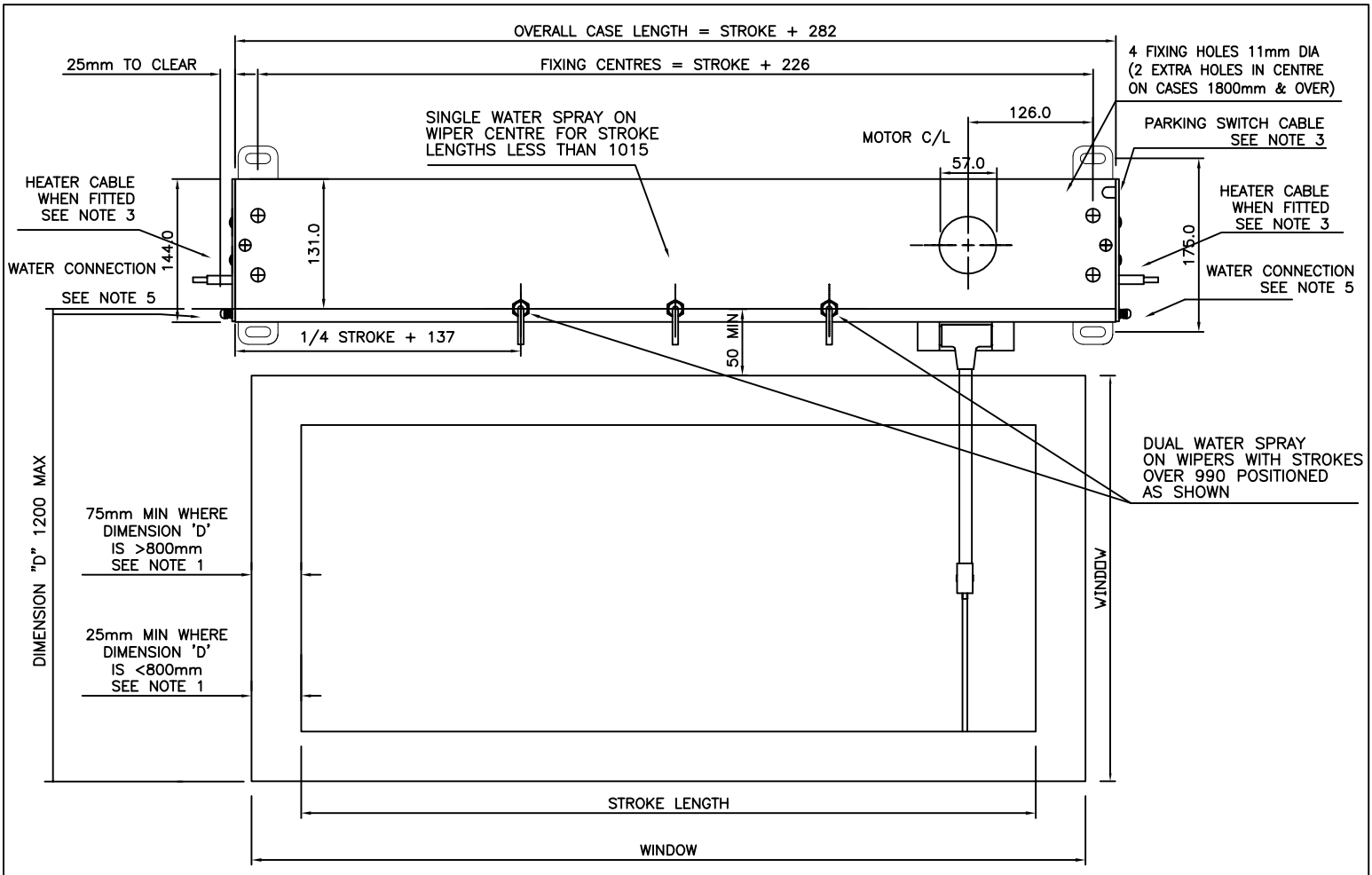

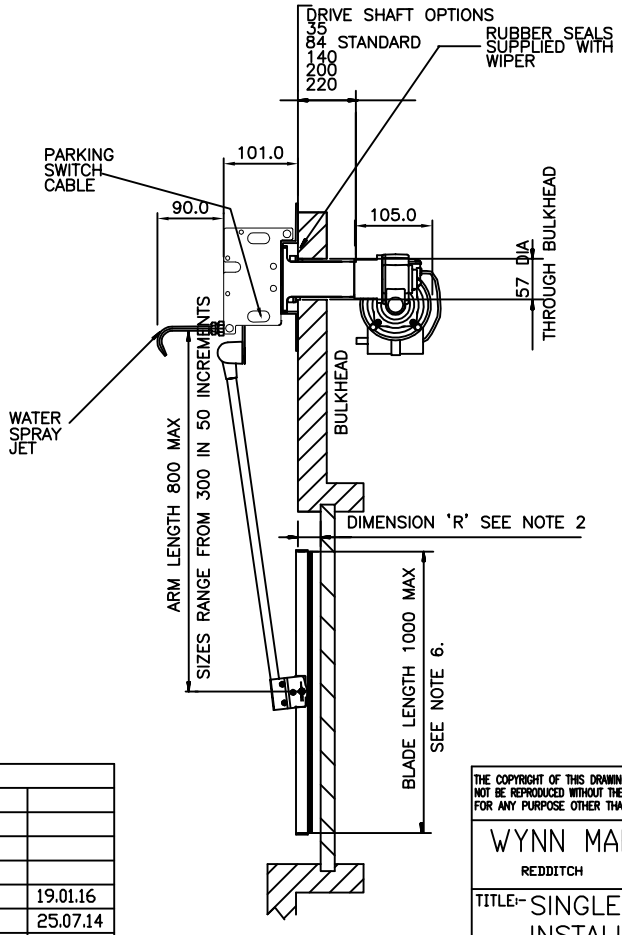

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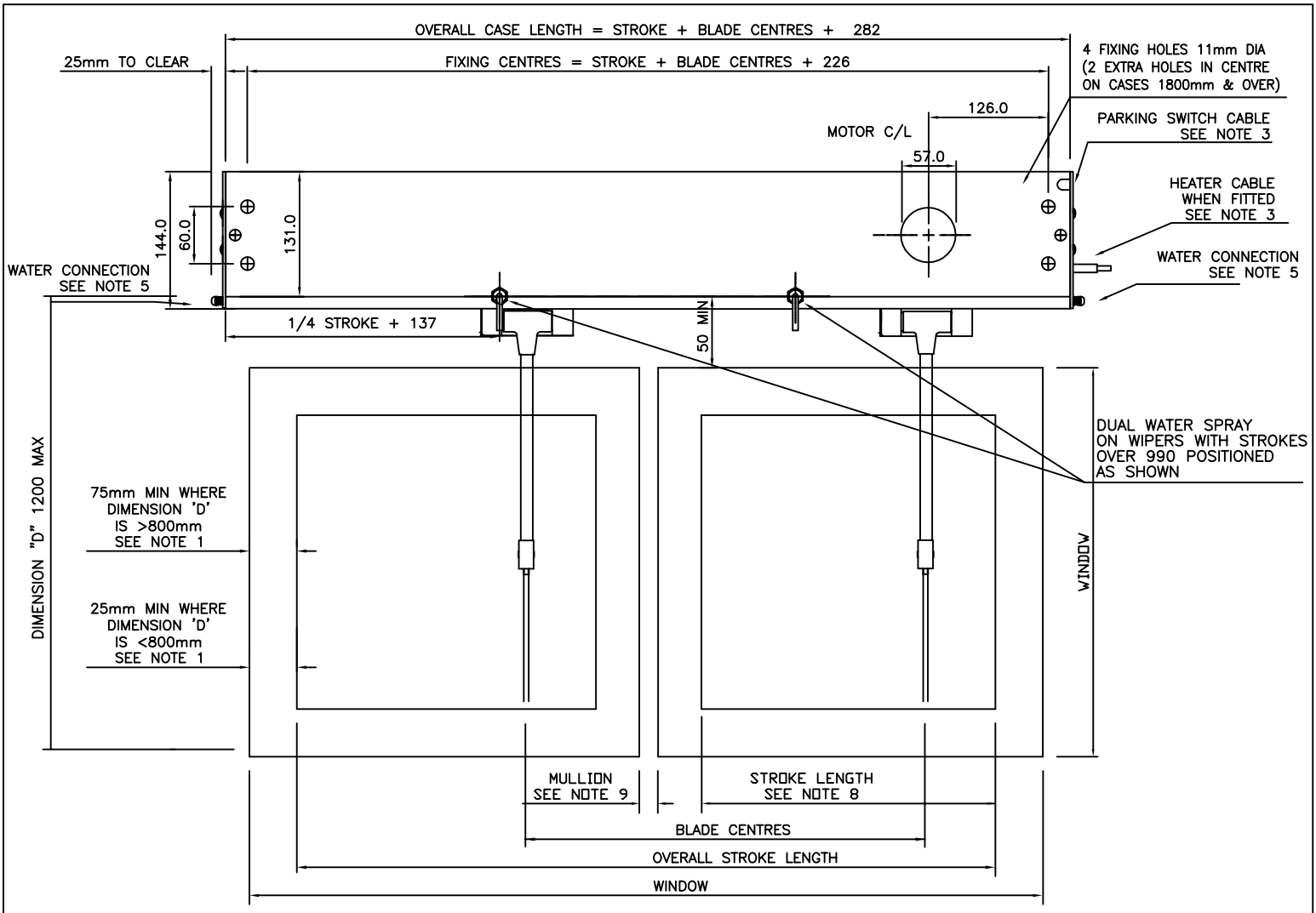

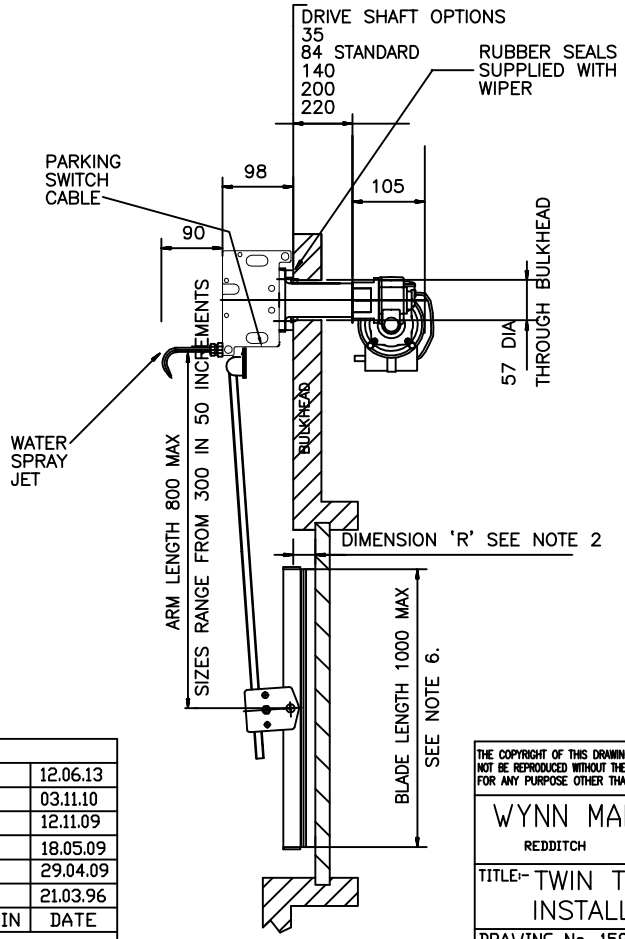

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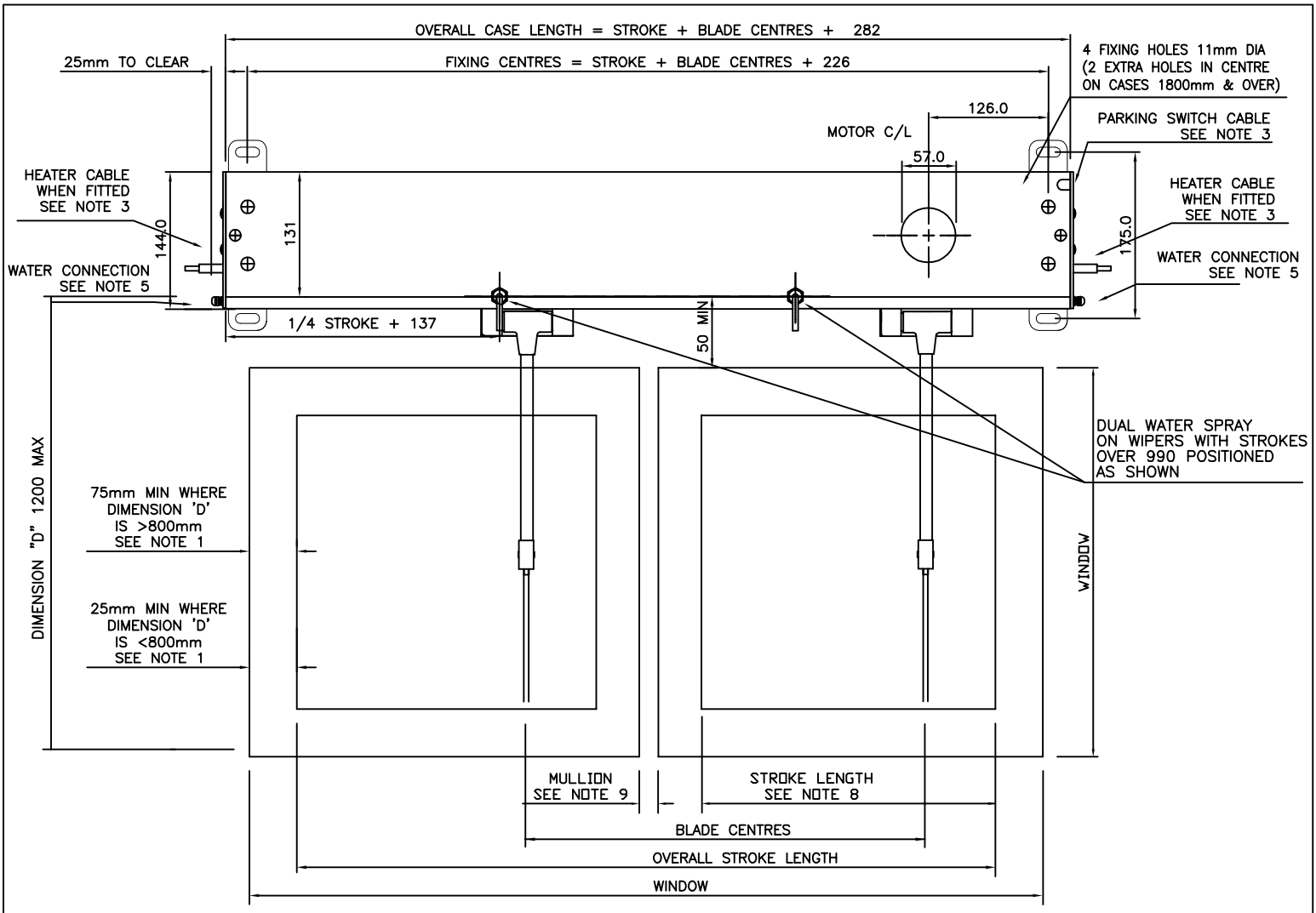

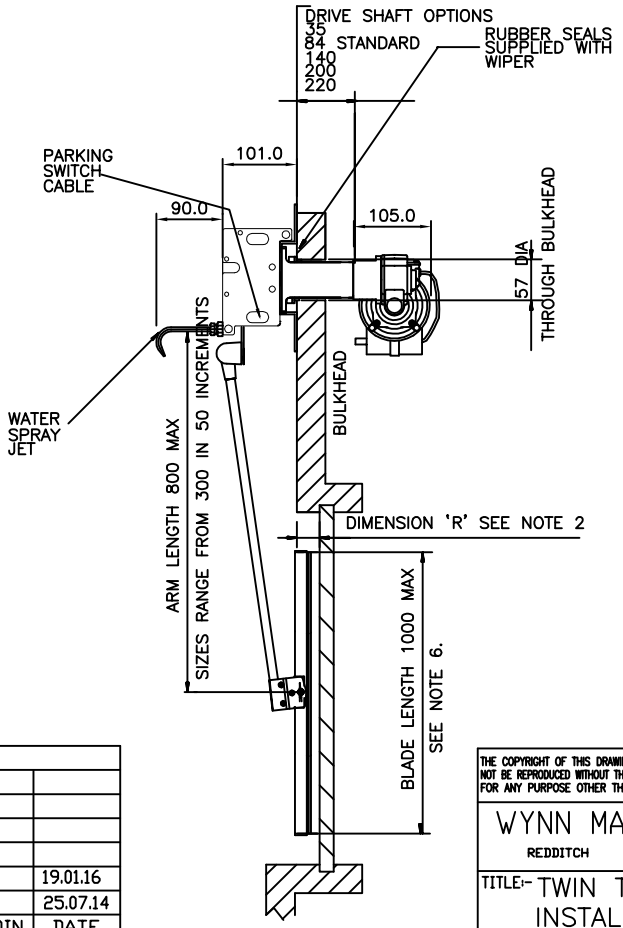

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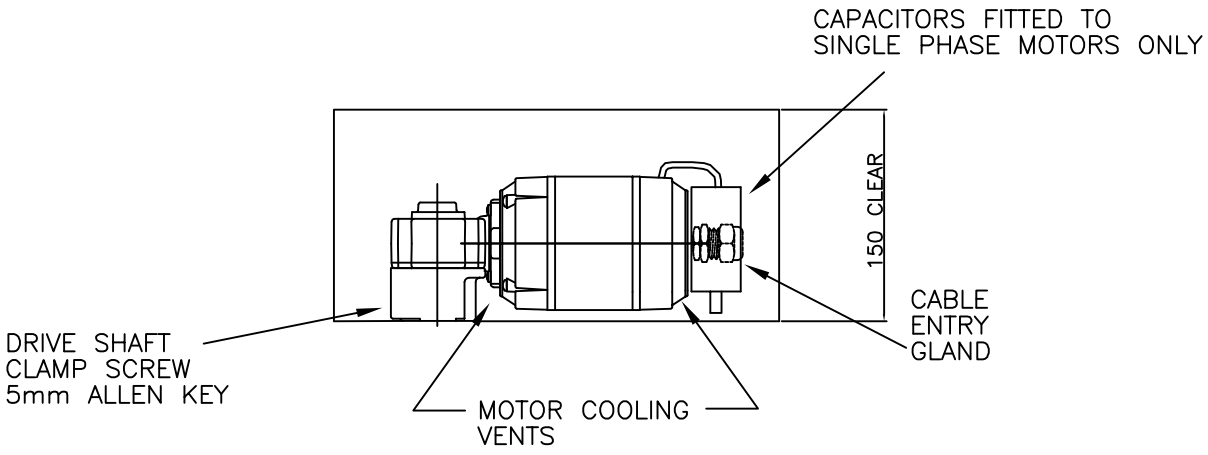
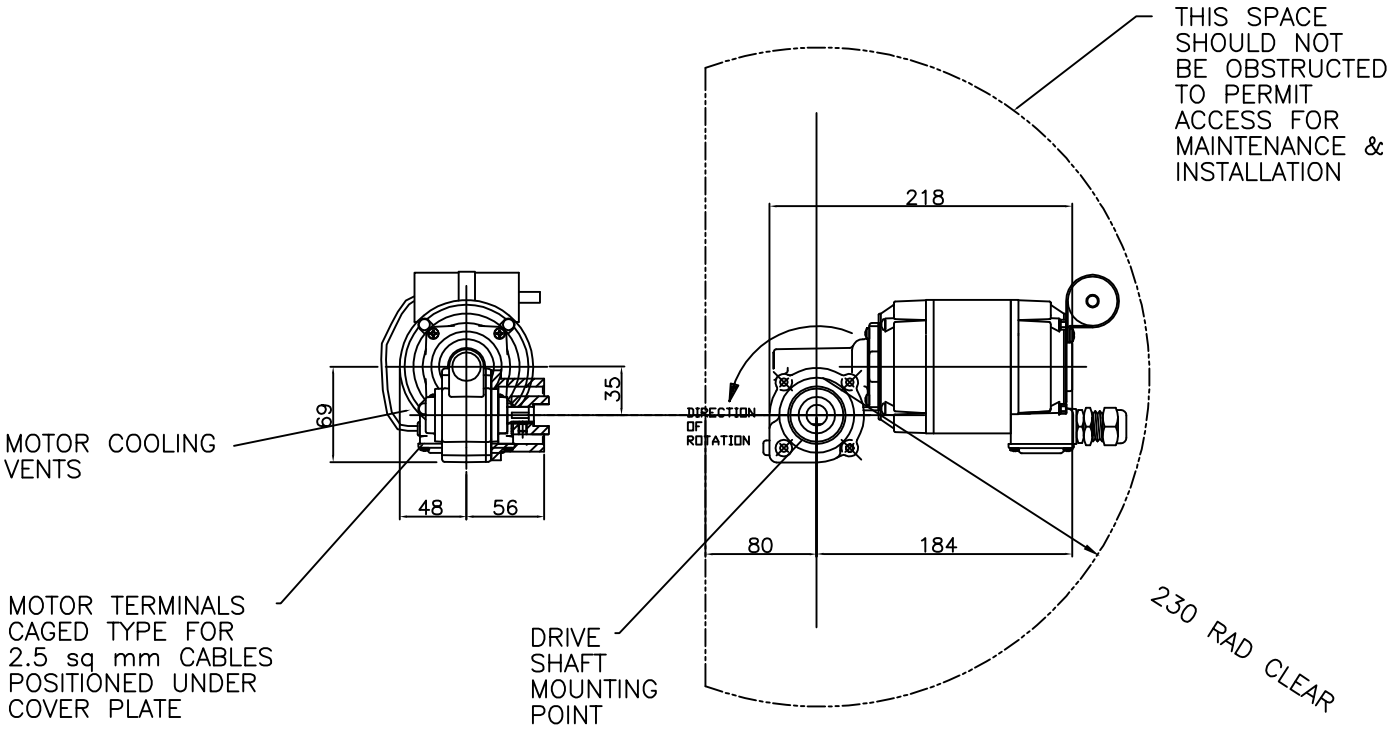




NOTES

1. USE T RATED FUSES.
2. EARTH BONDING TO CONFORM TO APPROPRIATE NATIONAL CODES AND STANDARDS.
3. CUSTOMER TO WIRE FROM MOTOR CABLES OR TERMINATIONS TO TERMINALS ON THE CONTROLLER WHEN SUPPLIED.
4. ALL MOTORS CAN BE ROTATED THROUGH 360 DEGREES AROUND THE DRIVE SHAFT CENTRE-LINE. NOTE THE ACCESS SPACE WILL ROTATE WITH THE MOTOR.

PARVALUX MOTORS WEIGHT 4.5Kg

M O T O R O P T I O N S

MOTOR TYPE	VOLTAGE	Hz	PHASE	SPEED	SAFE COMPASS DISTANCE MIN	RUN CURRENT 50Hz	RUN CURRENT 60Hz	FUSE RATING 50Hz	FUSE RATING 60Hz	CAPACITOR
PARV61	115AC	50/60	3	2	0.5M	1.3A	1.1A	2.0A	1.6A	–
PARV62D	230AC	50/60	3	2	0.5M	0.6A	0.6A	1.0A	1.0A	–
PARV64	230AC	50/60	1	1	0.5M	1.2A	1.6A	1.6A	2.0A	8.4uF M-MISC-098PARV
PARV64L	230AC	50/60	1	1	0.5M	0.75A	0.95A	1.0A	1.6A	5uF M-MISC-095PARV
PARV65	115AC	50/60	1	1	0.5M	2.3A	2.6A	2.5A	3.15A	28uF M-MISC-099PARV
PARV65L	115AC	50/60	1	1	0.5M	1.5A	1.6A	2.0A	3.15A	28uF M-MISC-099PARV
PARV81	115AC	50	3	V	0.5M	1.5A		CONTROLLER		–
PARV82	220AC	50	3	V	0.5M	1.1A		CONTROLLER		–

ALL UNSPECIFIED UNITS OF LENGTH IN mm's

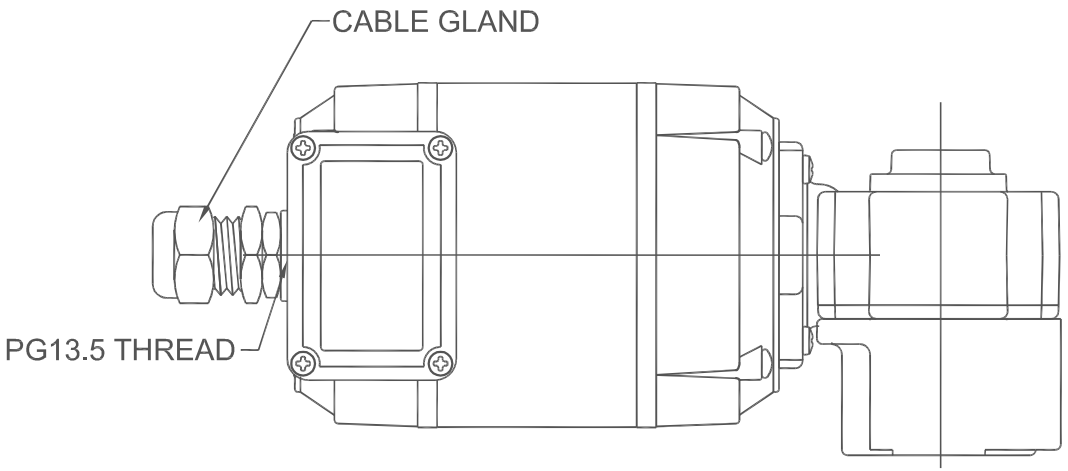
5		12.05.11
4		03.11.10
ISSUE	DIN	DATE

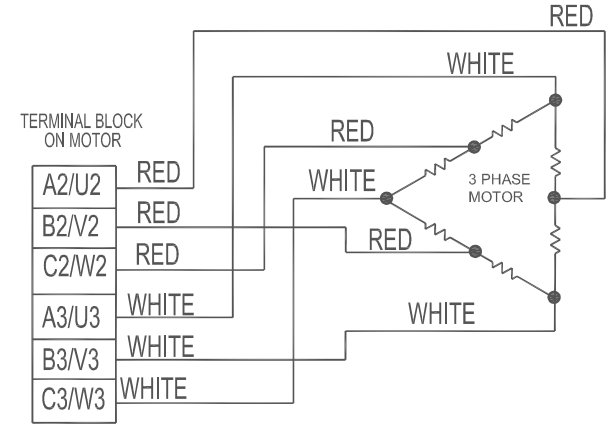
WYNN MARINE LTD
REDDITCH
ENGLAND

TITLE:- TYPE C WIPER STANDARD PARVALUX MOTOR OPTIONS CHART

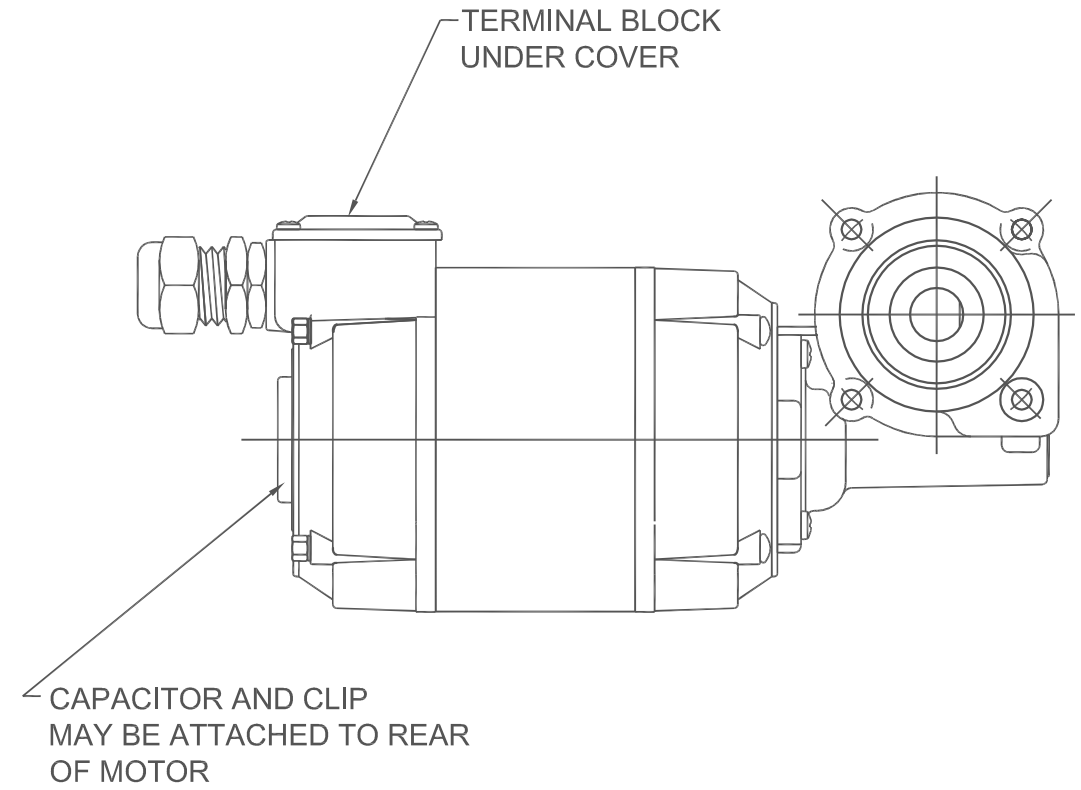
DRAWING NUMBER:- INST-1588-06

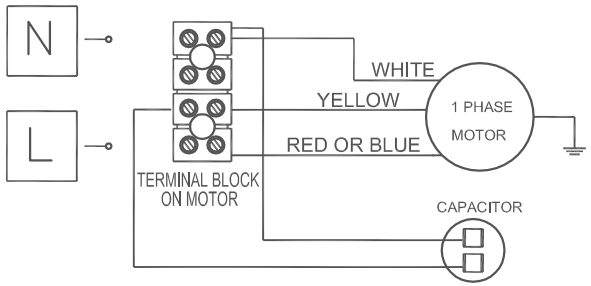
WIRING DIAGRAM FOR PARVALUX TYPE AC MOTORS
FOR WYNN TYPE C STRAIGHT LINE WIPER





MOTOR TERMINAL BLOCK WIRING DIAGRAM
3 PHASE PARVALUX TYPE MOTORS





WIRING DIAGRAM
FOR A PARVALUX TYPE 1 PHASE MOTOR
FIT CAPACITORS AS SUPPLIED

GENERAL FAULT FINDING GUIDE

NOTE: This fault finding guide assumes a reasonable level of technical ability and should be carried out by a suitably qualified person.

Problems: Control panel does not operate wiper.

Possible Cause	**Solution**
No Power.	Check power supply is on and working.
Power not reaching motor	Check ship's incoming supply fuses or circuit breakers. Check for wiring fault, broken wire or loose terminal. If possible confirm (with voltmeter) power is present at motor input and output terminals of control module.
Connections to motor incorrect.	Check wiring according to the appropriate electrical installation drawing.
Ship's voltage too low.	Check voltage as close to the motor as possible, with motor running. See relevant tables for acceptable values.
Motor Thermal Cut Out tripped. Single Phase AC motors only.	The 1 Ø AC motors have a thermal cut out embedded into the stator winding. If the motor gets too hot the thermal cut out disconnects the supply to the motor. Switch off and allow the motor to cool down. About 20 minutes later the cut out will reset allowing normal operation.
Motor brushes or commutator worn (DC motor only)	Check motor commutator and brushes
Motor burned out.	This should not be possible - could happen by incorrect voltage of motor, or a motor fault. The motor needs a reasonable amount of free space to provide sufficient cooling airflow – check. The motor should be protected by fuses, check type and rating.
Wiper motor not fully engaged on coupling.	Slacken pinch bolt, move motor and/or wiper arm to align coupling and push motor into engagement with coupling. Retighten pinch bolt. Make sure that the rubber coupling is fitted
Carriage motion jammed.	It should be possible by pushing the blade arm to move the mechanism over the stroke length. Remove cover and check for obstructions. Check the Blade Arm Screws.
Drive pulley turning but belt slipping.	Excessive friction - Check carriage rollers and motor drive coupling. Replace as required. Idler pulley springs broken or missing. Replace.
Drive belt broken or damaged.	Inspect belt for slip or burn damage. Belt at end of life. Replace.
Idler pulley jammed.	Damaged by impact, or bearing system failed. Replace assembly.
Corrosion.	If corroded, check for water ingress through seals and tightness of connections, Replace wiper unit if necessary

Problem: Wiper runs but at wrong speed

Possible Cause	Solution
Ship's voltage incorrect.	Check voltage as near as possible to the motor, with motor running.
Motor brushes worn (DC Only)	Inspect brushes and replace as necessary.
High / Low speed wiring incorrect (3 Phase 2 Speed models only)	Check wiring complies with appropriate drawing.
One phase missing (3 Phase 2 Speed models only)	Check controller. Check ships fuses.

Problem: Wiper runs but is noisy

Possible Cause	Solution
Wiper arm is obstructed by: - Window frame, spray jets, etc.	If necessary gently bend arms or spray jets out of path of wiper arm.
Incorrect arm attachment screws.	These must not be longer than the 10mm screws provided by Wynn
Vibration of wiper unit	Check the front cover fixing screws are secure.
Arm attachment plate fouling on wiper case	Attachment screws not fully tightened - check. Blade arm or bracket bent out of place - check.

Problem: Wiper does not clean the screen properly.

Possible Cause	Solutions
Blade not in contact with screen.	Blade or arm bent - inspect and replace. Arm pivots seized due to corrosion - replace. Heaters ineffective allowing ice build up.
Weak springs on blade arm.	Stronger springs may be required. Contact Agent/Distributor
Broken springs on blade arm.	Investigate reason of failure and replace. Springs are good down to -40°C.
Blade rubber missing or damaged.	Maintenance item. Replace as required.

Problem: Wiper does not park correctly

Possible Cause	Solution
Park Sensor failed.	Check reed sensor action, will need tester (meter).
Park Sensor Actuator missing.	Check magnet/spacer arrangement on carriage.

Problem: If fitted, heater does not become warm when switched on

Possible Cause	Solutions
Fuse blown or circuit breaker tripped (if fitted).	Check for short-circuited heater, will need tester (meter). Check for wiring damage or loose wires. Check connections are good.
Heater failed.	Check for continuity, will need tester (meter).
Earth leakage circuit breaker trips.	It is common for earth leakage to rise if a heater has not been used for a while - if possible allow heater the warm up so to dry out. The heater's water seal or cable may be damaged allowing ingress of water - check and replace.
No power.	Check Controller.

Problem: If fitted, little or no washer water comes out when button pressed.

Possible Cause	Solution
Pump or supply pressure too low.	Check Ship's water supply, or pump for output pressure.
On reservoir systems, empty.	Check - refill.
Water control valve faulty or not operating.	Check solenoid valve continuity. Replace if open circuit.
Supply lines or jets blocked.	Try air purge, if available. Dismantle and flush pipes.
Water frozen.	Switch on heaters.

TYPE C WIPER MAINTENANCE

Wynn products have been proven over many years to perform well under the harshest condition of use. To maintain their performance the following schedule is recommended:

Every 6 Months

DC motors only

1. Inspect the motor brushes. Remove motor end cover. Prevent brushes from running down to less than 6mm height in service. Brushes can be lifted out of their holder after lifting off the springs. Replace brushes back into same holder and in the same orientation. Ensure that the brush 'pig tails' is free and that the springs are correctly replaced.

2. When replacing brushes, carefully clear out any residual carbon dust from the motor.

WARNING: DO NOT INHALE THE CARBON DUST.

3. Inspect the motor commutator – it should still be bright. If it is blackened the motor should be replaced or serviced. This can be done with light cleaning with 'flour' paper, but not 'emery' paper.

Every 12 Months

1. Check condition of the Articulated/Rigid Wiper Blade. Replace if necessary.

2. Check Heaters if fitted. If these have not been used for some time, then leave them on for approximately 2 hours.

   NOTE: If not used for long periods, some mineral insulated heaters will take up moisture and begin to show current leakage to ground. By running them for the stated time this process can be reversed and the insulation returned to near infinity values. When dry, insulation resistance is > 100 M ohm at 500V.

3. Check the drive belt for deterioration. Replace if necessary.

4. Check carriage is smooth and all guide rollers are free to rotate. Inspect 'tyres' on the guide rollers for splitting / perishing. Replace complete roller if necessary.

Caution: Guide rollers have an integral dry bearing and MUST NOT be oil or grease lubricated.

5. Check for free movement of idler pulleys in response to belt tension. Lubricate as necessary with water resistant grease.

6. Ensure free movement of drive pulley. Replace if damaged or when showing signs of excessive wear.

   NOTE: The drive pulley is jig assembled and should not be dismantled.

7. Check for free blade arm spring movement. Dismantle, re-grease or replace if necessary.

TYPE C WIPER INSPECTION / RENEWAL OF PARTS

WARNING: To ensure health & safety, remove power from the control unit, before working on any parts of the wiper either inside or outside.

Blade Replacement

1. Loosen the 2 x 7mm nuts on the blade attachment clip.
2. Slide the blade attachment clip and blade assembly off the wiper arm.
3. Re-assembly is reversal of above instructions.

Arm Replacement

1. If Heaters are fitted disconnect from terminals to allow the cover to be removed from the wiper.

   OUTSIDE

2. Remove any pipework fittings / blanking plugs from both ends of the wiper.
3. Slacken cable glands and withdraw heater cable from bulkhead.
4. Remove the 2 x M8 Cap head bolts at each end of the cover and set aside.
5. Carefully remove the cover and set aside.
6. Remove the 4 x M6x10mm screws securing the arm to the carriage plate. The arm and blade assembly is now free from the wiper, set both assembly and fasteners aside.
7. Slacken the blade clip bolts and remove blade. Set aside for reuse.
8. Re-assembly is reversal of above instructions.

Drive Belt

1. If Heaters are fitted disconnect from terminals to allow the cover to be removed from the wiper.

   OUTSIDE

2. Remove any pipework fittings from both ends of the wiper.
3. Slacken cable glands and withdraw heater cable from bulkhead.
4. Remove the 2 x M8 Cap head bolts at each end of the cover and set aside.
5. Carefully remove the cover and set aside.
6. Remove the 4 x M6x10mm screws securing the arm to the carriage plate. The arm and blade assembly is now free from the wiper, set both assembly and fasteners aside.
7. Slip the belt off the spring-loaded pulleys then slide the carriage/belt assembly out of the end of the case at the idler pulley end. Note: The assembly can be removed from the drive pulley end, but the park sensor will then need to be detached first (where fitted).

8. In multi wiper installations, if there is insufficient space between adjacent wipers to remove the carriage, then it will be necessary to draw the carriage / belt assembly through adjacent wiper cases, detaching park sensors where necessary.

9. Inspect the drive belt and replace if damaged or worn. To detach the drive belt, note how the parts are assembled, then undo the 2 small nuts securing the belt to the clip.

10. Fit a new belt. Spare belts are supplied with nuts and clip plate. Refit and tighten nuts to the same height as the original and secure with Loctite thread lock (or similar).

11. Fit the carriage & belt assembly back into the casing and slip the belt onto the drive & idler pulleys.

12. Move the carriage by hand and ensure that it travels the full stroke length freely and without any obstruction. (Motion will feel restricted because the motor is being rotated if in doubt discount the motor). Refit the blade assembly with special screws removed.

13. Refit the front cover and secure with the 2 off M8 cover bolts. Reconnect any pipework fittings removed in para 2, and heater cable if removed at para 1.

Guide Rollers

1. Follow the Drive Belt renewal instructions 1 to 7 above.

2. Remove the roller stub shaft securing the guide roller and remove the guide roller.

3. Fit the new guide roller and secure with the roller stub shaft. Ensure that roller stub shaft is tightened firmly.

4. Re-assembly is reversal of above instructions.

Caution: Guide rollers have an integral dry bearing and MUST NOT be oil or grease lubricated.

Drive Shaft and Pulley Assembly

1. Slacken the clamping bolt securing the motor to the drive shaft assembly, withdraw the motor from the shaft and set aside ensuring the black coupling is kept with the motor.

2. Follow the Drive Belt renewal instructions 1 to 6 above.

3. Remove the 2 screws securing the park switch to the wiper case, withdrawing the cable through the slot in the case. Keep screws and fittings safe.

4. Dismount wiper from bulkhead and set aside fixings.

5. Unbolt drive shaft and pulley assembly from the main body of the wiper and set the fixings aside.

6. Withdraw the assembly from the wiper body and discard.

7. Insert the new assembly onto the body. Re-assembly is reversal of the above instructions and in accordance with the standard wiper installation instructions elsewhere in the manual.

Wiper Motor Replacement

1. Disconnect motor wiring and make a note of the connections.

2. Loosen motor pinch bolt and remove motor.

3. Ensure new motor has a rubber coupling fitted to the dog gear. Line up motor dog gear with drive shaft dog gear and slide motor into position. Tighten pinch bolt.

4. Wire to motor terminal connections.

Type C Common Cover Wiper Spares List

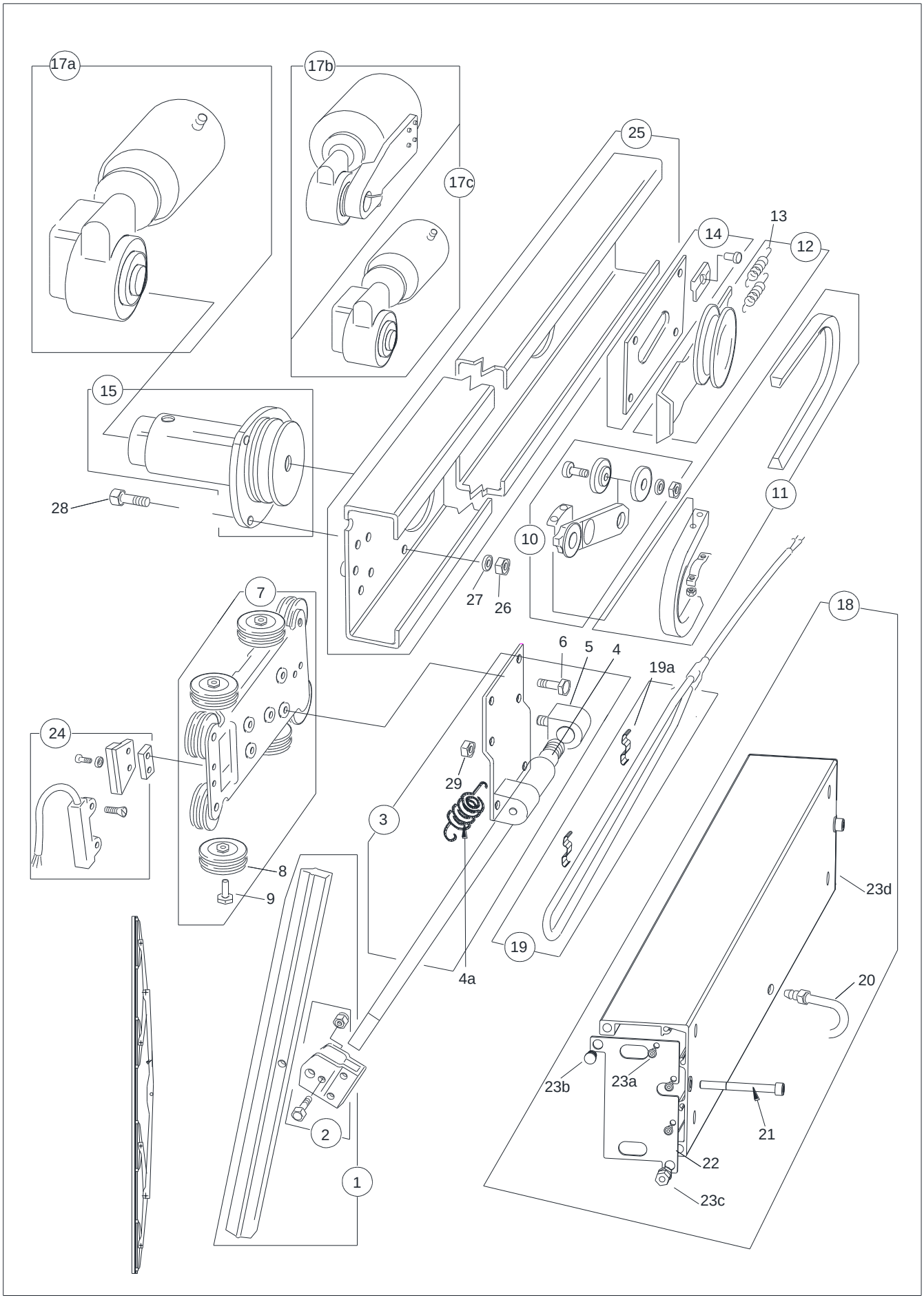
Ident	Description	Quantity	Part Number
1	Heavy Duty Blade Assembly	1	SP1688-001-***
	Articulated Blade Assembly	1	SP1279-553-***
2	Blade Attachment Clip (Stainless Steel)	1	SP1279-443
3	Blade Arm Assembly	1	CC**#R
4	Blade Arm Torsion Spring	1	SP1292-221
4a	Arm Spring(s) - where fitted at top of arm ‡	A/R	1279-157
5	Blade Arm Pivot Blocks	1 Kit/arm	SP1279-486-#.#
6	Arm Attachment Screws	Set of 4	SP1588-488
7	Carriage Plate Assembly – Single Blade	1	SP1588-005-M
	Carriage Plate Assembly – Twin Blade	1	SP1588-312-***
8	Guide Rollers c/w with Tyre & spanner	Set of 8	SP1588-117
	Guide Rollers c/w with Tyre	1	SP1588-006
9	Roller Stub Shaft	Set of 8	SP1588-113
10	Connecting Rod Assembly – Single	1	SP1588-474
	Connecting Rod Assembly – Twin Blade	1	SP1588-474T
11	Vee-Belt	1	SP1279-106-###
12	Idler Pulley Assembly c/w Springs (Single Blade)	1	SP1588-452
	Idler Pulley Assembly c/w Spring (Twin Blade)	1	SP1588-452T
13	Idler Pulley Tension Spring (Single Blade)	Set of 2	SP1279-157
	Idler Pulley Tension Spring (Twin Blade)	Set of 2	SP1279-496
14	Idler Pulley Guide Assembly	1	SP1588-490
15	Drive Shaft and Pulley Assembly - 84mm Std	1	SP1588-009-117
	Drive Shaft and Pulley Assembly - 140mm	1	SP1588-009-173
	Drive Shaft and Pulley Assembly - 200mm	1	SP1588-009-233
	Drive Shaft and Pulley Assembly - 220mm	1	SP1588-009-253
	Drive Shaft and Pulley Assembly - 240mm	1	SP1588-009-273

Ident	Description	Quantity	Part Number
	Drive Shaft and Pulley Assembly - 310mm	1	SP1588-009-310A
	Drive Shaft and Pulley Assembly - 35mm	1	SP1642-003
	Gas Tight Drive Shaft and Pulley Assembly Std	1	SP1588-030-117
	Gas Tight Drive Shaft and Pulley Assembly 140mm	1	SP1588-030-173
	Gas Tight Drive Shaft and Pulley Assembly 200mm	1	SP1588-030-233
17a	Parvalux 61, 115V AC, 50/60Hz, 3-Ph, 2 Speed	1	SP1490-000GA61
	Parvalux 62D+, 230V AC, 50/60Hz, 3-Ph, 2 Speed	1	SP1490-000GA62D
	Parvalux 64-T, 230V AC, 50/60Hz, 1-Ph, 1 Speed	1	SP1490-000GA64
	Parvalux 64L, 230V AC, 50/60Hz, 1-Ph, Low Speed	1	SP1490-000GA64L
	Parvalux 65, 115V AC, 50/60Hz, 1-Ph, 1 Speed	1	SP1490-000GA65
	Parvalux 65L, 115V AC, 50/60Hz, 1-Ph, Low Speed	1	SP1490-000GA65L
	Parvalux 81, 115V AC, 3-Ph, 3 Speed	1	SP1490-000GA81
	Parvalux 82, 220V AC, 3-Ph, 3 Speed	1	SP1490-000GA82
17b	SD11AM 115V AC, 50 Hz Variable Speed	1	SP1279-347
	SD11AM 115V AC, 60 Hz Variable Speed	1	SP1279-348
	SD11AM 230V AC, 50/60 Hz Variable Speed	1	SP1279-349
17c	PM3M 24Vdc Motor	1	SP1279-558-24
	PM3M 24Vdc Motor Slow Speed	1	SP1279-558L-24
	PM5M 24Vdc Motor	1	SP1279-513
18	Front Cover - Less Heater	1	See calculator 1681-161
19	Heater - Single Wiper	1	SP1588010$$$^^^
19a	Heater Clip	A/R	SP1588-056
20	Spray Tube Assembly	1	SP1588-418
21	Cover Bolts	each	zA0008-090S
22	End Cover Left Hand	each	SP1588-058L*
	End Cover Right Hand	each	SP1588-058R*
23a	Fixing Screw	6	zP00012S-1.0S

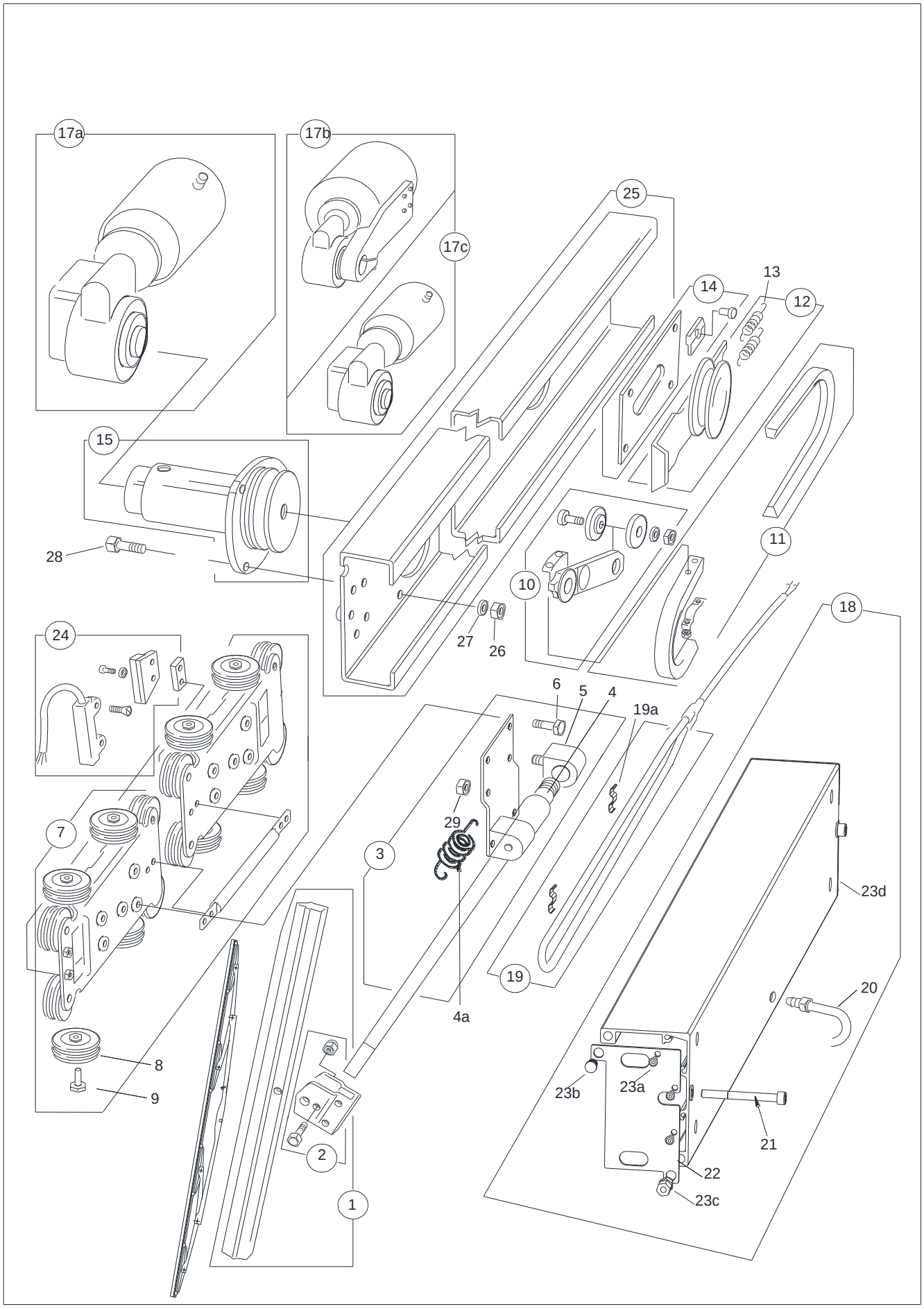
Ident	Description	Quantity	Part Number
23b	Blanking Plug	2	1588-062
23c	Metric Pipe Fitting	1	1588-038
23d	Tubing Plug	1	1588-037
24	Self-Parking Assembly (Reed sw and magnet) 2m	1	SP1588-012-1
	Self-Parking Assembly (Reed sw only) 2m	1	SP1587-034-1
25	Main Frame	1	See calculator 1681-161
26	Motor Housing Nut	each	10015100
27	Motor Housing Washer	each	10025306B
28	Motor Housing Bolt	each	zA0006-020S
29	Pivot Block Securing Nut	2	zNL0.25F-S
not shown	Wash Fittings SLW Single	1	SP1588-672
not shown	Wash Fittings SLW Twin	1	SP1588-673
not shown	Wash Fittings SLW Single Long	1	SP1588-674
not shown	Drive Coupling – fitted inside Drive Shaft	1	SP1279-250
not shown	L050 Rubber Spider – fitted to Drive Coupling	1	SP1279-252
not shown	Sealing Grommet – fitted around Drive Shaft	1	SP1279-137
not shown	Sealing Grommet Spacer– fitted around Drive Shaft	1	SP1588-745

*** In the Part Number means length in mm.
**# In the Part Number means length in mm and arm spring pressure code.
#.# In the Part Number means spring pressure in lb/ft. This is determined by Wynn according to arm and blade dimensions, together with any window rake angle from the vertical. This value can also be obtained from the original order documentation. See Wynn Agent for more details.
Belt length (written on belt as A###) in Inches.
‡ Where required, extra spring pressure is obtained by the addition of 1 or 2 springs to the wiper arm. Where fitted, order 1 or 2 as required. Contact Wynn Agent for more details.
$$$ Where $$$ is voltage (220,115 or 024)
^^^ Where ^ is heater length code.

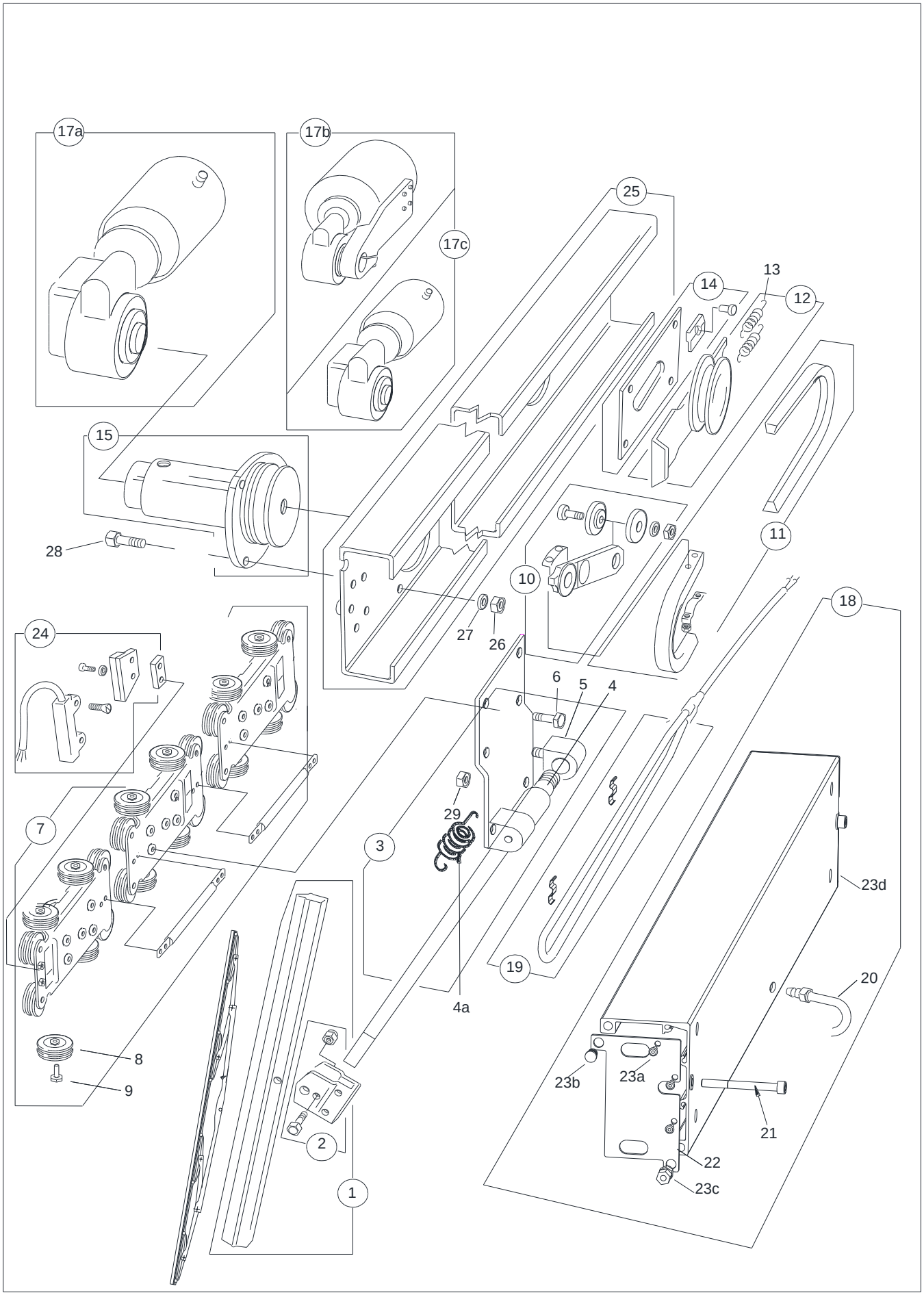
Type C Common Cover Single Spare Parts Drawing



Type C Common Cover Twin Spare Parts Drawing (Short)



Type C Common Cover Twin Spare Parts Drawing (Long)



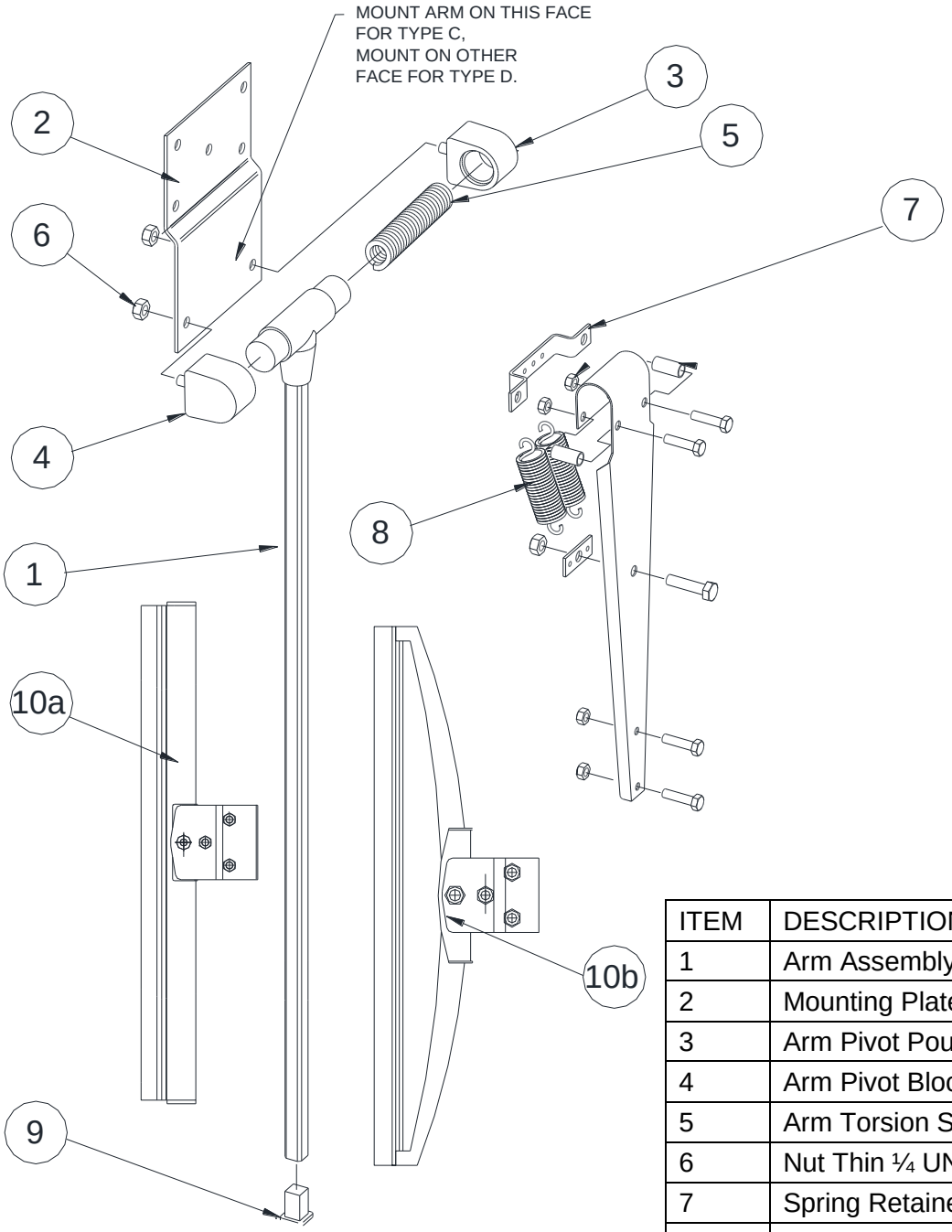
SLW Wiper Arm

The wiper arm is manufactured from stainless steel.

The wiper arm is shown below. One wiper arm assembly is used on a single bladed wiper, two wiper arm assemblies on a twin bladed wiper and three wiper arm assemblies on a triple bladed wiper unit.

The wiper arm assembly mounts on to the wiper assembly carriage plate. The wiper arm is secured to the carriage plate via four 10mm long mounting bolts.

The blade is secured to the arm assembly using the blade clip arrangement fitted to the wiper blade.



ITEM	DESCRIPTION	QTY
1	Arm Assembly	1
2	Mounting Plate	1
3	Arm Pivot Poundage Block	1
4	Arm Pivot Block	1
5	Arm Torsion Spring	1
6	Nut Thin ¼ UNF	2
7	Spring Retainer	1 (A/R)
8	Additional Spring	(0, 1, 2)
9	Sealing Plug	1
10a	Rigid Blade	1
10b	Articulated Blade	

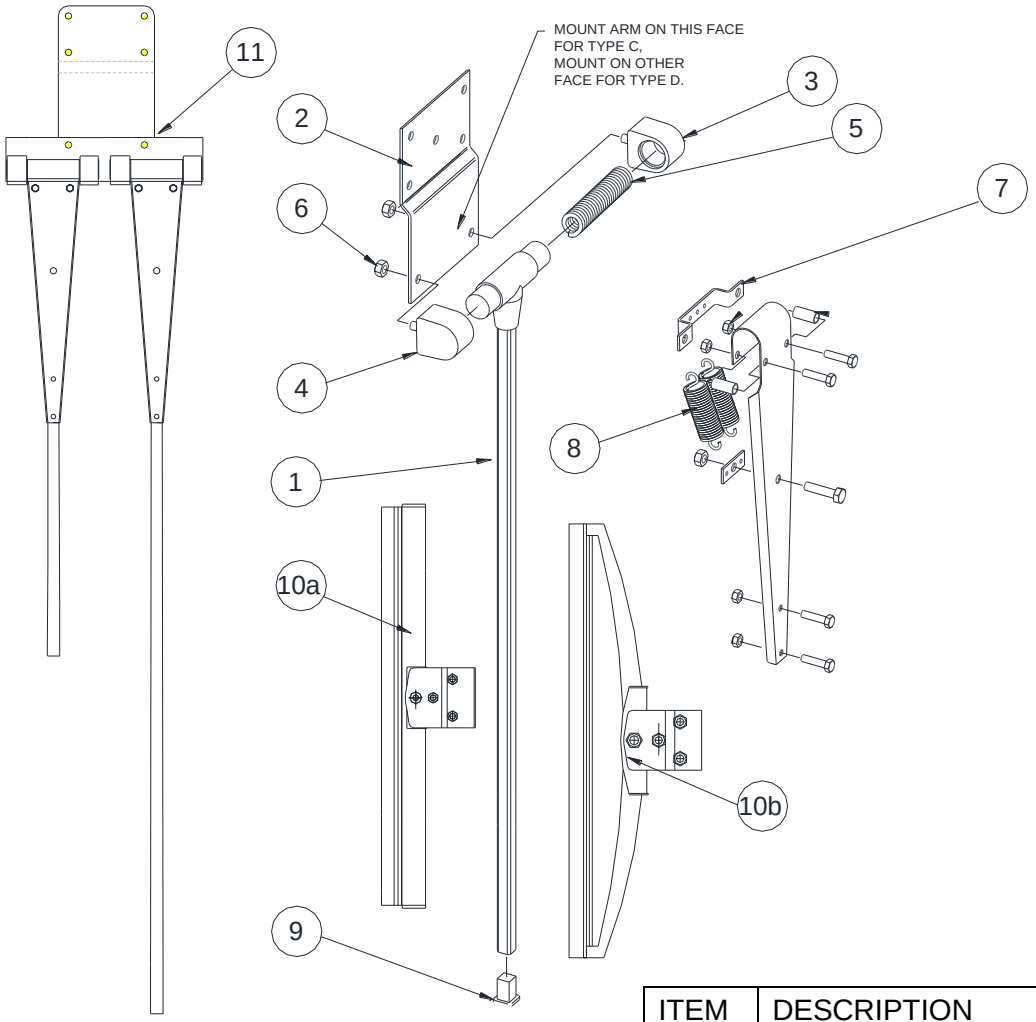
SLW Double Wiper Arm Assembly

The wiper arm is manufactured from stainless steel.

The wiper arm is shown below. One wiper arm assembly is used on a single bladed wiper, two wiper arm assemblies on a twin bladed wiper.

The double wiper arm mounting plate is secured to the wiper arm mounting plate with two bolts, washers and nuts. The complete wiper arm assembly mounts on to the wiper assembly carriage plate. The wiper arm is secured to the carriage plate via four 10mm long mounting bolts.

The blade is secured to the arm assembly using the blade clip arrangement fitted to the wiper blade.



OUTSIDE LOOKING IN

ITEM	DESCRIPTION	QTY
1	Arm Assembly	2
2	Mounting Plate	1
3	Arm Pivot Poundage Block	2
4	Arm Pivot Block	2
5	Arm Torsion Spring	2
6	Nut Thin ¼ UNF	4
7	Spring Retainer	2(A/R)
8	Additional Spring (per arm)	(0, 1, 2)
9	Sealing Plug	2
10a	Rigid Blade	2
10b	Articulated Blade	
11	Double Arm Mtg Plate	2

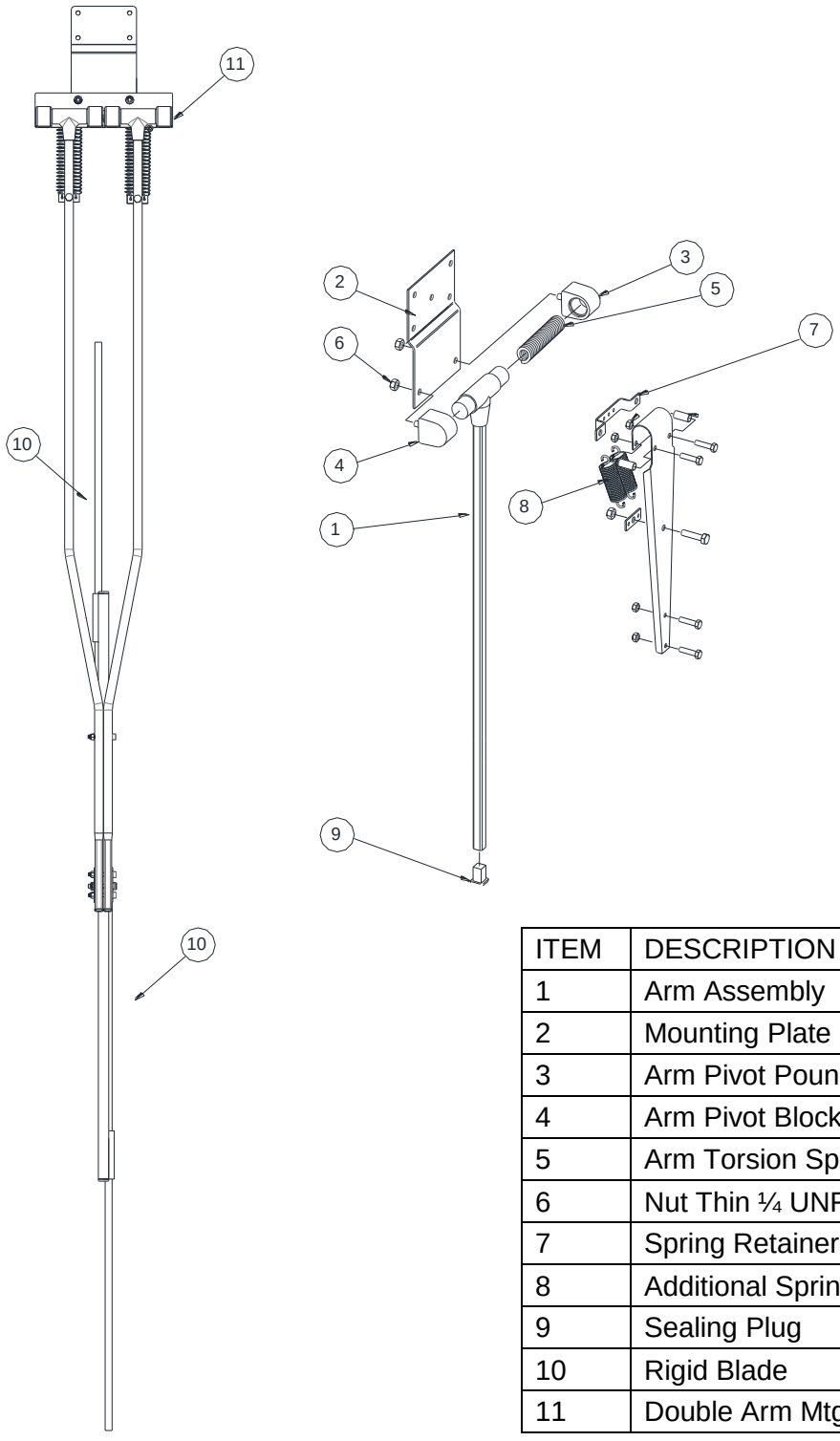
SLW Double Wiper Arm Assembly

The wiper arm is manufactured from stainless steel.

The wiper arm is shown below. One wiper arm assembly is used on a single bladed wiper.

The double wiper arm mounting plate is secured to the wiper arm mounting plate with two bolts, washers and nuts. The complete wiper arm assembly mounts on to the wiper assembly carriage plate. The wiper arm is secured to the carriage plate via four 10mm long mounting bolts.

The blade is secured to the arm assembly using the blade clip arrangement fitted to the wiper blade.



OUTSIDE LOOKING IN

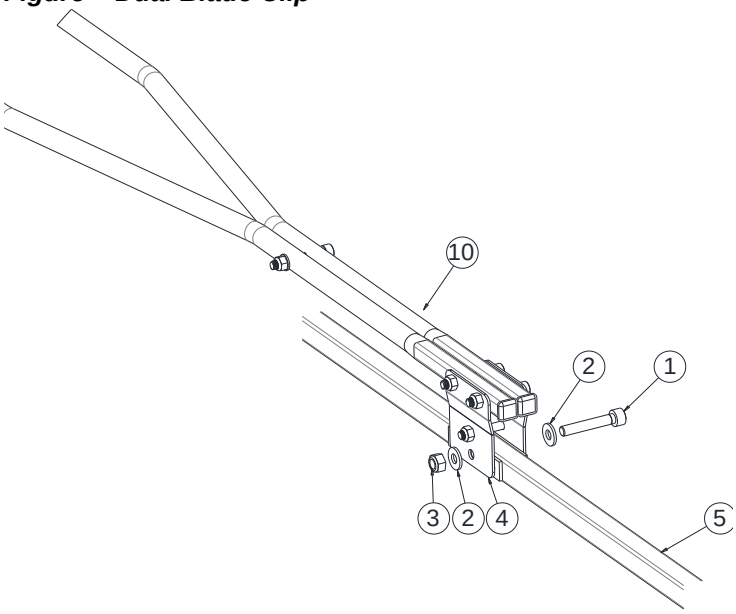
ITEM	DESCRIPTION	QTY
1	Arm Assembly	2
2	Mounting Plate	1
3	Arm Pivot Poundage Block	2
4	Arm Pivot Block	2
5	Arm Torsion Spring	2
6	Nut Thin ¼ UNF	4
7	Spring Retainer	2(A/R)
8	Additional Spring (per arm)	(0, 1, 2)
9	Sealing Plug	2
10	Rigid Blade	2
11	Double Arm Mtg Plate	2

FITTING THE WIPER BLADE CARRIER

The wiper blades should be changed every 12 months but this is dependent on use and operating conditions

Ref Figure – Dual Blade Clip

Figure – Dual Blade Clip



1. Remove one M6 blade retaining bolt ***(1),*** two M6 flat washers ***(2),*** and M6 Nylock nut ***(3),*** from blade clip on double wiper arm assy ***(10)***.

2. Place dual blade carrier assy ***(5)***, into blade clip on Arm ***(10)***.

3. Ensure that all fixing holes align.

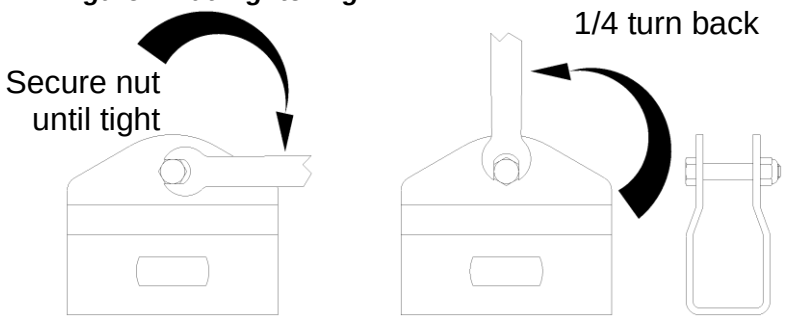
4. Secure in place with one M6 blade retaining bolt ***(1),*** two M6 flat washers ***(2),*** and M6 Nylock nut ***(3).***

IMPORTANT
DO NOT over tighten blade carrier retaining bolt and nut, as blade carrier is required to pivot on glass.

Ref Figure – Nut Tightening

5. Secure nut until tight – then 1/4 turn back.

Figure – Nut Tightening



EXAMPLE NUMBER

D	5	1	1	9	B	1	A	1	C	E	B	A	1	A	-

WIPER TYPE	CODE
D1	D1
D2	D2
D4	D4
D5	D5
C - 35mm Drive Shaft	C1
C - 84mm Drive Shaft	C2
C - 140mm Drive Shaft	C3
C - 200mm Drive Shaft	C4
C - 220mm Drive Shaft	C5
C - 84mm Gastight Drv Shft	C6
C - 140mm Gastight Drv Shft	C7
C - 200mm Gastight Drv Shft	C8

STROKE TYPE	CODE
Single	1
Twin	2
Special Twin Case (Non-std ctrs)	Q
Special Single (See Instructions)	S
Special Twin (See Instructions)	T
Type C Single Old Style Cse/Cvr	3
Type D Single Old Style Cse/Cvr	4
Type C Twin Old Style Cse/Cvr	5
Type D Twin Old Style Cse/Cvr	6
Type 76 Converted to Type D	7

TWIN STROKE LENGTH STANDARD 1 INCH (25MM) STROKE OVERLAP		
INCHES	MILLIMETRES	CODE
2 X 13	2 X 330	13
2 X 14	2 X 356	14
2 X 15	2 X 380	15
2 X 16	2 X 407	16
2 X 17	2 X 430	17
2 X 18	2 X 457	18
2 X 19	2 X 480	19
2 X 20	2 X 510	20
2 X 21	2 X 533	21
2 X 22	2 X 558	22
2 X 23	2 X 585	23
2 X 24	2 X 610	24
2 X 25	2 X 635	25
2 X 26	2 X 660	26
2 X 27	2 X 685	27
2 X 28	2 X 710	28
2 X 29	2 X 735	29
2 X 30	2 X 760	30
2 X 31	2 X 787	31
2 X 32	2 X 810	32
2 X 34	2 X 865	34
2 X 36	2 X 915	36
2 X 40	2 X 1015	40
2 X 41	2 X 1040	41
2 X 43	2 X 1095	43
2 X 45	2 X 1145	45
2 X 47	2 X 1195	47
2 X 49	2 X 1245	49
2 X 52	2 X 1335	52
2 X 57	2 X 1450	57
2 X 61	2 X 1560	61
2 X 67	2 X 1700	67
2 X 71	2 X 1800	71
2 X 76	2 X 1930	76
2 X 79	2 X 2005	79
SPECIAL TWIN		ST

(for twins , eg: 2x24" is shown as 24 with the 2 being stated at the previous part number digit)

LOW SPEED (L)

SINGLE STROKE LENGTH CODE	
INCHES	MM
12	305
13	330
14	356
15	380
16	407
17	430
18	457
19	480
20	510
21	533
22	558
23	585
24	610
25	635
26	660
27	685
28	710
29	735
30	760
31	787
32	810
33	840
34	865
35	890
36	915
37	940
38	965
39	990
40	1015
41	1040
43	1095
45	1145
47	1195
49	1245
51	1295
53	1335
55	1400
57	1450
59	1500
61	1560
63	1605
67	1700
71	1800
76	1930
79	2005
89	2260

HEATER	CODE
No Heater	0
24v Heater	A
115v Heater	B
220v Heater	C
SEE INST	S

HEATER CABLE LENGTH	CODE
Not Supplied	0
2 Metres	1
3 Metres	7
5 Metres	2
6 Metres	8
8 Metres	9
10 Metres	3
15 Metres	A
20 Metres	4
25 Metres	5
Terminated in Enclosure	6

PARKING	CODE
Parking Not Fitted	0
Standard Drive End Parking	
Normally open) Reed Switch (TYPE D)	- A
Normally open) Reed Switch (TYPE C)	- B
Proximity Switch (TYPE D)	- J
Non-Standard Drive End Parking	
Proximity Switch (TYPE D)	- G
Reed Switch Change over (Special Type C)	- C
Standard Idler End Parking	
Normally open) Reed Switch (TYPE D)	- D
Normally Open) Reed Switch (Type C))	- E
Non-Standard Idler End Parking	
Proximity Switch (Type D)	- H
Reed Switch c/over (Special Type C)	- F

PARKING CABLE LENGTH	CODE
Not Supplied	0
2 Metres	1
3 Metres	7
5 Metres	2
6 Metres	8
8 Metres	9
10 Metres	3
15 Metres	A
20 Metres	4
25 Metres	5
Terminated in Enclosure	6

Wiper Type	Motor Type	Code
MOTOR NOT SUPPLIED		MO
NO POD		00
C/D	115vac 1ph 50/60hz 1Sp GA65	CA
C/D	115vac 1ph 50/60hz Low Sp GA65-L	CB
C/D	115vac 3ph 50/60hz 2Sp GA61	CE
C	115vac 3ph 50/60hz 2Sp IP23 GA61-IP23	CF
B/C/D	115vac 3ph 50/60hz 1Sp GA63	CG
C/D	230vac 1ph 50/60hz 1Sp GA64	CH
C/D	230vac 1ph 50/60hz Low Sp GA64L	CJ
C	230vac 1ph 50/60hz 1Sp IP23 GA64-IP23	CL
C/D	230vac 3ph 50/60hz 2Sp GA62D	CM
C/D	230vac 3ph 50/60hz 1Sp GA68	CN
C/D5	24vdc 320rpm 90W (1279-557) PM3	CS
C	230vac 3ph 50/60hz 2Sp GA62D-IP23-E (emc)	CV
C	100vac 1ph 1sp GA69	CW
C/D	414vac 3ph 50/60hz 2 Sp	CX
D5/C	24vdc **162rpm** SLOW (1279-557L) PM3	CY
C/D2	Pneumatic Drive Motor	PN
C/D	110V 360RPM (1279-559-01) PM3	CZ

For use **only** when replacing a Type B with a Type C

C	115vac 1ph 50hz Var Sp	SD 11	CC
C	115vac 1ph 60hz Var Sp	SD11	CD
C	230vac 1ph 50/60hz Var Sp	SD11	CK

Motors for use with the 8000 series control system

C/D	115vac 1 & 3ph 50/60hz	GA81	DA
C/D	230vac 1 & 3ph 50/60hz	GA82	DB

MOTOR CABLE LENGTH MULTIPLE CABLES (D)	SINGLE CABLE (D)	TYPE C
Not Supplied A	A	A
2 Metres B	K	S
3 Metres X	Y	G
5 Metres C	L	T
6 Metres 6	Q	Z
7 Metres	7	
10 Metres D	M	U
12 Metres	H	
15 Metres	R	J
20 Metres E	N	V
25 Metres F	P	W

PAINT FINISH	CODE
Standard White	A
Ad Light Grey BS381C/697	B
Munsell Green N7.5	C
R84890 Haze Grey	D
RAL 7001	E
Storm Grey	F
Int Paint H725	G
French Gry J724 BS381C/ 630	H
Light Grey BS381C/631	J
RAL 7000 Navy Grey) (Bruno Peter Type 76))	K
Cream 20320	L
Yellow RAL 1003	M
Int Paint E459	N
Black Dull RAL 9005	P
Canadian Grey CL1647	R
Lt W'work GRY BS381C676	T
SWEDISH NAVY GREY	- U
NC S5005-R808	
LIGHT GREY RAL 7035	-V
Special Paint (see special instructions)	S

MOUNTING	CODE
Std Boss - 24 O/A (1588-057)	-
Boss - 26 O/A (1588-820)	B
Bracket (1588-870 - Type C) (1642-870 - Type D)	C
Universal Carrier (1588-871 & BRACKET)	D
Boss - 64 O/A (1588-057-60)	E
Quick Release - No Plug (1642-468)	F
Quick Release and CVN Plug (1642-468) + (A-ELEC-701)	G
QUICK RELEASE ONLY (1588-647)	H

SPRAY	CODE
No Spray	0
Std Spray Fitted	1
Spray Std + Banjo	2
Spray Jet S/Steel	3
150mm Spray Jet	4
SEE INST	S

MOTOR POSITION (viewed from outside)	CODE
Above Window Left	A
Above Window Right	B
Below Window Left	C
Below Window Right	D
Left Side Window Top	E
Right Side Window Top	F
Left Side Window Bttm *	G
Right Window Bottom *	H

*NOTE * = NOT RECOMMENDED

COMPLETE WIPER PART NUMBERS

CAD FILENAME + DIRECTORY M:\DRAW\1681\1681-161.DWG

3rd ANGLE PRO.

TOLERANCES UNLESS OTHERWISE STATED
DECIMAL DIMS. TO 2 PLACES ± 0.1mm.
DECIMAL DIMS. TO 1 PLACE ± 0.25mm
NO DECIMAL PLACES ± 0.5mm
ANGLES ± 1°

MOD STATUS									
30	s1702	17.10.11	25	10-454	30.11.10	35	S7760	21.08.13
29	S618	10.05.11	24	6478	13/09/10	34	S6646	18.04.13
28	S448	19.04.11	23	NONE	18.11.05	33	S6249	07.03.13
27	11-134	08.03.11	37	S15178	30.07.2015	32	s2930	16.03.12
26	6953	08.03.11	36	S11968	16.10.2014	31	S2641	15.02.12
MAT'L:-	ISS.	DIN DATE	ISS.	DIN	DATE	ISS.	DIN	DATE
FINISH:-	SCALE:-	DRAWN:- DD	CHKD:-			CHANGED:- DD		

USED ON:

Wynn MARINE LIMITED
CHELTENHAM ENGLAND

TITLE:- STRAIGHT LINE WIPER UNIT PART NUMBER OPTIONS

DRAWING No. 1681-161

SPARES ORDERING

EXAMPLE NUMBER

D	5	1	1	1	9	B	1	A	1	1	A	1	-
*	*	*	*	*	*	*	*	*	*	*	*	*	*

WIPER TYPE	CODE
D1	-D1
D2	-D2
D4	-D4
D5	-D5
C	-C1

COVER / CASE	CODE
COVER	-1
CASE	-2
COVER old style C	-3
COVER old style D	4

STROKE TYPE	CODE
Single	1
Twin	2
Special Twin Case (Non-std ctrs)	Q
Special Single (See Instructions)	S
Special Twin (See Instructions)	T

SINGLE STROKE LENGTH CODE	
INCHES	MM
12	305
15	350
17	430
19	480
21	533
23	585
25	635
27	685
29	735
31	787
33	840
35	890
37	940
39	990
41	1040
43	1095
45	1145
47	1195
49	1245
51	1295
53	1335
55	1400
57	1450
59	1500
61	1560
63	1605
67	1700
71	1800
76	1930
79	2005
89	2260

TWIN STROKE LENGTH STANDARD 1 INCH (25MM) STROKE OVERLAP		
INCHES	MILLIMETRES	CODE
2 X 13	2 X 330	13
2 X 14	2 X 356	14
2 X 15	2 X 380	15
2 X 16	2 X 407	16
2 X 17	2 X 430	17
2 X 18	2 X 457	18
2 X 19	2 X 480	19
2 X 20	2 X 510	20
2 X 21	2 X 533	21
2 X 22	2 X 558	22
2 X 23	2 X 585	23
2 X 24	2 X 610	24
2 X 25	2 X 635	25
2 X 26	2 X 660	26
2 X 27	2 X 685	27
2 X 28	2 X 710	28
2 X 29	2 X 735	29
2 X 30	2 X 760	30
2 X 31	2 X 787	31
2 X 32	2 X 810	32
2 X 34	2 X 865	34
2 X 36	2 X 915	36
2 X 40	2 X 1015	40
2 X 41	2 X 1040	41
2 X 43	2 X 1095	43
2 X 45	2 X 1145	45
2 X 47	2 X 1195	47
2 X 49	2 X 1245	49
2 X 52	2 X 1335	52
2 X 57	2 X 1450	57
2 X 61	2 X 1560	61
2 X 67	2 X 1700	67
2 X 71	2 X 1800	71
2 X 76	2 X 1930	76
2 X 79	2 X 2005	79
SPECIAL TWIN		ST

(for twins , eg: 2x24" is shown as 24 with the 2 being stated at the previous part number digit)

HEATER	CODE
No Heater	-0
24v Heater	-A
115v Heater	-B
220v Heater	-C
SEE INST	-S

NOTE: HEATERS FITTED TO COVERS ONLY

HEATER CABLE LENGTH	CODE
Not Supplied	-0
2 Metres	-1
3 Metres	-7
5 Metres	-2
6 Metres	-8
8 Metres	-9
10 Metres	-3
15 Metres	-A
20 Metres	-4
25 Metres	-5
Terminated in Enclosure	-6

WIPER SPARE CASE/COVER PART NUMBERS

PARKING CABLE LENGTH	CODE
Not Supplied	-0
2 Metres	-1
3 Metres	-7
5 Metres	-2
6 Metres	-8
8 Metres	-9
10 Metres	-3
15 Metres	-A
20 Metres	-4
25 Metres	-5

PARKING	CODE
Parking Not Fitted	0
Standard Drive End Parking	
Normally open) Reed Switch (TYPE D)	- A
Normally open) Reed Switch (TYPE C)	- B
Proximity Switch (TYPE D)	- J
Non-Standard Drive End Parking	
Proximity Switch (TYPE D)	- G
Reed Switch Change over (Special Type C)	- C
Standard Idler End Parking	
Normally open) Reed Switch (TYPE D)	- D
Normally Open) Reed Switch (Type C))	- E
Non-Standard Idler End Parking	
Proximity Switch (Type D)	- H
Reed Switch c/over (Special Type C)	- F

PAINT FINISH	CODE
Standard White	- A
Admiralty Light Grey	- B
Munsell Green N7.5	- C
R84890 Haze Grey	- D
RAL 7001	- E
Storm Grey	- F
Int Paint H725	- G
French Grey J724	- H
Light Grey BS381C	- J
RAL 7000 Navy Grey (Bruno Peter Type 76)	- K
Cream 20320	- L
Yellow RAL 1003	- M
Int Paint E459	- N
Black Dull RAL 9005	- P
Canadian Grey CL1647	- R
RAL 7037 Dusty Grey	- T
SWEDISH NAVY GREY NC S5005-R808	- U
LIGHT GREY RAL 7035	-V
Special Paint (see special instructions)	- S

SPRAY	CODE
No Spray	- 0
Std Spray Fitted	- 1
Spray Std + Banjo	- 2
Spray Jet S/Steel	- 3
150mm Spray Jet	- 4
SEE INST	- S

NOTE: SPRAY FITTED TO COVERS ONLY. NO SPRAY ON 80, B OR 48

MOUNTING	CODE
Std Boss - 24 O/A (1588-057)	-
Boss - 26 O/A (1588-820)	B
Bracket (1588-870 - Type C) (1642-870 - Type D)	C
Universal Carrier (1588-871 & BRACKET)	D
Boss - 64 O/A (1588-057-60)	E
Quick Release - No Plug (1642-468)	F
Quick Release and CVN Plug (1642-468) + (A-ELEC-701)	G
QUICK RELEASE ONLY (1588-647)	H

WINDOW HANDING	
Not Supplied	-0
LEFT	-1
RIGHT	-2

(above window)

CAD FILENAME + DIRECTORY M:\DRAW\1681\1681-161.DWG

3rd ANGLE PRO.

TOLERANCES UNLESS OTHERWISE STATED
DECIMAL DIMS. TO 2 PLACES ± 0.1mm.
DECIMAL DIMS. TO 1 PLACE ± 0.25mm
NO DECIMAL PLACES ± 0.5mm
ANGLES ± 1°

MOD STATUS	ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE
	30	s1702	17.10.11	25	10-454	30.11.10	35	S7760	21.08.13
	29	S618	10.05.11	24	6478	13/09/10	34	S6646	18.04.13
	28	S448	19.04.11	23	NONE	18.11.05	33	s6249	07.03.13
	27	11-134	08.03.11	37	S15178	30.07.2015	32	s2930	16.03.12
	26	6953	08.03.11	36	S11968	16.10.2014	31	S2641	15.02.12

MAT'L:- FINISH:- SCALE:- DRAWN:- DD CHKD:- CHANGED:-

USED ON:

Wynn MARINE LIMITED
CHELTENHAM ENGLAND

TITLE:- STRAIGHT LINE WIPER COVER/CASE SPARES PART NUMBER OPTIONS

DRAWING No. 1681-161

SERIES 8000 CONTROL SYSTEM

The Series 8000 Network Control System contains a touch sensitive keypad and a wiper motor control PCB that can fitted in individual modules or in multiples in a range of 19” Racks.

The Keypad

This is specially designed for marine applications and by using the latest modern electronics the system is very robust. The intermittent and wash cycle timings can be easily programmed from the keypad. The background illumination on the key icons can be dimmed to completely off.

Standard keypads are flush mounted into the Bridge Console, and are touch sensitive with three wiper speeds, two intermittent speeds, wash program, window and wiper case heat keys. Customised keypads are available on request.

The Wiper Motor Control PCB

These have a mains operating voltage of 110 or 230v AC at 50~60Hz 1 phase or 3 phase.

Each module generates its own 24v DC supply for the control circuitry and keypads from the mains voltage, so there is no requirement for an external PSU.

Each motor control PCB has four additional outputs which can be used for wash, purge, wiper heater and window heater control. The modules have a group address so wipers can be selectively controlled from the keypad. They are preset in production but can also be reset by the customer.

Power for the wiper, heaters and wash system is taken directly to the control module, located close to the wiper unit or to the 19 inch Rack Units located in a suitable room. Onboard current monitoring circuitry will isolate and shut down the motor output if too much current is drawn. The Auxiliary outputs are protected by an internal fuse, 10A total for all four outputs.

The connectors are high quality Cage clamp connectors. There are double height connectors for bus and power input. All other connectors are single height.

System Compatibility And Requirements

The systems comply with ISO 60945 ESD, EMC and environmental specifications.

The bus communications protocol can be either RS485 or CAN-bus. CAN-bus systems can easily be interfaced with touch screens.

Bus wiring is must consist of a twisted pair for the communication lines (Bus+, Bus-) and a twisted pair for the power lines (24V, 0V). The power lines are connected at each module to ensure a constant supply to the keypad in the event of a module failure. The cable must comply with the DeviceNet specification and the communication pair have a characteristic impedance of 120 Ohms.

The cable size is dependent on the distance between the first wiper module/rack unit and furthest keypad:-

Bus Length	Min Cable Size	
	Power	Data
Up to 100m	0.38 mm² (22 AWG)	0.22mm² (24 AWG)
Above 101m	1.5 mm² (15 AWG)	0.96mm² (18 AWG)

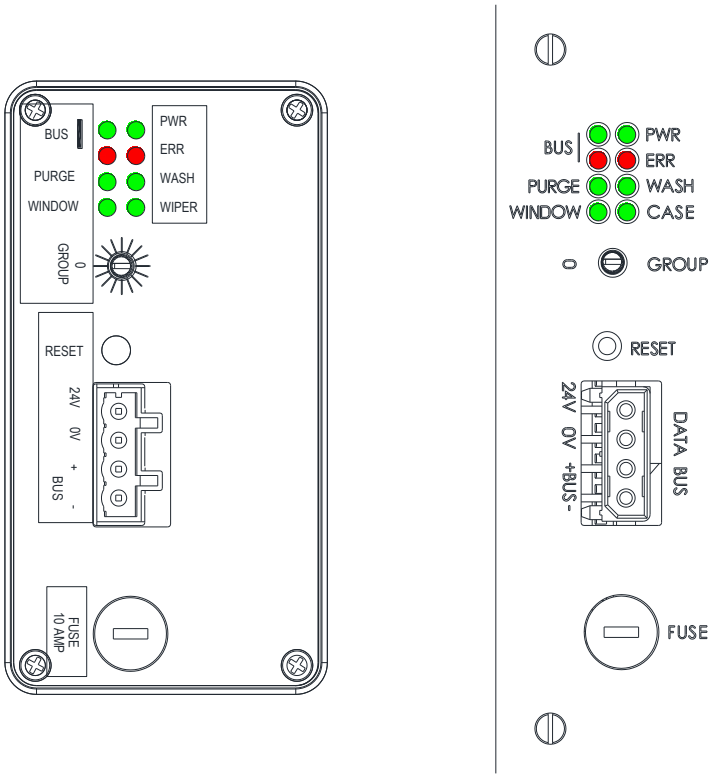
A terminating resistor module must be connected into the communication lines at the first keypad and a terminating resistor module must be connected across the communication lines at the last module.

Integrated Fault Diagnosis

Each wiper motor control PCB has a built in, real time integrated fault diagnosis, which is made visual by LED's on the end panel.

The diagnostic real time fault functions are:-

PWR	ON	Internal/external supply status (indication that the module has power)
BUS	ON	Bus activity (indication that the bus is working correctly)
PURGE WASH WINDOW WIPER	ON ON ON ON	Output status, for the wash, purge, wiper heater, window heater (indication of auxiliary output status)
BUSERR	ON	Bus command errors
ERR	FLASH 0.5/1.5 sec	PCB Overheat detection
ERR	FLASH 2.5/0.5 sec	Park switch not detected
ERR	FLASH 1.0/1.0 sec	Over current detection (on all outputs)
ERR	FLASH 0.5/0.5 sec	Short circuit detection (on all outputs)
PWR BUS	FLASH TOGETHER	Phase missing (3 phase systems)



MODULE RACK

FRONT PANEL SHOWING DIAGNOSTIC LED'S

INSTALLING DEVICENET BUS CABLES

General Guidelines

Bus cables should ideally be installed in their own steel cable channels or conduits. Plastic trunking provides no screening whatsoever: it is just a cable tidy. Basket type cable trays also do not provide screening.

If not installed in conduit bus cables should be brightly coloured and installed where they are clearly visible and separate from all other cables in order to improve any interference pickup and to avoid accidental damage.

When installing, it is important not to distort or damage bus cables since this can cause reflections to occur in the network. ***In particular, do not twist or stretch bus cables, do not squash or crimp them and adhere to the recommended minimum bend radius*** (typically stranded cables: 45mm for a single bend and 65mm for repeated bending).

Bus cable selection

The bus cable must comply with the DeviceNet specification and the communication pair have a characteristic impedance of 120 Ohms. DeviceNet spec cables provide data & power combined.

The cable size is dependent on the distance between the first wiper module/rack unit and furthest keypad:-

Bus Length	**Min Cable Size**	
	Power	**Data**
Up to 100m	0.38 mm² (22 AWG)	0.22mm² (24 AWG)
Above 101m	1.5 mm² (15 AWG)	0.96mm² (18 AWG)

Suitable cables for bus systems up to 100m are:-

a) Belden 3084A
b) Leoni L45467-F16-W6
c) SAB DN 656 Drop Cable Pt No 06562241
d) LAPP Unitronic Bus FD P DeviceNet Drop Cable Pt No 2170 255
e) LAPP Unitronic FD P DeviceNet Thin Pt No 2170 345
f) LAPP Unitronic DeviceNet Thin Pt No 2170 341

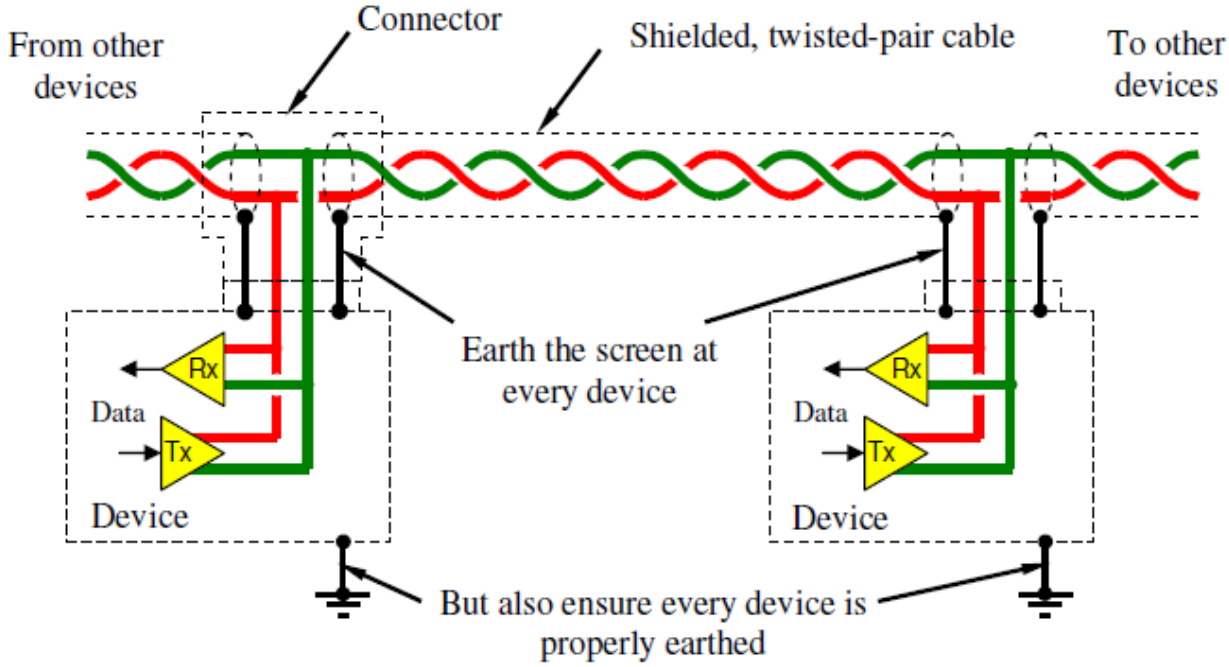
Suitable cables for bus systems over 101m are:-

a) Belden 3082A
b) Leoni L45467-F21-W6
c) SAB DN 656 Trunk Cable Pt No 06562781
d) LAPP Unitronic Bus FD P DeviceNet Trunk Cable Pt No 2170 254
e) LAPP Unitronic FD P DeviceNet Thick Pt No 2170 344
f) LAPP Unitronic DeviceNet Thick Pt No 2170 340

All factory and relevant approvals testing has been completed using Belden 3084A cable. This is our recommend cable to use.

Screening balanced cables

DEVICENET RS-485 transmission is balanced to improve noise rejection. Therefore we should earth the cable screen at both ends to ensure that it is effective at high frequencies. This is normally done by connecting the cable screen to the device earth via the connectors. However, we must make sure that the device is correctly earthed. Poor shielding or earthing is a very common wiring error.



Cable Segregation

To reduce the chances of interference pickup, it is important that bus cables are run separately from other types of cable. It is useful to categorise various cable applications as follows:

Category I:

- Fieldbus and LAN cables (e.g. DeviceNet, Ethernet etc.).
- Shielded cables for digital data (e.g. printer, RS232 etc.).
- Shielded cables for low voltage (≤25V) analogue and digital signals.
- Low voltage power supply cables (≤60V).
- Coaxial signal cables

Category II:

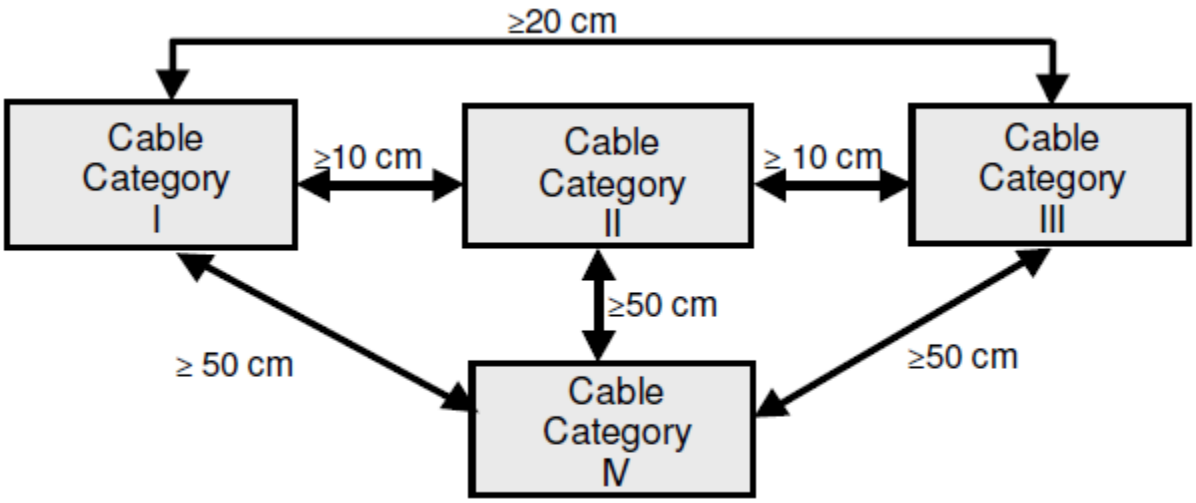
- Cables carrying DC voltages >60V and ≤400 V
- Cables carrying AC voltages >25V and ≤400 V

Category III:

- Cables carrying DC or AC voltages >400 V
- Cables with heavy currents.
- Motor/drive/inverter cables.
- Telephone cables (can have transients >2000V).

Category IV:

- Cables of categories I to III at risk from direct lightning strikes (e.g. connections between components in different buildings)

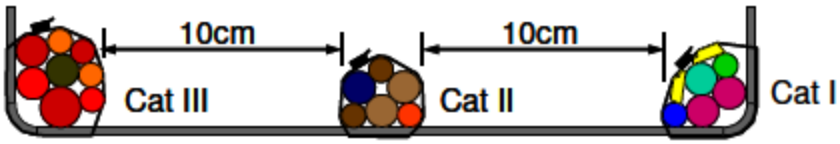


Separation distances for cables of different category

Sometimes it is impossible to adhere to the separation distances. Where cables have to cross, they should cross at right angles and should never run in parallel even for short distances.

Use of cable trays and channels

Cables from the same category can be bundled together or laid directly beside each other in the same cable trays. Cables of different category must be separated by at least the distances shown.



Cables mounted on a cable tray, rack or ladder must be separated by the recommended clearances

Common RS-485 wiring errors

It is common to find simple RS-485 wiring and layout errors in the field. The most frequently occurring errors are described below:

1. Termination problems:
   a. Lack of bus terminations (6000-TR120) at the end of the bus.

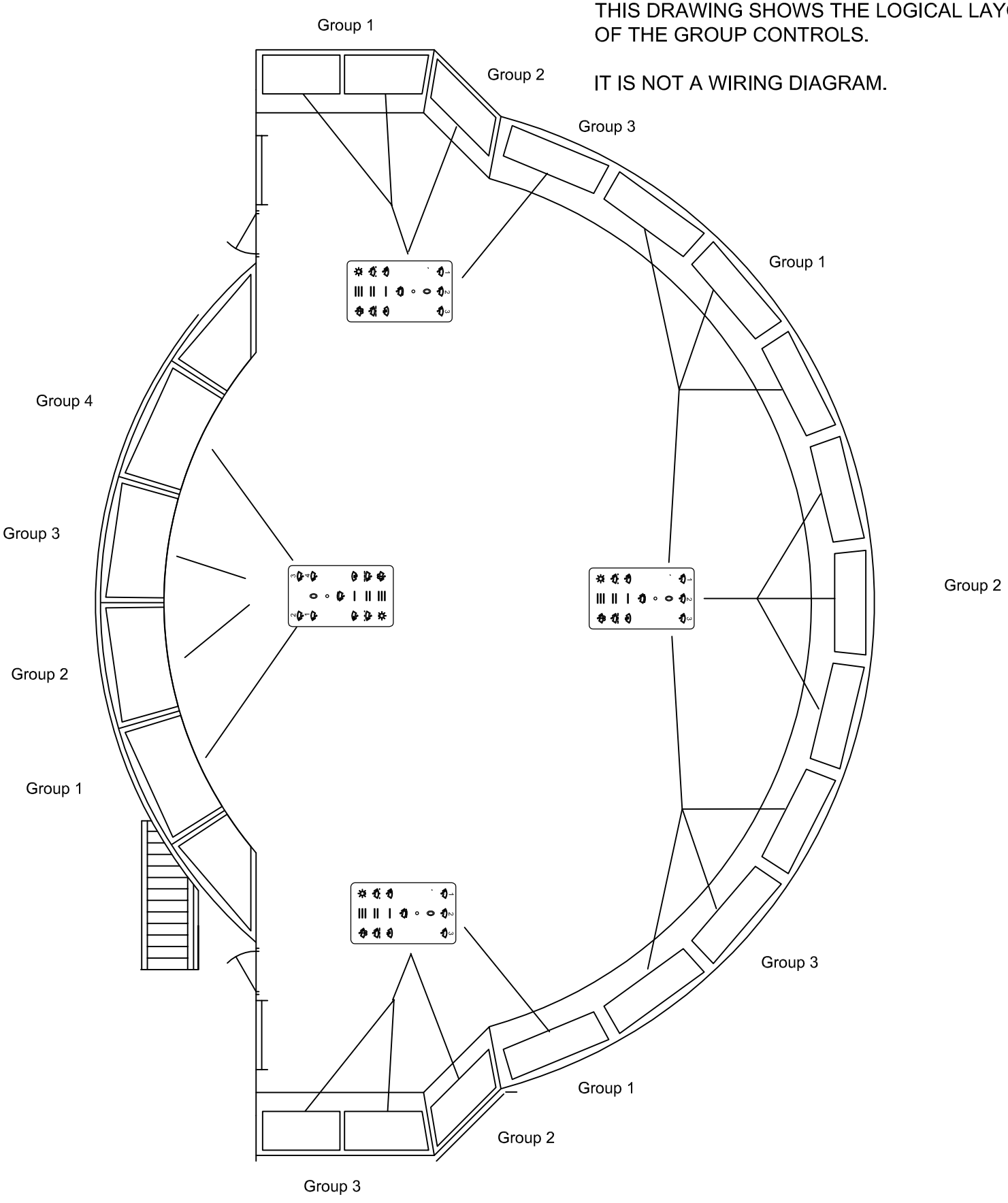
2. Pickup and interference caused by:
   a. Laying bus cables too close to electrically noisy power cables or equipment.
   b. Lack of proper earthing of the cable screen at every device.

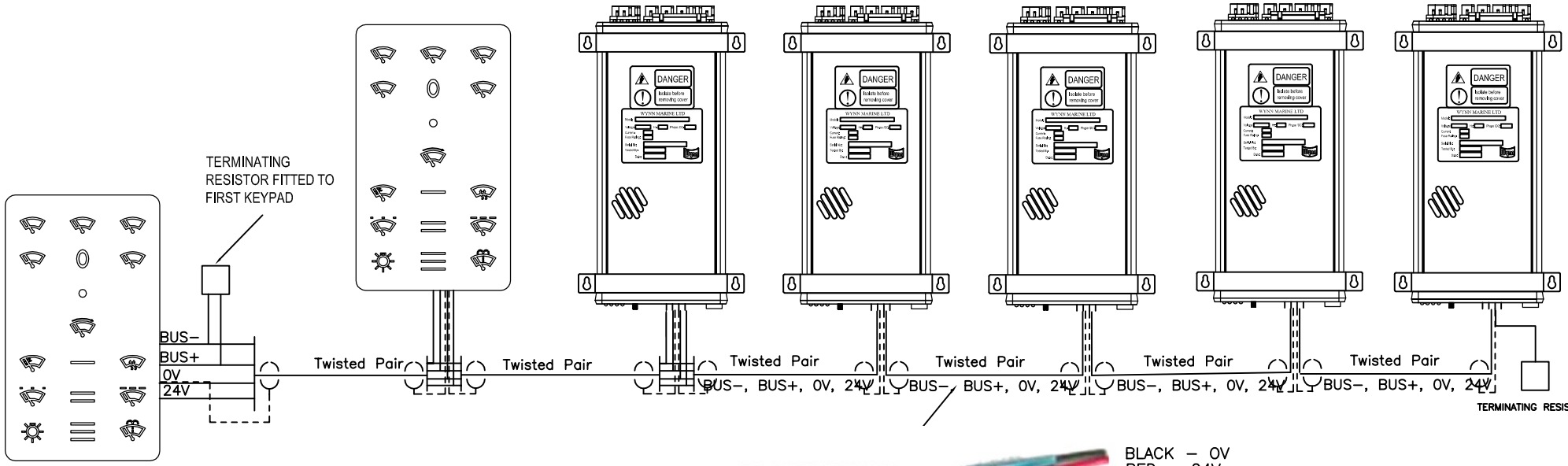
3. Wiring problems:
   a. Wrong cable used.
   b. Damaged cable (including squashed, over-bent)
   c. Swapped cores at a device
   d. Un-earthed screen (not connected at every device, un-earthed devices etc.)

TYPICAL BRIDGE LAYOUT

THIS DRAWING SHOWS THE LOGICAL LAYOUT OF THE GROUP CONTROLS.

IT IS NOT A WIRING DIAGRAM.





BLACK – 0V
RED – 24V

BLUE – BUS+
WHITE – BUS–

CABLE SCREEN MUST BE CONNECTED TO BUS 0V AT ALL CONNECTION POINTS

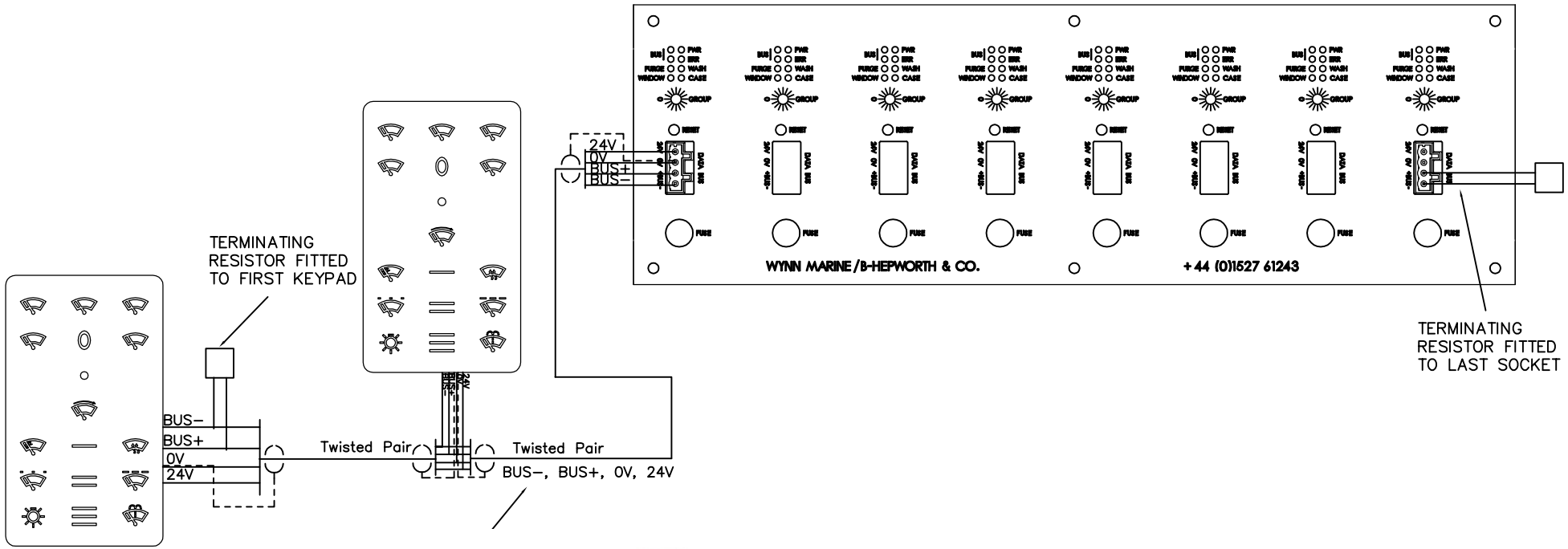
												1		29.08.13	
ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE	
DRAWN: DM			CHANGED:			APPROVED:			CAD FILE					SCALE: 1:1	

THIRD ANGLE PROJECTION

B. HEPWORTH & CO LTD

TITLE:– 8200 BUS WIRING

DRAWING No. 8200-BUS-MODULE



BLACK – 0V
RED – 24V

BLUE – BUS+
WHITE – BUS−

CABLE SCREEN MUST BE CONNECTED TO BUS 0V AT ALL CONNECTION POINTS

												1		29.08.13	
ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE	ISS.	DIN	DATE	
DRAWN: DM			CHANGED:			APPROVED:			CAD FILE			SCALE: 1:1			

THIRD ANGLE PROJECTION

B. HEPWORTH & CO LTD

TITLE:– 8200 BUS WIRING

DRAWING No. 8200–BUS–19RACK

INSTALLATION OF SHIELDED TWISTED PAIR CABLE

Belden DeviceBus ® for ODVA DeviceNet

- 300V Class 2 Thin
- 22 and 24 AWG Stranded Tinned Copper
- 100% individually foil shielded + overall 65% TC Braid
- Drain Wire
- PVC Insulation (Power)
- FPE Insulation (data)
- Lt Gray sunlight / oil resistant PVC jacket
- Thin 75^{o}C
- **Conductor (stranding) Diameter Nom. DCR** - (2) 22 AWG TC (154 x 44) 17.5 Ω/ M', 57.4 Ω /km
- **Conductor (stranding) Diameter Nom. DCR** - (2) 24 AWG TC (105 x 44) 28.0 Ω/ M', 91.9 Ω /km, Nom. Characteristic Impedance 120 Ω, Nom. Capacitance Conductor to Conductor 12 pF/ft
- **Shielding materials Nom. DCR** - 100% individual foil + overall 65% TC braid 3.2 Ω/ M', 10.5 Ω /km
- **Nominal OD** - 0.28", 7.11mm

This guide is based on the use of Belden 3084A cable (or similar, see specification above).

The cable is made up of a 22AWG power pair (red/black) and a 24AWG data pair (blue/white), each pair is individually foil screened with a drain wire, and an overall shielding braid.

For installation in a Wynn 8000 Series Network Control System, the screen needs to be terminated at both ends of each piece of bus cable.

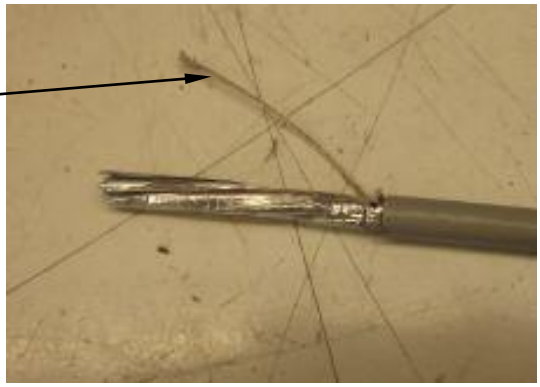
Poor Screening = Poor reliability

Both end of the cable should be prepared as follows:-

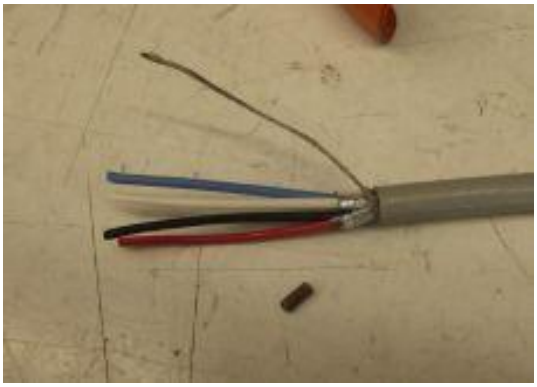
1. Strip the outer insulation back 50mm.

2. Carefully peel back the braid and trim back to insulation.

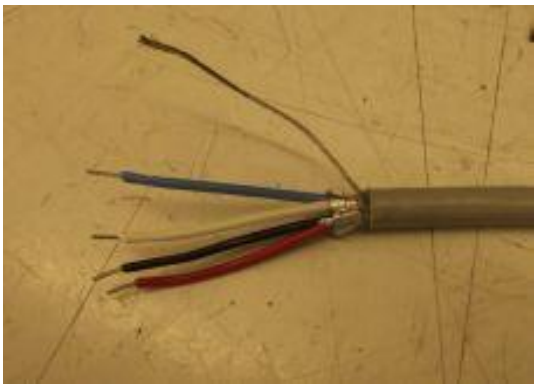
   Do not cut drain wire.



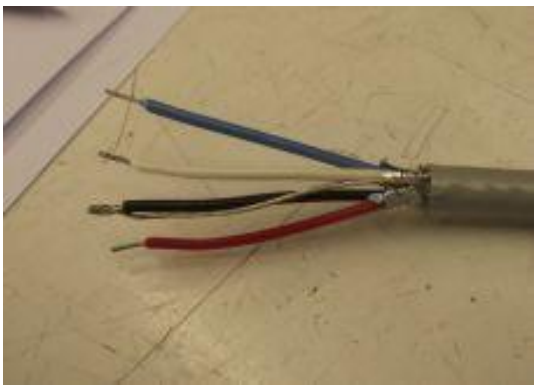
3. Remove the foil insulation leaving 5mm showing.



4. Untwist each pair and strip back insulation on each conductor 5mm and twist strands together.



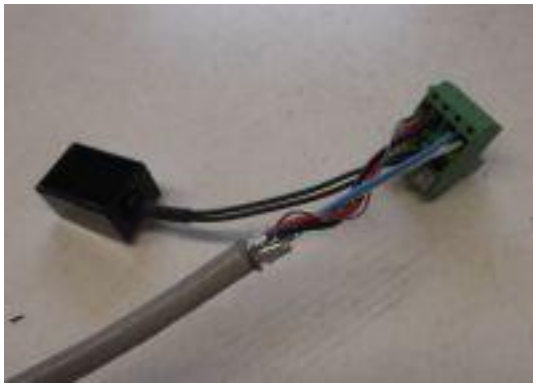
5. Secure the braid/drain wire together with the 0V conductor - Black in the bus plug. This connection is electrically bonded to the Earth pin on the mains connection plug.



6. Connect the conductors to the keypad 4 way bus connector as follows:

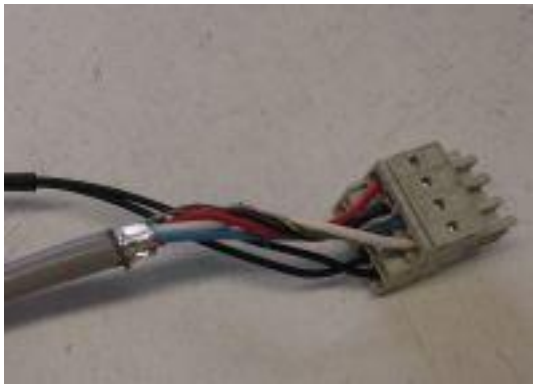
Bus Connection	Colour
24V Power	Red
0V Power	Black
Bus +	Blue
Bus -	White

7. Connect termination resistor (6000-TR120) to Bus+ & Bus- connections. (First Keypad Only)



8. Connect the conductors to the module 4 way bus connector as follows:

Bus Connection	Colour
24V Power	Red
0V Power	Black
Bus +	Blue
Bus -	White



9. Connect termination resistor (6000-TR120) to Bus+ & Bus- connections. (Last module only)

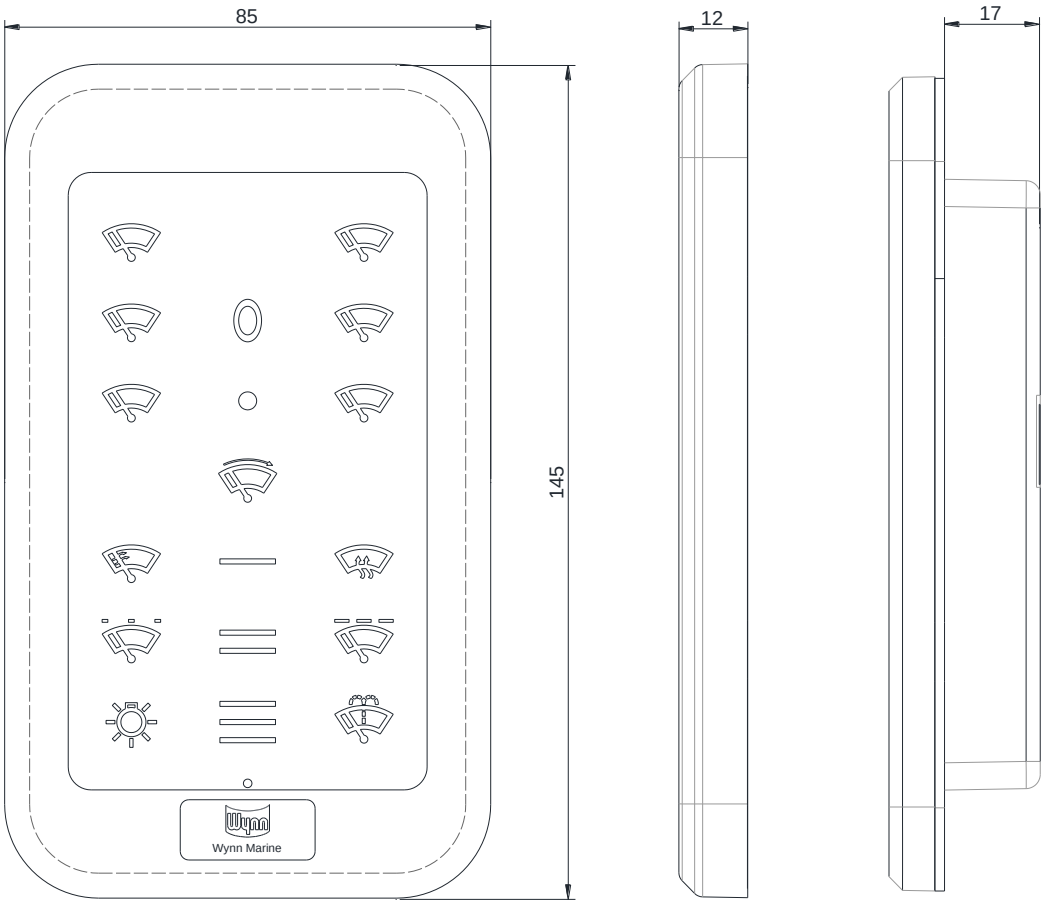
8500 KEYPAD

Technical specifications

Input supply	24VDC – From Bus
Maximum number of groups	9
Number of Auxiliary controls	4
IP rating	IP66
Technology	Capacitive Touchpad
Communications	RS485/CANBUS/(USB – Service only)
Illumination	3 colour LED – Fully dimmable

Keypad Dimensions

The overall keypad and clip-on cover dimensions are shown in the diagram below.



The 8500 keypad must be panel mounted, but can be in any plane it is important to ensure access can be gained to the rear connectors.

The 2-way and 4-way connectors are mounted on the rear of the keypad enclosure accept a Phoenix Contact style plug with screw terminals.

The 2-way connector is for remote interface operation (future option) and the 4-way connector for the bus connection.

A USB connector is fitted; this is for Service Personnel access only.

There are no adjustable or user-serviceable parts within the keypad.

WARNING!
The Keypad module is a low voltage (24V DC) module – It has been designed to withstand bus wiring errors without damage but any voltage over 40V dc applied to the unit will destroy it and will void any warranty.

Installation procedures must be carried out with care, to ensure correct and safe operation. If you are in any doubt, consult qualified and competent engineering personnel, or consult Wynn Marine technical support (contact details on front and rear cover of this document).

A Termination resistor (6000-TR120) must be connected to the first keypad in the bus line only. ***(Supplied with keypad)*** **On multiple keypad systems all other keypads are connected directly onto the bus without the termination resistor.**

A Termination resistor (6000-TR120) ***(Supplied with keypad)*** **must be connected to the last module on the bus.**

Only connect the devices to the bus, power and outputs when you are sure the wiring is correct. Connect the plug firmly. Make all connections with the power off.

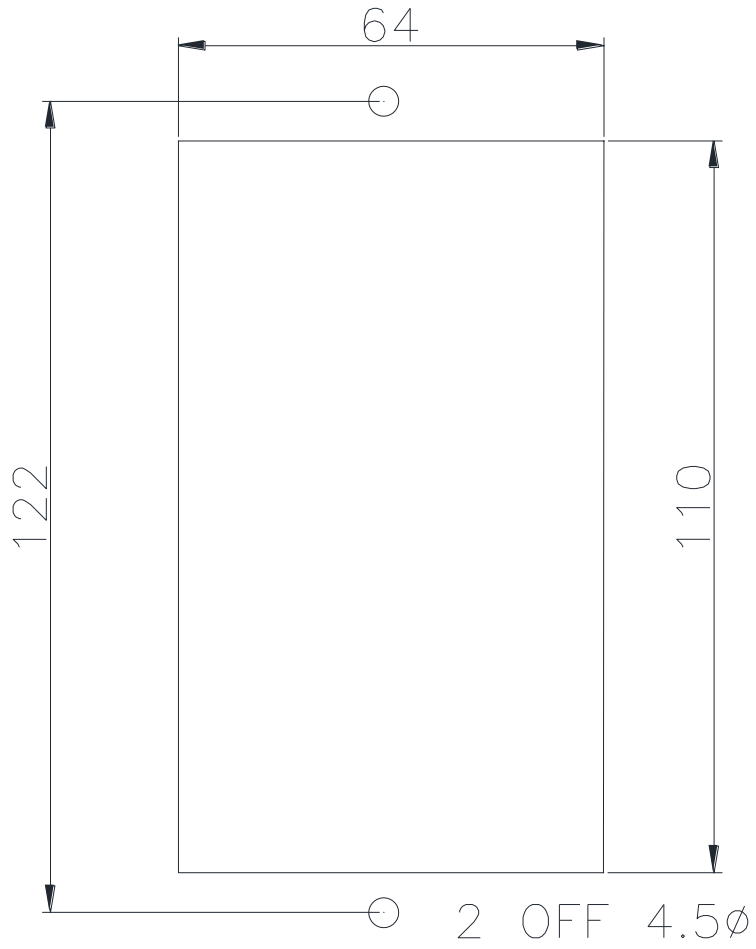
INSTALLATION INSTRUCTIONS

IMPORTANT
Installation procedures must be carried out with care, to ensure correct and safe operation. If you are in any doubt, consult qualified and competent engineering personnel, or consult Wynn Marine technical support (contact details on front and rear cover of this document).

Ref Figure - Panel Cut-Out Requirements

1. Provide a cut out in console for keypad according to dimensions.

Panel Cut-Out Requirements

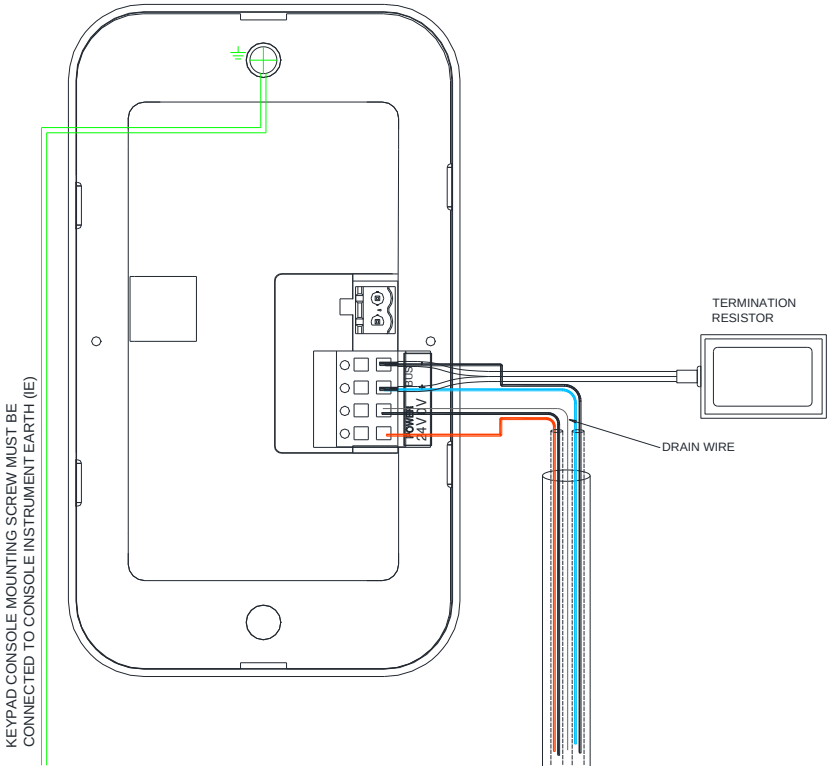


Ref Figure - Keypad Dimensions

2. Remove front clip-on cover, fit keypad into opening and secure keypad to panel with suitable M4 fixings. ***(Not supplied)***

3. Refit clip-on cover with Wynn logo at bottom.

Connection Details



4. Connect termination resistor and bus cable to 4-way connector ***(Supplied in keypad socket)***
   In accordance to wiring diagram.

5. If keypad is installed in a metal console/control desk, earth one of the mounting screws to console instrument earth. (Instrument earth is a separate earth point a minimum 3m away from 230v supply earth point.)

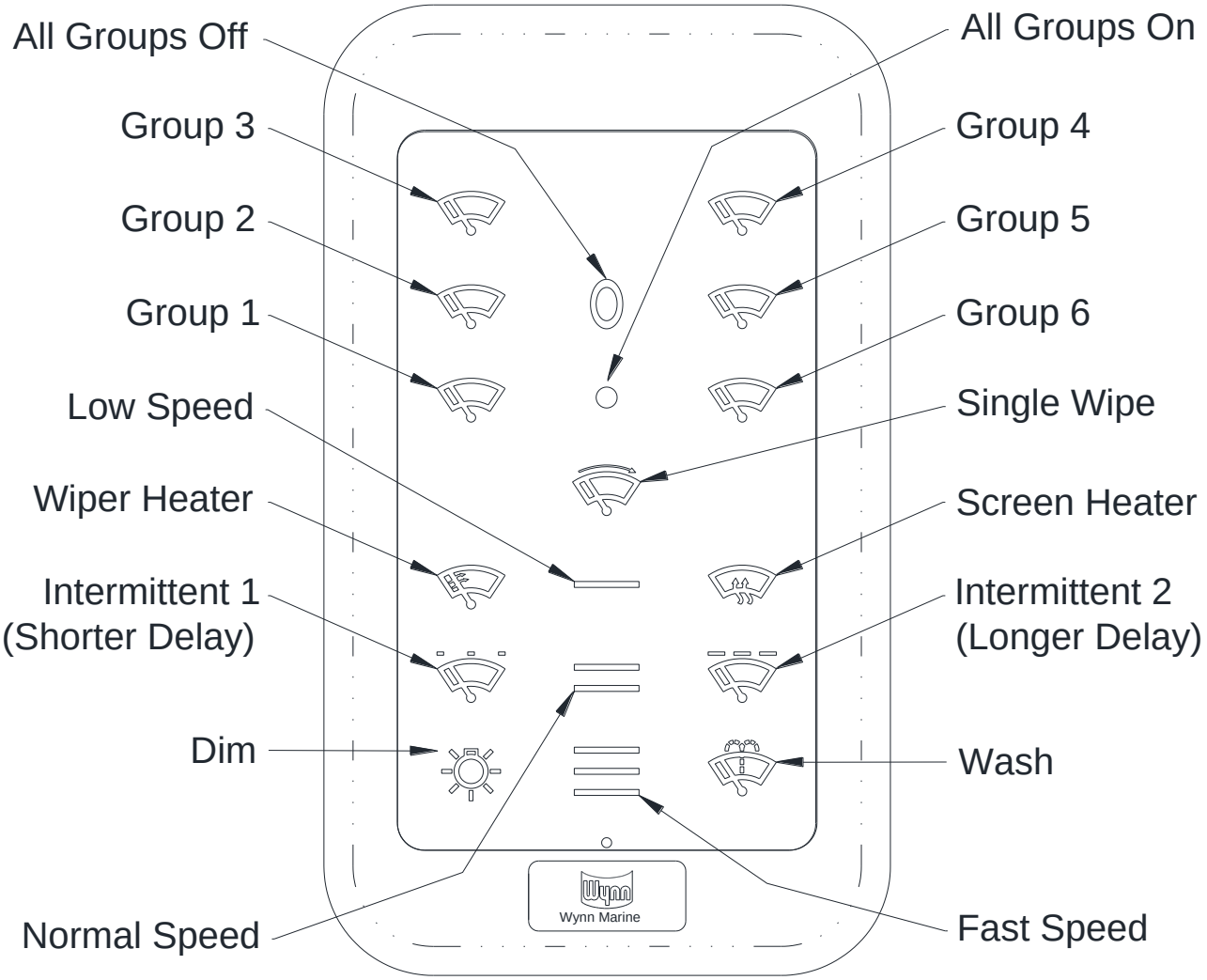
6. Fit connector into keypad. (Ref notes above).

8500 KEYPAD OPERATION

The 8500 Keypad is a component part of the Wynn Marine 8000 Series wiper control devices.

User Operational Description

This section describes end-user operation of the 8500 Keypad in normal usage.
The diagram below shows a typical 8500 6 way Keypad layout and the names given to the keys.



Keypad Icons

On power being supplied to the keypad, all icons will turn **GREEN** to show availability.
When in operation, icons will turn **RED** to show those in use.

Systems with Multiple keypads.

As supplied all keypads are supplied as Masters. In a multiple keypad system there can only be one Master Keypad, all other must be set as Slaves, each with a different address.

If more than one Keypad is fitted in the bus see *Setting a keypad to Slave Mode* in 8500 Keypad User-Programming section.

Description and Operation of Keypad

Icon	Description	Operation
	Individual Wiper Group	***Press -*** turns group on in normal speed. Group icon turns **RED** ***Press -*** while running, turns group off. **RED** light turns **GREEN**
	All Wiper Groups - Turn Off	***Press -*** while running turns all groups off. **RED** lights turns **GREEN**
	All Wiper Groups - Turn On	***Press -*** turns all groups on in normal speed. Group icons turns **RED**
	Single wipe	***Press -*** turns all groups on for single wipe in normal speed *(does not affect any group already wiping)*
	Low Speed	***Press -*** followed by ***group icon*** or ***all group icon*** turns group(s) on in low speed or to low speed if in any other setting Icon will turn **RED** whilst icons pressed ***Group icon(s)*** turn **RED** ***Press -*** while running, turns ***group icon(s)*** off. **RED** light turns **GREEN**
	Normal Speed	***Press -*** followed by ***group icon*** or ***all group icon*** turns group(s) on in normal speed or to normal speed if in any other setting Icon will turn **RED** whilst icons pressed ***Group icon(s)*** turn **RED** ***Press -*** while running, turns ***group icon(s)*** off. **RED** light turns **GREEN**
	High Speed	***Press -*** followed by ***group icon*** or ***all group icon*** turns group(s) on in high speed or to high speed if in any other setting Icon will turn **RED** whilst icons pressed ***Group icon(s)*** turn **RED** ***Press -*** while running, turns ***group icon(s)*** off. **RED** light turns **GREEN**
	Heated Wiper	***Press -*** turns all heated wipers on. *Heated Wipers = heated unit and/or heated arm and/or heated wash jet)* Heated wiper icon turns **RED** ***Press -*** while on, turns all heated wipers off. **RED** light turns **GREEN**
	Heated Screen	***Press -*** turns on all heated screens. Heated wiper icon turns **RED** ***Press -*** while on, turns all heated screens off. **RED** light turns **GREEN**
	Intermittent 1 (Shorter Delay)	***Press -*** followed by ***group icon*** or ***all group icon*** turns group(s) on in/to intermittent wipe- short delay *(Default - 8 second interval between wipes)* Icon turns **RED** and ***group icon(s)*** turn **RED** ***Press -*** while running, turns intermittent wipe off. **RED** light turns **GREEN**
	Intermittent 2 (Longer Delay)	***Press -*** followed by ***group icon*** or ***all group icon*** turns group(s) on in/to intermittent wipe- long delay *(Default - 12 second interval between wipes)* Icon turns **RED** and ***group icon(s)*** turn **RED** ***Press -*** while running, turns intermittent wipe off. **RED** light turns **GREEN**
	Dim	***Press -*** repeatedly to cycle through from maximum brightness to off, then back to maximum brightness. Stop pressing icon at required brightness
	Wash	***Press -*** followed by ***group icon*** or ***all group icon*** starts wash cycle Wash icon turns **RED** and ***group icon(s)*** turn **RED** ***Press -*** while in cycle terminates wash cycle. **RED** light turns **GREEN** *On installations with air-purge, purge will be activated as part of wash cycle.*

Default timings for wash cycle

Water is sprayed onto screen for 10 seconds. Wiper starts five seconds after ***group icon*** or ***all group icon*** is pressed and wipes for a period of fifteen seconds.

If Air-purge fitted

After completion of water spray period, air purge is activated for five seconds. Wiper continues for a period after end of air purge.

8500 KEYPAD USER-PROGRAMMING

Introduction

The 8000 system features a user-programmable set-up mode, which enables the end-user to programme the system to their requirements. In Set-up mode, the user can:

- Set the keypad to Master or Slave.
- Programme the wiper intermittent periods
- Programme the wash cycle timing (wash period and optional air purge period).
- Select wash with-or-without wipe and programme wipe delay and wipe hold times.
- Set all groups or individual-group wash cycle timings (multi-way systems only).
- Restore default wiper intermittent rates and wash cycle timings.

The following sections describe how to enter and exit set-up mode, and how to programme the system to the user's requirements.

Entering and Exiting User Set-Up Mode

NOTE
On power up, the 8500 keypad will operate normally.

	USER KEY-SEQUENCE	LED INDICATION	RESULTING ACTION
First Step	DIM & WIPER OFF	DIM LIGHT FLASHES	Enter user set up mode.
Programmable Steps as Required	*With reference to the following charts for setting Master/Slave; Intermittent Periods; All Groups or Individual-Group Wash Cycle Timings; Wash/Air Purge with Extended Wipe; and restoration of Factory Default:*		
Last Step	DIM & WIPER OFF	DIM LIGHT GREEN	User set up mode exited.

IMPORTANT
The system will not exit set-up mode if programming of intermittent periods or wash cycle is not complete. User must complete programming before system will allow itself to return to the normal operating mode.

Setting the keypad to Master or Slave

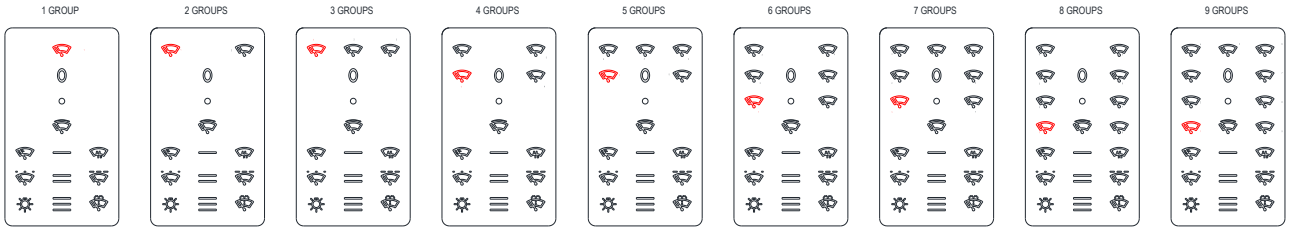
A Master the keypad sends wiper commands directly to the wiper control modules.

A Slave the keypad sends button press commands to the Master keypad.

In a single keypad control system the keypad must be set to Master. If the keypad is set to Slave it cannot control the wipers.

In a multiple keypad control system one keypad only must be sent to Master, the remainder to a different Slave number. This is so the Master keypad can identify which slave keypad sent the button press commands.

The following table describes the key steps required to program the keypad bus address to be either a Master or Slave.



KEYPAD MASTER (GROUP1) BUTTON POSITIONS

To Change Keypad Bus Address

	USER KEY-SEQUENCE	LED INDICATION	RESULTING ACTION
Step 1	DIM ☼ & WIPER OFF ⓪	DIM LIGHT FLASH	Enter user set up mode.
Step 2	SLOW SPEED ═	CURRENT KEYPAD ADDRESS GROUP LED RED OTHER GROUP LEDS GREEN	Enter Keypad number allocation mode.
	MASTER = GROUP 1 SLAVE = GROUP 2, GROUP 3, GROUP 4, GROUP 5, GROUP 6, GROUP 7, GROUP 8 OR GROUP 9.		
Step 3	PRESS GROUP RELATING TO THE KEYPAD NUMBER	SELECTED GROUP LED RED –OTHER GROUP LEDs GREEN	Keypad set to master or slave
Step 4	SLOW SPEED ═	ALL GROUP LEDs OFF	Save change and enter user set up mode.
Step 5	DIM ☼ & WIPER OFF ⓪	DIM LIGHT GREEN	User set up mode exited.
Step 6	POWER DOWN ENTIRE SYSTEM	ALL OFF	
Step 7	POWER UP ENTIRE SYSTEM	ALL ON GREEN	SYSTEM RESET

NOTE
THERE CAN ONLY BE ONE MASTER AND UP TO A TOTAL OF 8 SLAVE UNITS

Programming the Intermittent Periods

The default intermittent rates are 8 and 12 seconds for intermittent keys INTERMITTENT 1 and INTERMITTENT 2 respectively.

To Programme a new Wiper Intermittent Period

	USER KEY-SEQUENCE	LED INDICATION	RESULTING ACTION
Step 1	DIM & WIPER OFF	DIM LIGHT FLASHES	Enter user set up mode.
Step 2	INTERMITTENT or	CORRESPONDING LIGHT FLASHES	All groups will perform a single wipe.
	Wait until next wipe is required *- (time from first wipe to second wipe is stored)*		
Step 3	INTERMITTENT or	CORRESPONDING LIGHT EXTINGUISHES	All groups will perform a single wipe at new time.
Step 4	DIM & WIPER OFF	DIM LIGHT GREEN	User set up mode exited.

NOTE
Settings are stored in the non-volatile memory of the system. They are retained even if the power is removed from the system. Previous intermittent rates are overwritten.

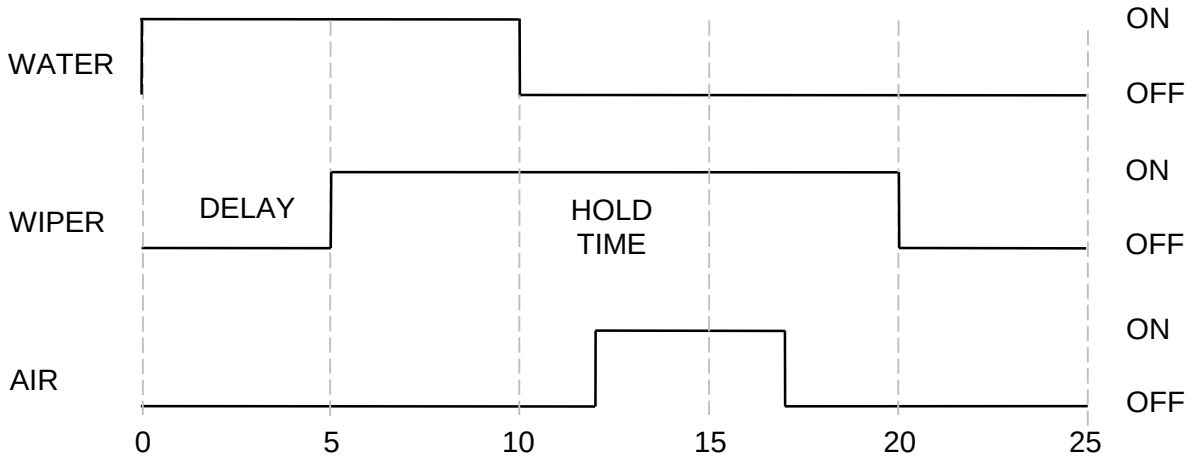
Maximum period for any intermittent parameter is fifty seconds. If user does not press INTERMITTENT key for a second time within fifty seconds, the programming is aborted and no change is made to the settings.

Wash Cycle Timings

A wash cycle comprises of a screen wash followed by an air-purge (if present in the system). Optionally the wiper will start after a delay and continue wiping during the remaining wash and air-purge.

The default wash cycle timings are as follows:

- Inclusive Wash [On]
- Wash time [10 seconds]
- Air purge time [5 seconds] *(Starts after wash finishes)*
- Wipe with Wash [On]
- Wipe delay [5 seconds] *(Starts 5 seconds after wash starts)*
- Wipe hold time [15 seconds] *(Finishes after wash and purge finish)*



Programming the Wash Cycle Timings

A group can be programmed so that its wash cycle timings are determined by *all-inclusive* wash cycle timings, which operate on all groups, or by *individual* wash cycle timings which operate on a single group only.

By default, the wash timings of groups are determined by *all-inclusive* wash cycle timings.

NOTE
Settings are stored in the non-volatile memory of the system. They are retained even if the power is removed from the system. Previous wash cycle periods are overwritten.

Maximum period for any wash cycle parameter is five minutes. If user does not press an APPROPRIATE KEY within the five minute period, the programming is aborted and no change is made to the settings.

To Programme a Wash-Without-Wipe Cycle

	USER KEY-SEQUENCE	LED INDICATION	RESULTING ACTION
Step 1	DIM & WIPER OFF	DIM LIGHT FLASHES	Enter user set up mode.
Step 2	WASH	WASH LED RED	Wash ON [single-way only]
Step 3	GROUP or	GROUP LED ON	Wash ON
Step 3	ALL GROUPS (Ref Note 1)	ALL GROUP LEDs ON	Wash ON
	Wait until enough water is on the screen		
Step 4	WASH	WASH LED ORANGE	Wash OFF, [Purge ON]
	Wait until enough air has cleared water from the wash jets		
Step 5	WASH	WASH LED OFF	[Purge OFF]
Step 6	WIPER OFF	WASH & SINGLE WIPE LEDs OFF	Wash-on and Purge-on, times are SAVED
Step 7	DIM & WIPER OFF	DIM LIGHT GREEN	User set up mode exited.

NOTE 1
ALL GROUPS key is pressed only on multi-way keypads.

Programming a Wash/Air Purge with Extended Wipe Cycle

The following table describes the key steps required to program the keypad for a wash/air purge cycle with extended auto-wipe.

To Programme a Wash/Air Purge with Extended Wipe Cycle

	USER KEY-SEQUENCE	LED INDICATION	RESULTING ACTION
Step 1	DIM & WIPER OFF	DIM LIGHT FLASH	Enter user set up mode.
Step 2	WASH	WASH LED RED	Wash ON [single-way only]
Step 3	GROUP or	GROUP LED ON	Wash ON
Step 3	ALL GROUPS (Ref Note 1)	ALL GROUP LEDs ON	Wash ON
	Wait until enough water is on the screen		
Step 4	SINGLE WIPE (Ref Note 2)	SINGLE WIPE LED ON	Wiper ON
	Wait until wiper has cleaned screen		
Step 5	WASH	WASH LED ORANGE	Wash OFF, [Purge ON]
	Wait until enough air has cleared water from the wash jets		
Step 6	WASH	WASH LED OFF	[Purge OFF]
	Wait until wiper has cleaned remaining water from screen		
Step 7	WIPER OFF	WASH & SINGLE WIPE LEDs OFF	Wipe OFF. Wash-on, Purge-on, Wipe delay, and Wipe-hold times are SAVED
Step 8	DIM & WIPER OFF	DIM LIGHT GREEN	User set up mode exited.

NOTE 1
ALL GROUPS key is pressed only on multi-way keypads.

NOTE 2
SINGLE WIPE key starts the wipers which will remain ON until the WIPER OFF key is pressed (step 7). Its behaviour differs from that in normal operating mode.

Restoring Default Intermittent Wipe and Wash Cycle Timings

The user may restore the default settings for intermittent wipe periods and wash cycle timings.
This does not affect the Master/Slave setting of the keypad.

To restore default settings

	USER KEY-SEQUENCE	LED INDICATION	RESULTING ACTION
Step 1	DIM & WIPER OFF	DIM LIGHT FLASH	Enter user set up mode.
Step 2	HIGH SPEED	No further indications are given	
Step 3	SINGLE WIPE	No further indications are given	
Step 4	HIGH SPEED	No further indications are given	
Step 5	SINGLE WIPE	No further indications are given	
Step 6	HIGH SPEED	DIM LED, HIGH SPEED LED AND SINGLE WIPE LED FLAST TOGETHER FOR 5 SECONDS	Default settings restored

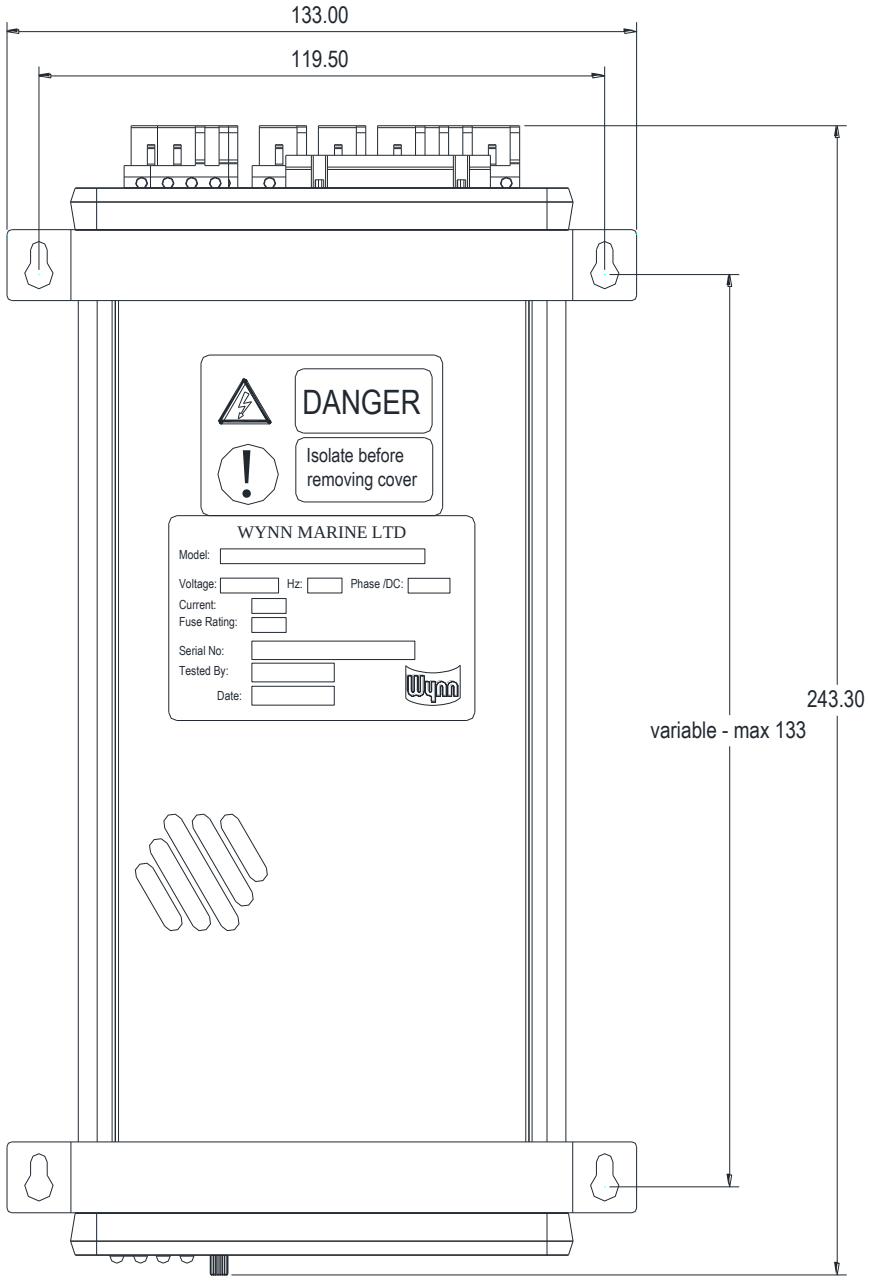
IMPORTANT
If wash cycle and/or intermittent periods have been previously set to customised values, this command will override the customised settings which will be permanently lost.

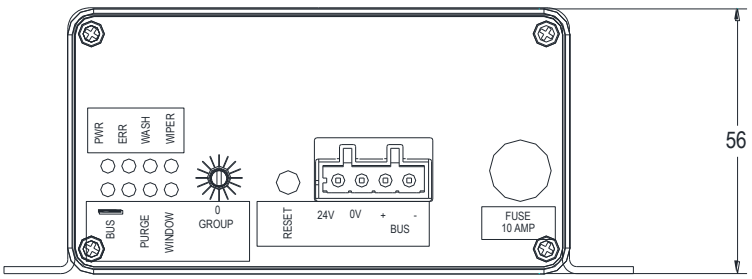
8200 MODULE

Technical specifications

Input supply	115 or 230 Vac 1Ph/3Ph 50/60Hz
Maximum Input Current	15A
Total Auxiliary Output Load	10A

Module Dimensions





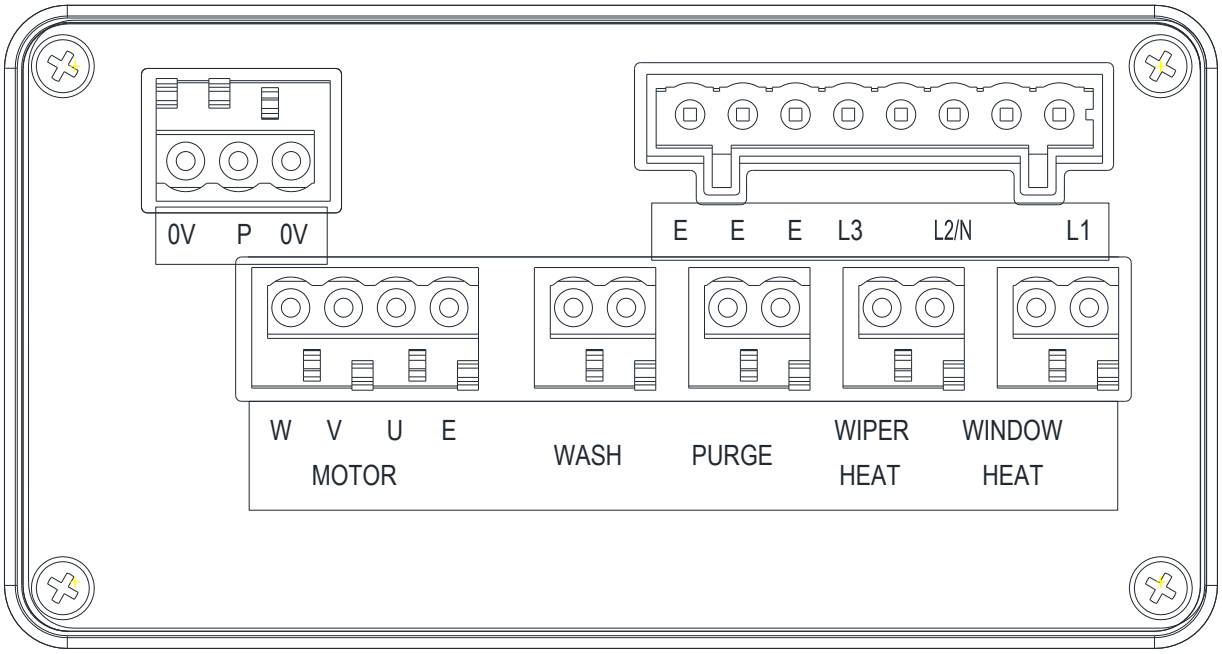
INSTALLATION INSTRUCTIONS

IMPORTANT
Wiper modules should be mounted in accordance with recommendations in IEC60945 sect 4.7.1. Care should be taken to install the units in line with the unit labelling and bridge layout drawings.

The module is supplied with the connector plugs fitted to the module sockets. The plugs can be removed for ease of installation.

A cable insertion tool is supplied for use with the single height connectors.

Rear Panel Connections



If junction boxes and shipyard supplied cables are used to extend the supplied cables, separate shielded cables must be used for wiper motor/heater/earth (6 or 7 core cable) and park switch (2 core cable).

The cable screen for wiper motor/heater/earth cable must be connected to ships earth at both ends of the cable.

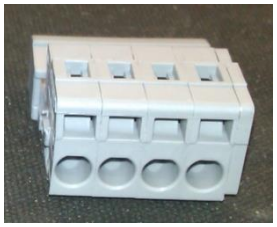
The cable screen for park switch cable must be connected to instrument earth at rack/cabinet end of the cable only. (Instrument earth is a separate earth point a minimum 3m away from 230v supply earth point.)

Choose a location for motor control module so that it is within range of motor cable, wiper heat/arm heater cable and park switch cable.

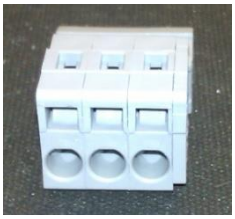
1. Mount modules with fixing clamps provided.

Enough space must be left between and around the modules for cooling air and to allow room for cables and plugs at both ends of the module.

2. Connect motor cable to 4-way motor connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.



3. Connect park switch cable to 3-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.



4. ***If required -*** connect wiper heat cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

5. ***If required -*** connect window heat cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

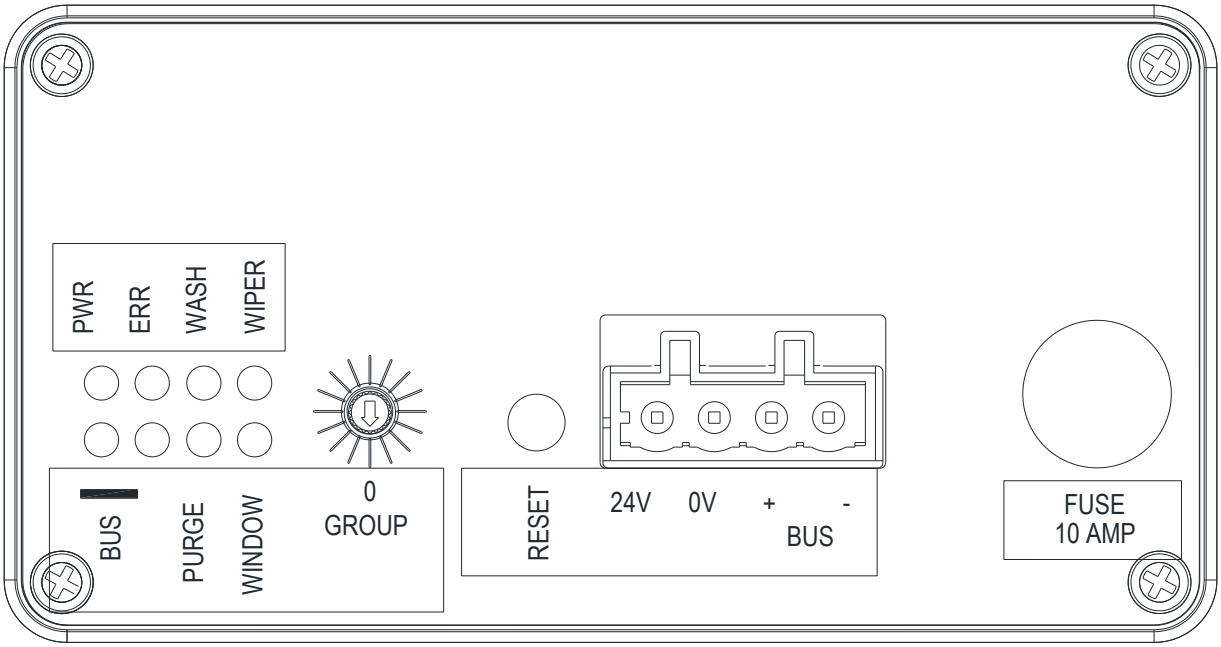
6. ***If required -*** connect wash cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

7. ***If required -*** connect purge cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

NOTE
The 8-way connector is double height to allow for continuous linking between the modules. In three phase systems the phases should be rotated between modules to balance the load.

8. Connect the power cable to 8-way connector ***(Supplied in module socket)*** in accordance with the wiring diagram.

Front Panel Connections



RS 485/CAN bus must be wired as one continuous bus without splitting of wiring.
The 4-way connector is double height to allow for continuous linking between the modules.

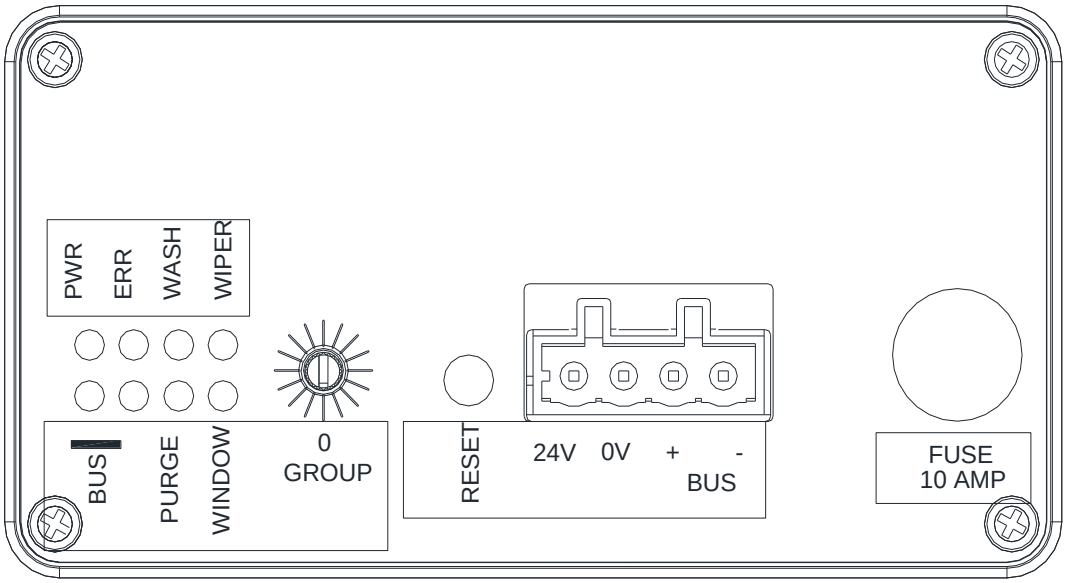
9. Connect bus cable to 4-way connector ***(Supplied in module socket)*** In accordance with the wiring diagram.

10. The terminating resistor module must be connected to the last module in the chain in accordance with the wiring diagram.

11. Ensure/set the Group Switch to the correct Group (see group switch drawing).

12. To change group, using a small screwdriver rotate the group switch one position to the right to go up one group, rotate the group switch one position to the left to go down one group. If the module is power up, press the reset button.

Group Switch



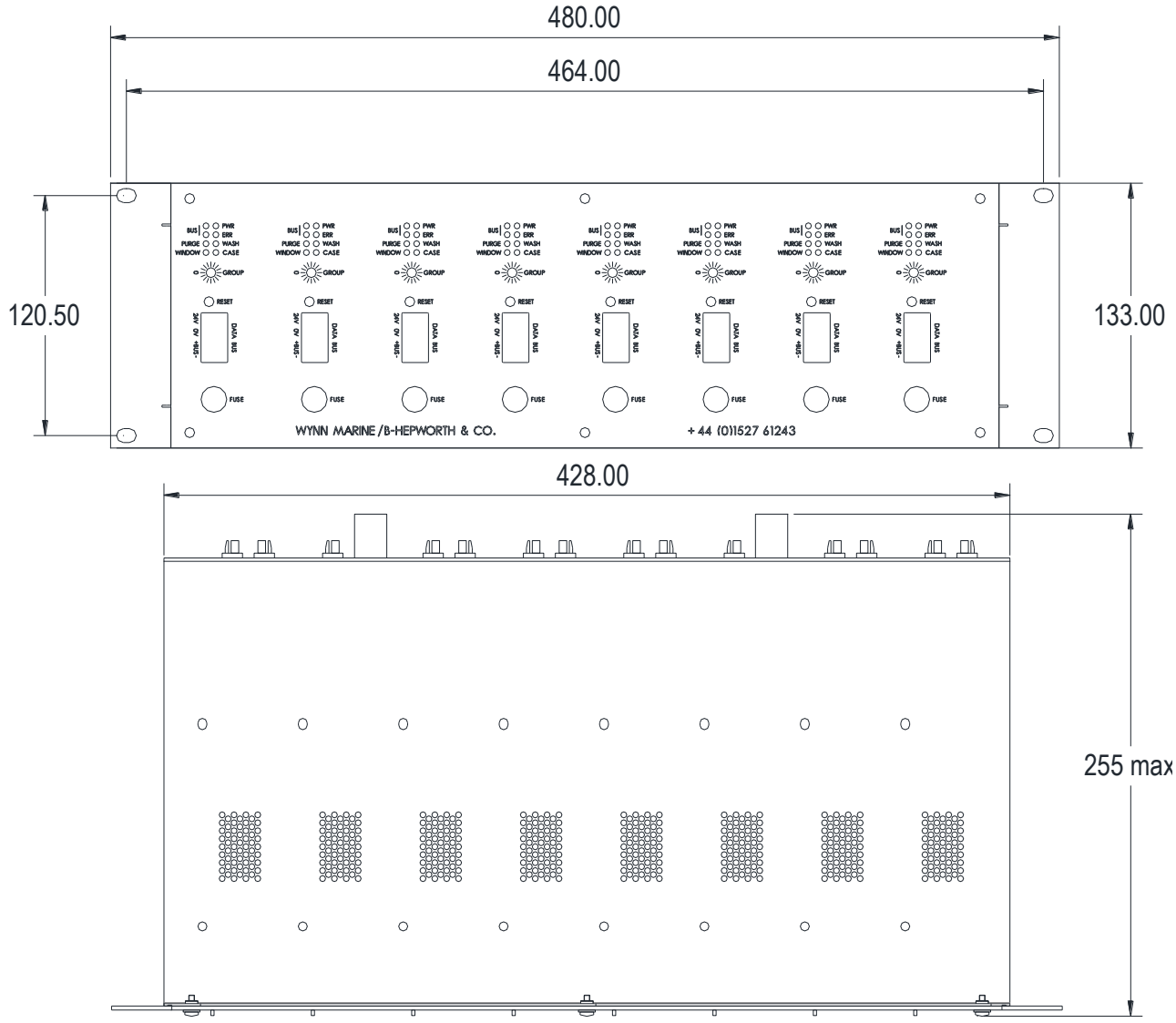
GROUP 1 GROUP 2 GROUP 3 GROUP 4 GROUP 5 GROUP 6 GROUP 7 GROUP 8 GROUP 9

8219 19” RACK INSTALLATION

Technical specifications

Input supply	115 or 230 Vac 1Ph/3Ph 50/60Hz
Maximum Input Current	15A – Per controller card
Total Auxiliary Output Load	10A – Per controller card
Module Height	3U
Max number of cards per rack	8

Module Dimensions



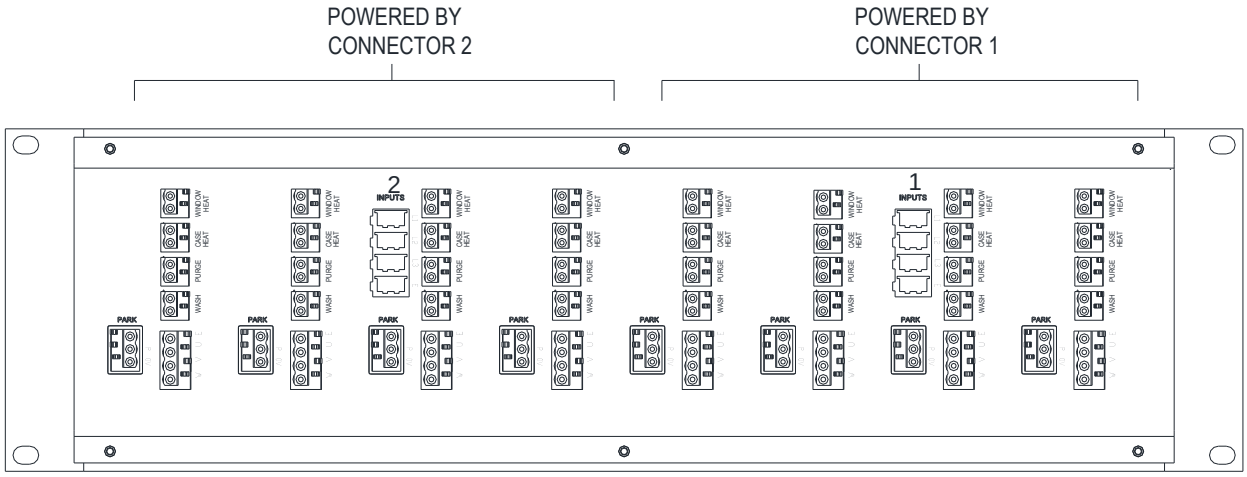
INSTALLATION INSTRUCTIONS

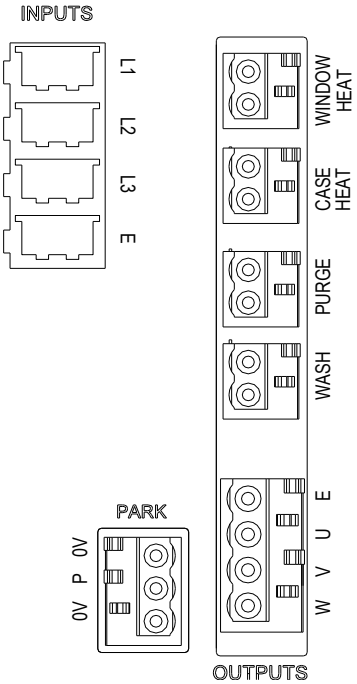
IMPORTANT
Wiper modules should be mounted in accordance with recommendations in IEC60945 sect 4.7.1. Care should be taken to install the units in line with the unit labelling and bridge layout drawings.

The module is supplied with the connector plugs fitted to the module sockets. The plugs can be removed for ease of installation.

A cable insertion tool is supplied for use with the single height connectors.

Rear Panel Connections





Rack units are supplied either as a separate unit suitable for mounting in a 19” cabinet or other suitable mounting position, or are supplied ready fitted to a suitable cabinet with the internal bus connections already complete.

Choose a location for the 19” Rack Unit or cabinet. The smaller units 3U to 15U can be wall mounted units, 18U to 24U units can be fitted to the floor. Motor cable and park switch cables should be fed into the enclosure. Auxiliary outputs MUST NOT be wired in parallel, this will cause damage to the PCB.

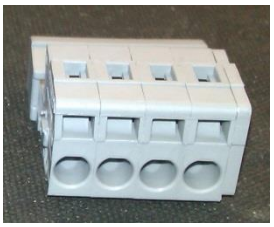
If junction boxes and shipyard supplied cables are used to extend the supplied cables, separate shielded cables must be used for wiper motor/heater/earth (6 or 7 core cable) and park switch (2 core cable).

The cable screen for wiper motor/heater/earth cable must be connected to ships earth at both ends of the cable.

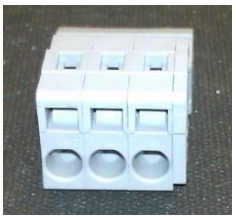
The cable screen for park switch cable must be connected to instrument earth at rack/cabinet end of the cable only. (Instrument earth is a separate earth point a minimum 3m away from 230v supply earth point.)

Enough space must be left between and around the Rack Modules or Cabinet for cooling air.

1. Connect motor cable to 4-way motor connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.



2. Connect park switch cable to 3-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.



3. ***If required -*** connect wiper heat cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

IMPORTANT
Auxiliary outputs MUST NOT be wired in parallel. This will cause damage to the PCB.

4. ***If required -*** connect window heat cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

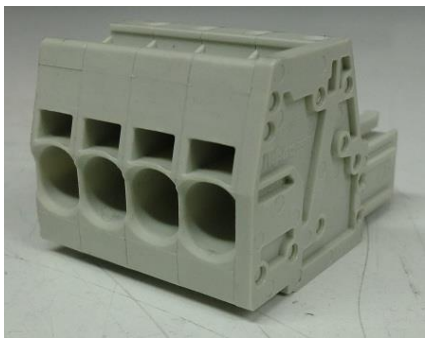
IMPORTANT
Auxiliary outputs MUST NOT be wired in parallel. This will cause damage to the PCB.

5. ***If required -*** connect wash cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

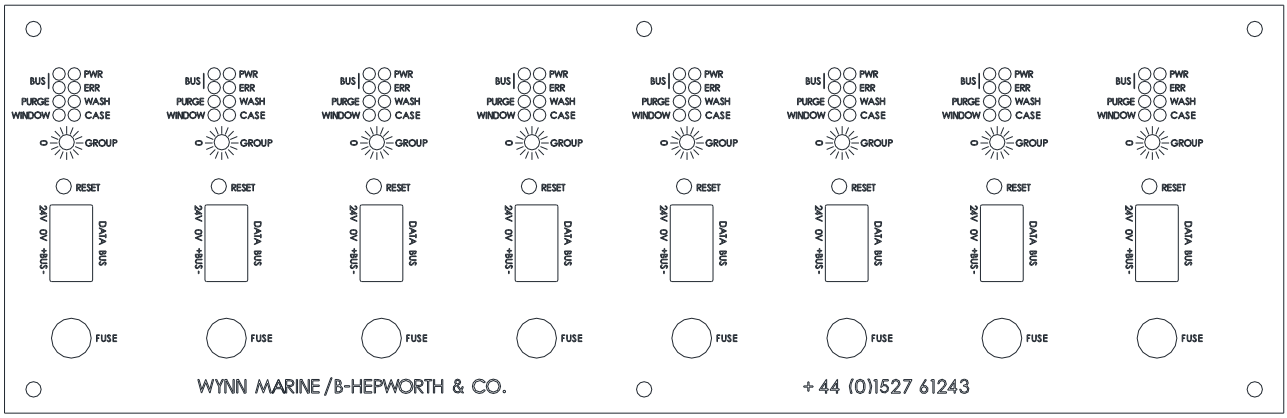
IMPORTANT
Auxiliary outputs MUST NOT be wired in parallel. This will cause damage to the PCB.

6. ***If required -*** connect purge cabling to 2-way connector. ***(Supplied in module socket)*** In accordance with the wiring diagram.

7. Connect the power cable to 4-way connector ***(Supplied in module socket)*** in accordance with the wiring diagram.

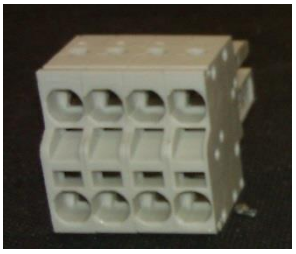


Front Panel Connections



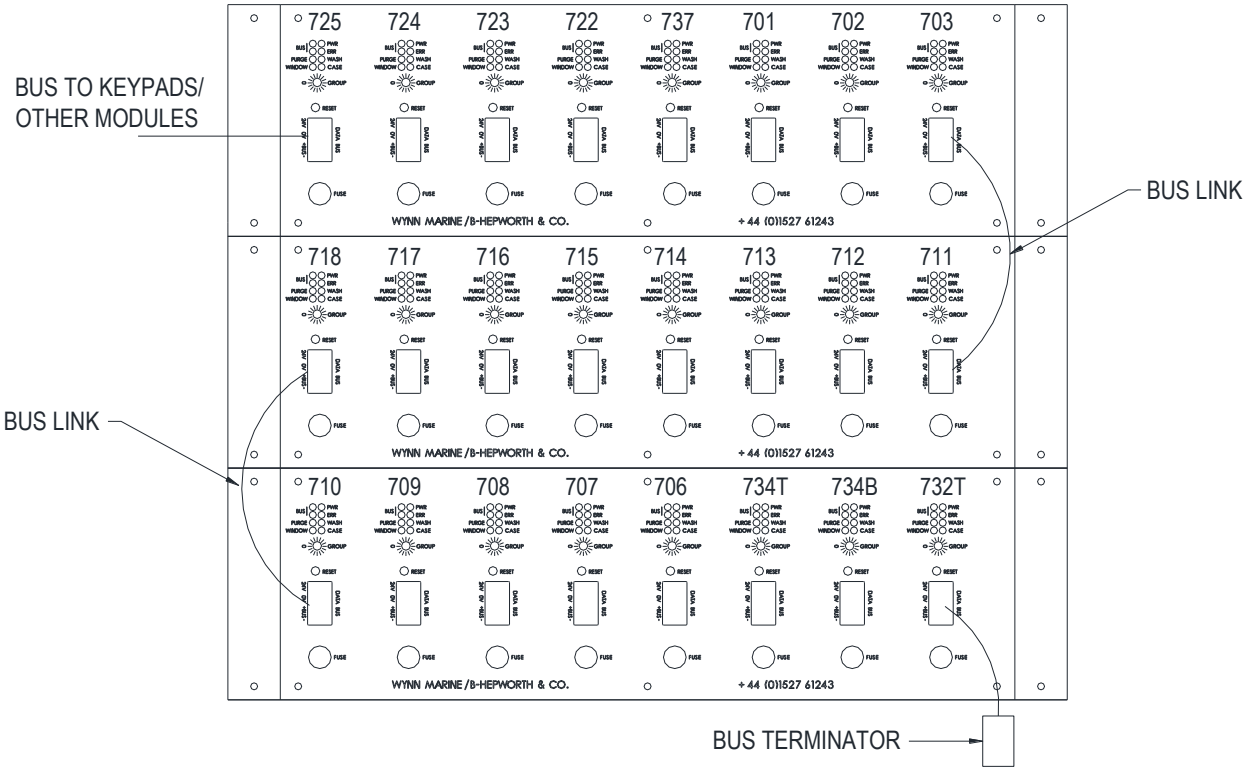
RS 485/CAN bus must be wired as one continuous bus without splitting of wiring. The bus is internally wired between all PCB.

8. Connect bus cable to 4-way connector ***(Supplied in module socket)*** In accordance with the wiring diagram.



9. The terminating resistor module must be connected to the last module in the chain in accordance with the wiring diagram.

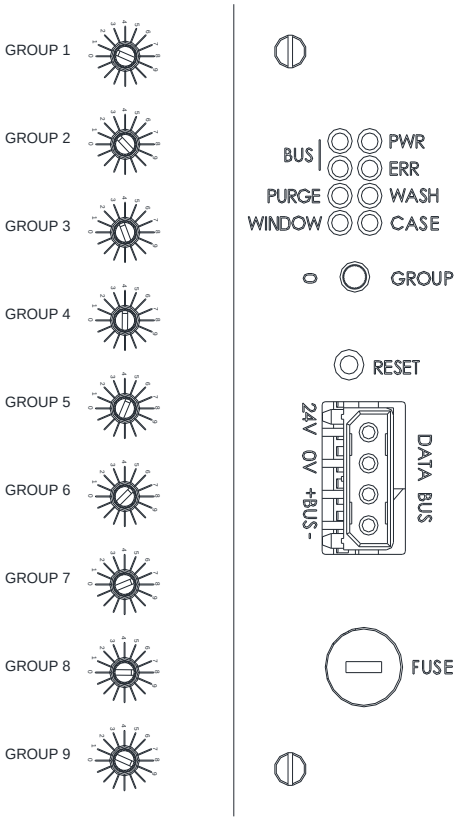
Example of bus connections made in a 3 rack cabinet



Group Switch

10. The group switch on each wiper control PCB is pre-set in the factory. Ensure/set the Group Switch to the correct Group (see group switch drawing below and bus wiring drawings when available (group number indicated in blue)).

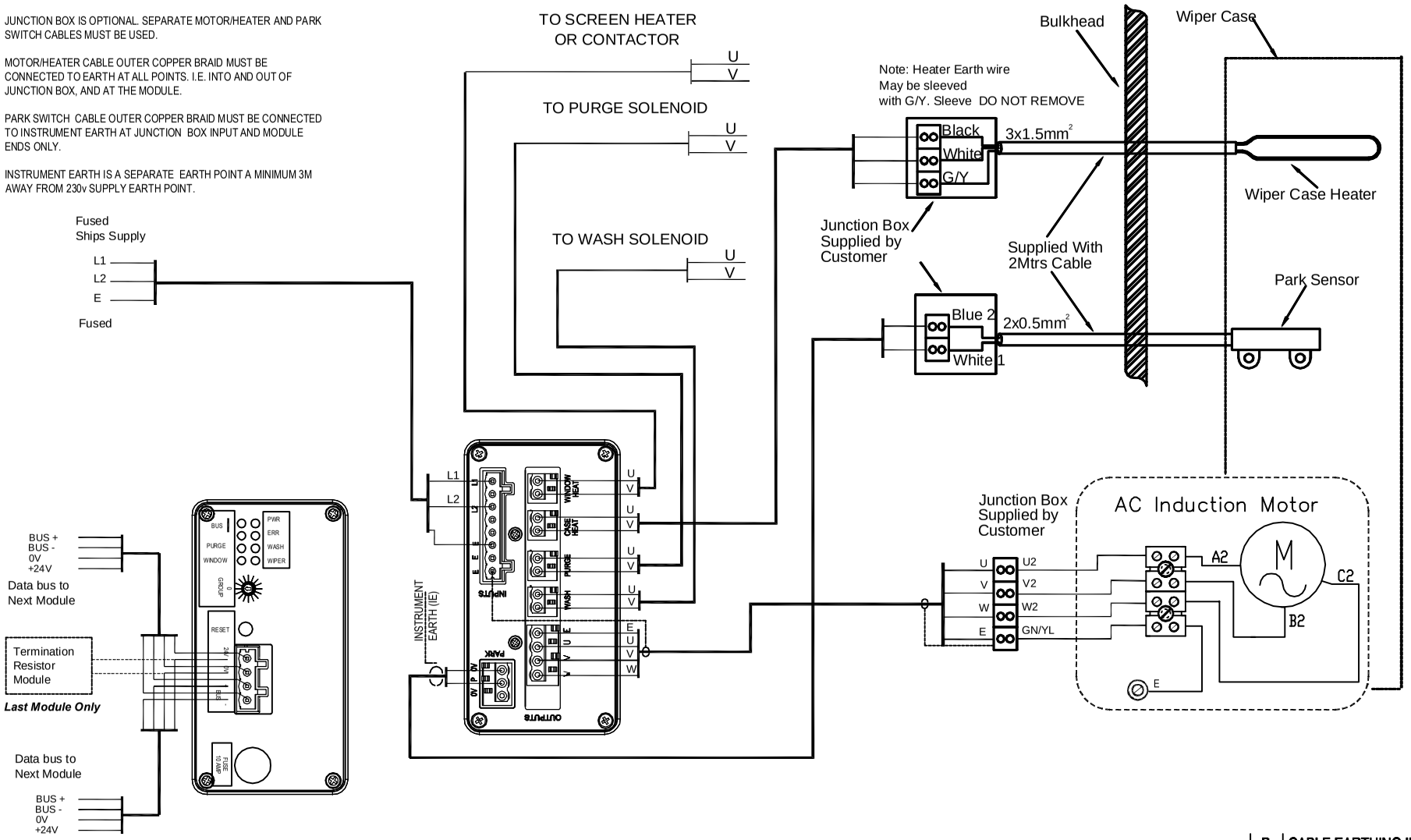
11. To change group, using a small screwdriver rotate the group switch one position to the right to go up one group, rotate the group switch one position to the left to go down one group. If the module is powered up, press the reset button.



8000 system wiring diagrams for C type wipers.

These diagrams cover the vast majority of wiper installations. In the case that these diagrams do not cover your specific installation please contact customer services on +44 1527 61243

1. JUNCTION BOX IS OPTIONAL. SEPARATE MOTOR/HEATER AND PARK SWITCH CABLES MUST BE USED.
2. MOTOR/HEATER CABLE OUTER COPPER BRAID MUST BE CONNECTED TO EARTH AT ALL POINTS. I.E. INTO AND OUT OF JUNCTION BOX, AND AT THE MODULE.
3. PARK SWITCH CABLE OUTER COPPER BRAID MUST BE CONNECTED TO INSTRUMENT EARTH AT JUNCTION BOX INPUT AND MODULE ENDS ONLY.
4. INSTRUMENT EARTH IS A SEPARATE EARTH POINT A MINIMUM 3M AWAY FROM 230v SUPPLY EARTH POINT.



Issue	Changes/Mod No.	Date	Name
B	CABLE EARTHING INFO ADDED	14/04/15	DCM

Date	Drawn by	Approved by	Drawing Log No.
30/09/13	APG		

828$RX-EL-TYPE C B

NOTE CRITICAL DIMENSIONS MARKED THUS 'CD'

SIGNIFICANT DETAILS MARKED THUS 'SD'

Matl. Type -
Matl. Part No. -
Other info -
Finish -
Matl. Size -

REMOVE SHARP EDGES | OUTSIDE LOOKING IN

GENERAL TOLERANCES unless otherwise stated

Dimension - No decimal place	± 1
Dimension - One decimal place	± 0.5
Dimension - Two decimal places	± 0.25
Dimension - Three decimal places	± 0.125
Dimension - Four decimal places	± 0.0625
Angular Dimension	± 1°

3RD ANGLE

All dimensions are in mm unless otherwise stated

DO NOT SCALE

IF IN DOUBT ASK

A Division of B. Hepworth
B. Hepworth & Co. Ltd
2-4 Merse Road, North Moons Moat,
Redditch, Worcestershire. B98 9HL
tel 01527 63057; fax 01527 66836

ELECTRICAL SCHEMATIC

8200 MODULE TO 'C' TYPE WIPER

ISSUE No. B

828$RX-EL-TYPE C

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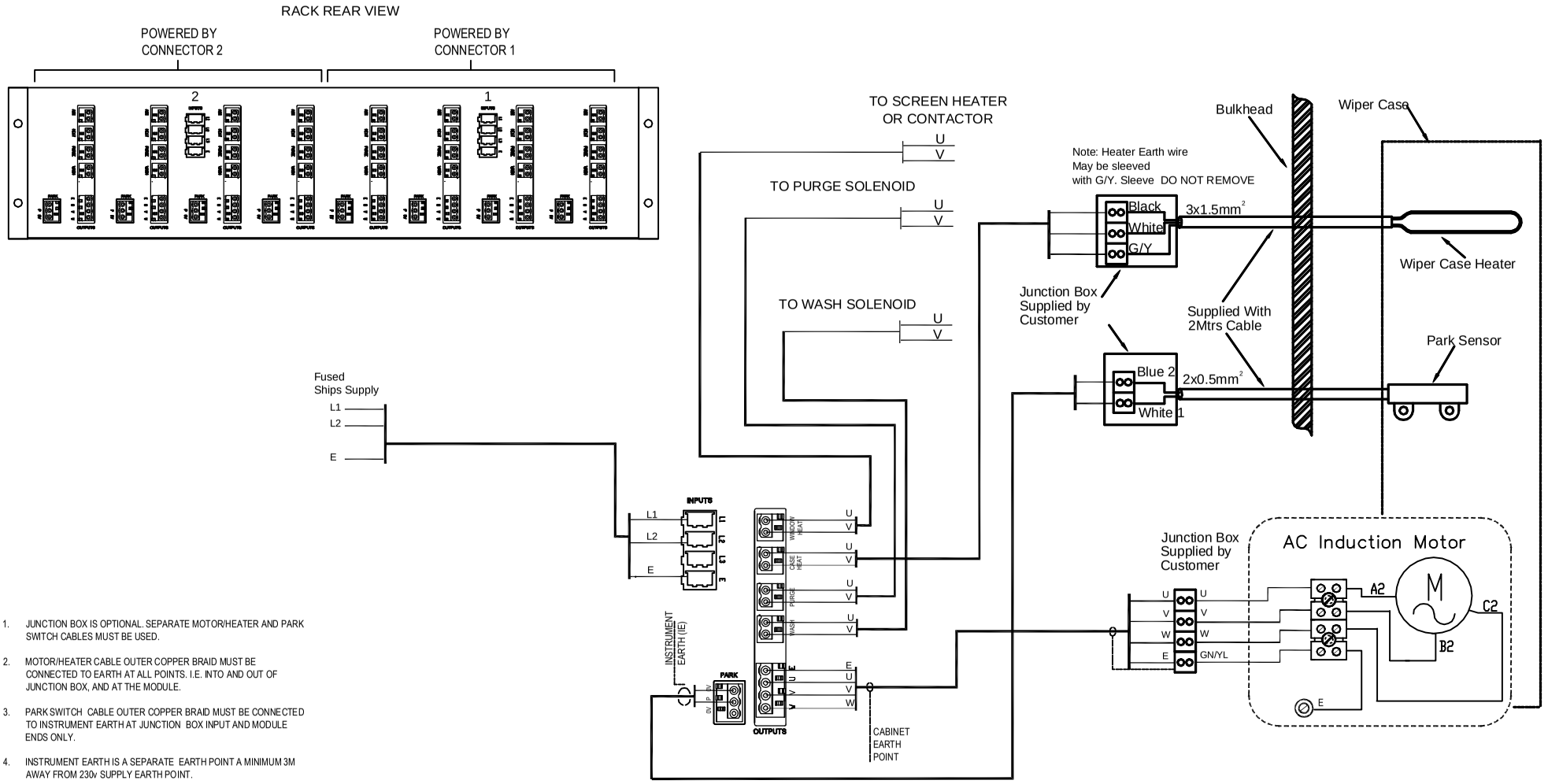

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Issue	Changes/Mod No.	Date	Name
B	CABLE EARTHING INFO ADDED	14/04/15	DCM

Date	Drawn by	Approved by	Drawing Log No.
30/09/13	APG		

8219R-EL-CTYPE-1PH B

NOTE CRITICAL DIMENSIONS MARKED THUS 'CD'

SIGNIFICANT DETAILS MARKED THUS 'SD'

Matl. Type -
Finish -
Matl. Part No. -
Matl. Size -
Other Info -

GENERAL TOLERANCES unless otherwise stated

Dimension - No decimal place	± 1
Dimension - One decimal place	± 0.5
Dimension - Two decimal places	± 0.25
Dimension - Three decimal places	± 0.125
Dimension - Four decimal places	± 0.0625
Angular Dimension	± 1°

All dimensions are in mm unless otherwise stated

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ELECTRICAL SCHEMATIC

8219 RACK TO 'C' TYPE WIPER

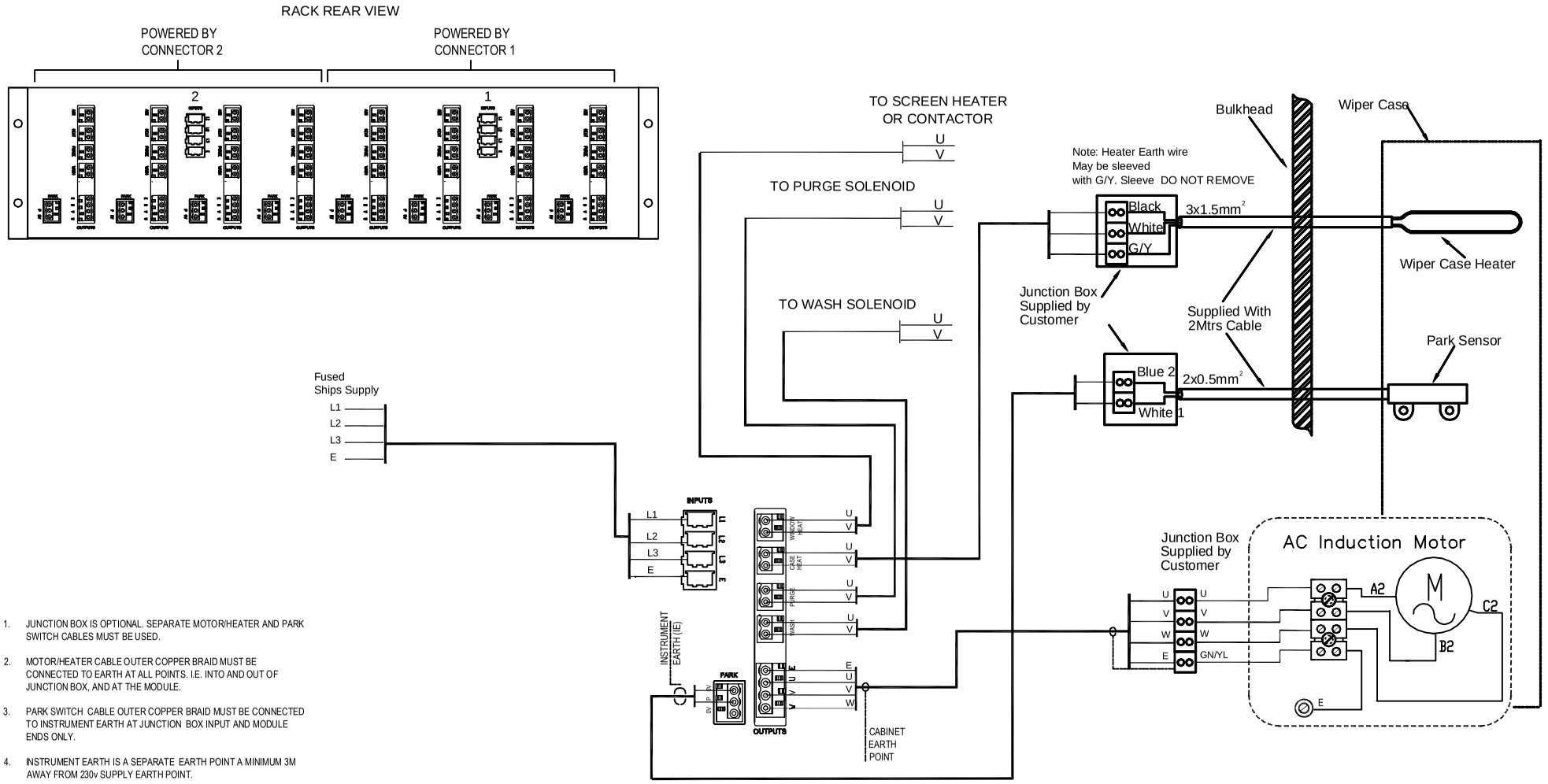
ISSUE No. B

REMOVE SHARP EDGES | OUTSIDE LOOKING IN | 3RD ANGLE | DO NOT SCALE | IF IN DOUBT ASK

8219R-EL-CTYPE-1PH B

8000 system wiring diagrams for C type wipers.

These diagrams cover the vast majority of wiper installations. In the case that these diagrams do not cover your specific installation please contact customer services on +44 1527 61243



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Issue	Changes/Mod No.	Date	Name
B	CABLE EARTHING INFO ADDED	14/04/15	DCM

Date	Drawn by	Approved by	Drawing Log No.
30/09/13	APG		

8219R-EL-CTYPE-3PH B

NOTE CRITICAL DIMENSIONS MARKED THUS 'CD'

SIGNIFICANT DETAILS MARKED THUS 'SD'

Matl. Type -
Finish -
Matl. Part No. -
Matl. Size -
Other Info -

REMOVE SHARP EDGES | OUTSIDE LOOKING IN

GENERAL TOLERANCES unless otherwise stated

Dimension - No decimal place	± 1
Dimension - One decimal place	± 0.5
Dimension - Two decimal places	± 0.25
Dimension - Three decimal places	± 0.125
Dimension - Four decimal places	± 0.0625
Angular Dimension	± 1°

3RD ANGLE

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IF IN DOUBT ASK

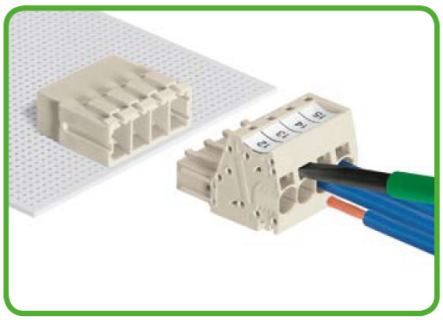
ELECTRICAL SCHEMATIC

8219 RACK TO 'C' TYPE WIPER

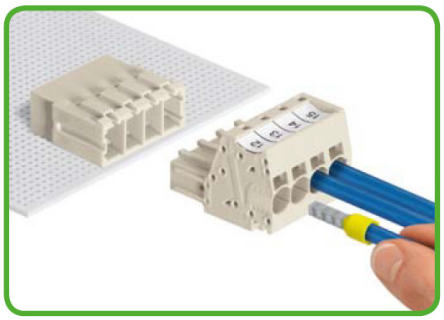
ISSUE No.

8219R-EL-CTYPE-3PH | B

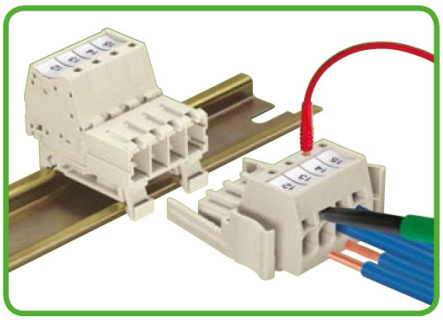
MULTI CONNECTION SYSTEM



Inserting fine-stranded conductors via 5.5 x 0.8 mm screwdriver.

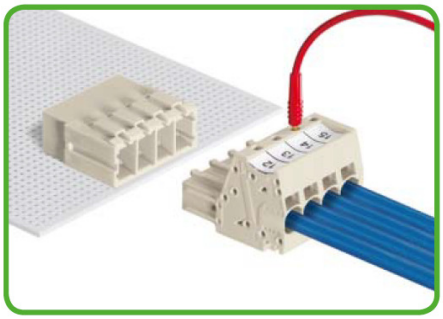


Inserting solid and ferruled conductors via push-in termination – no operating tool needed.

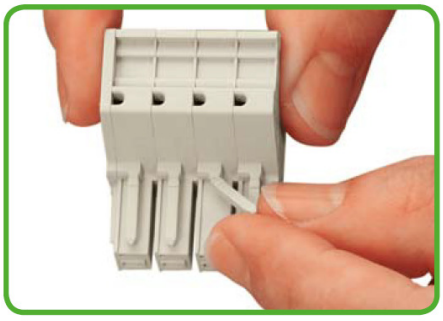


Male connector with CAGE CLAMP®S mounted on DIN 35-rail.

831 Series

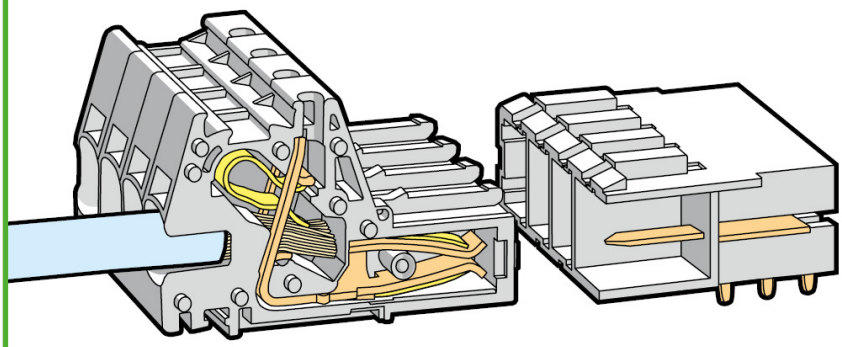


Testing with 2 mm Ø test plug.

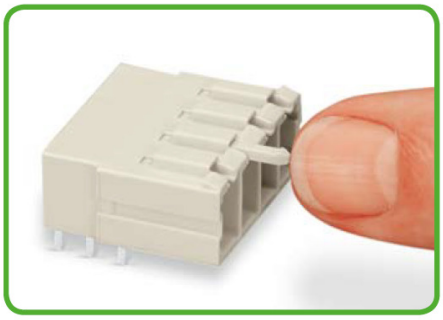


Break or cut off coding pin from female connector . . .

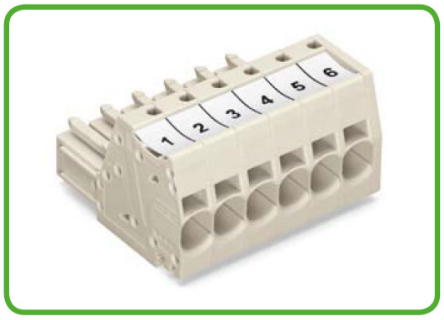
100 % protected against mismating



MCS-MAXI Pin spacing 7.62 mm



. . . Insert coding pin into male connector (break first) until it engages.



Marking via WMB or miniature WSB marker strips.

Marking via factory direct printing.

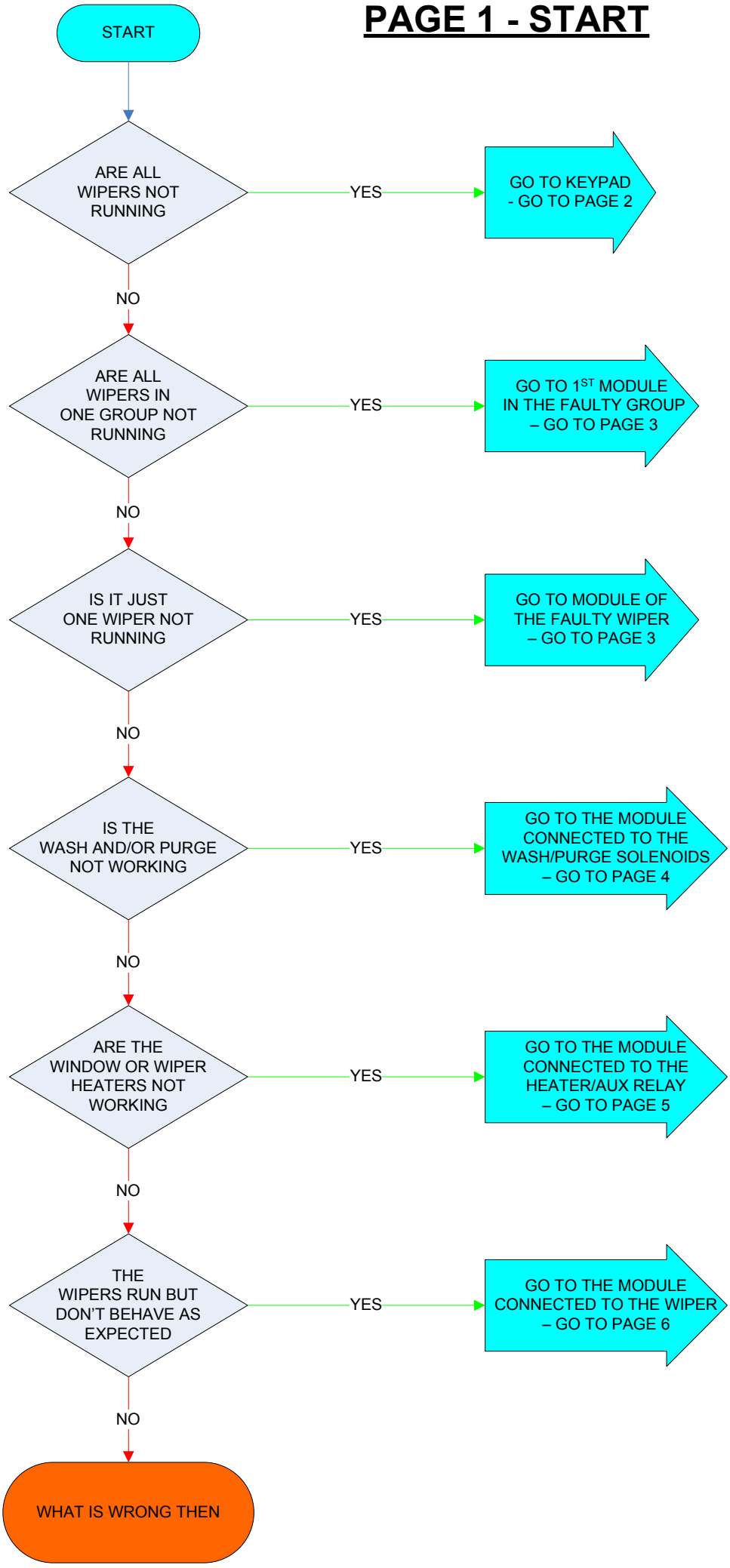
CAGE CLAMP®S clamps the following copper conductors:*

solid

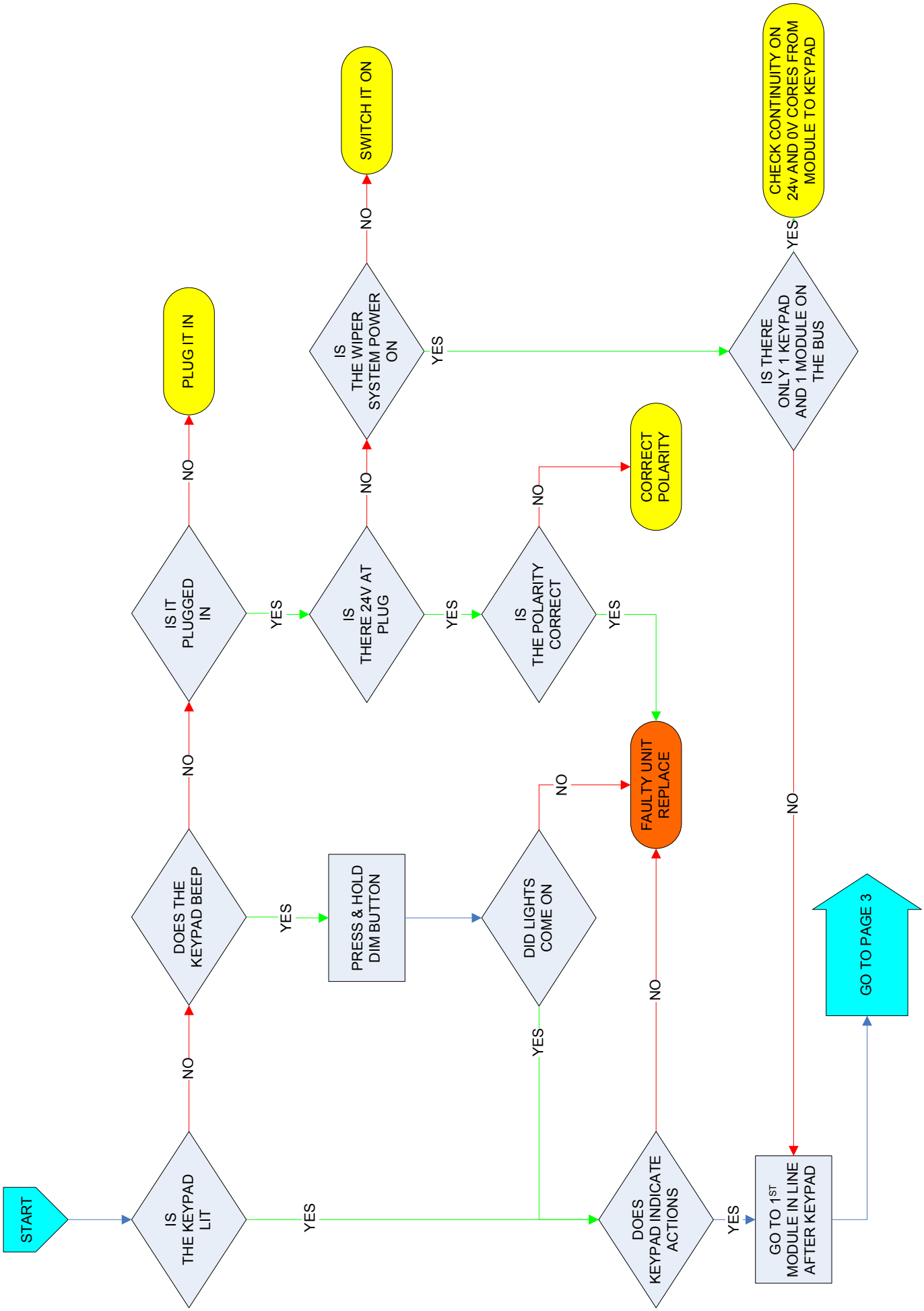
stranded

fine-stranded, also with tinned single strands

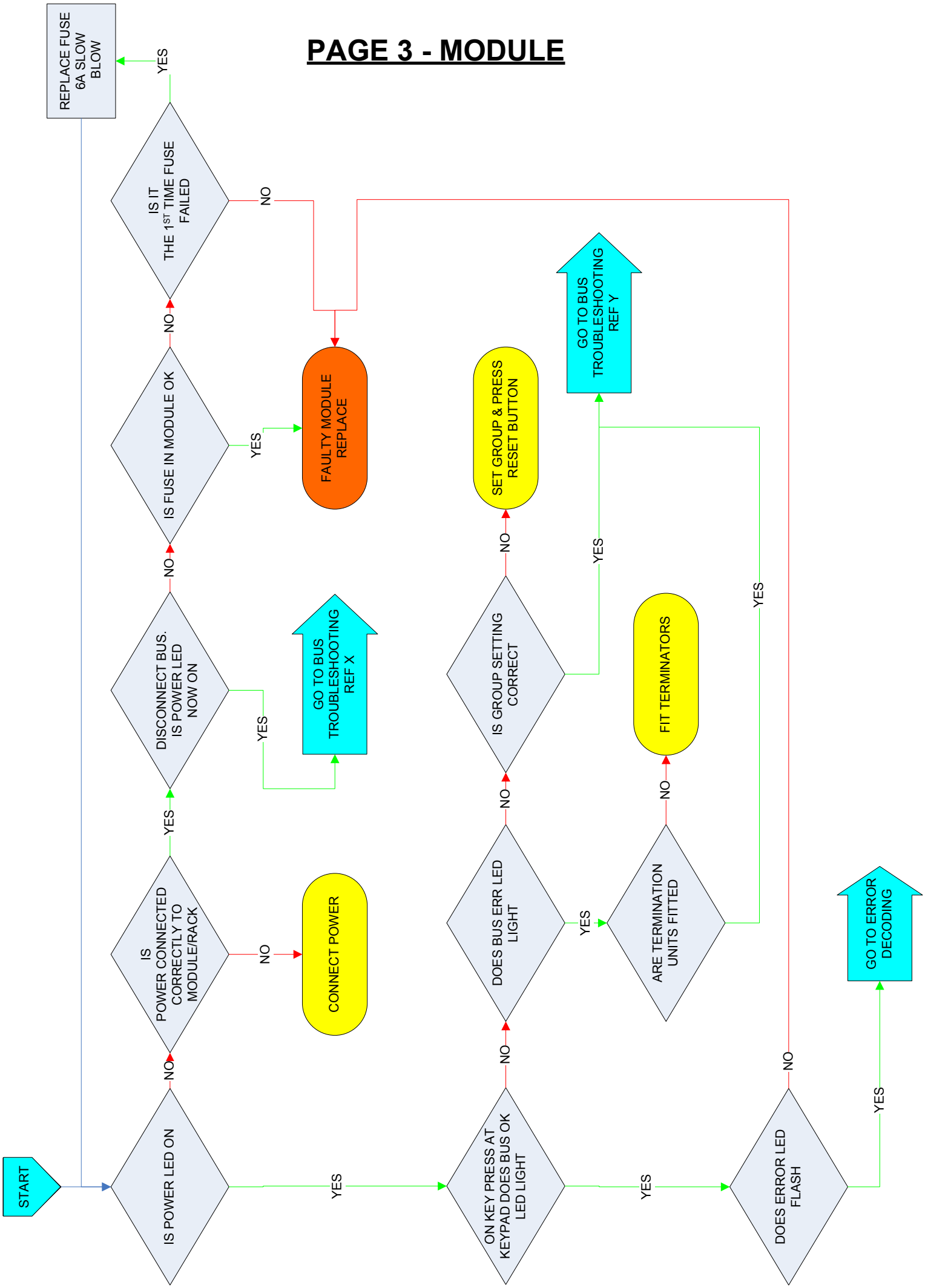
PAGE 1 - START


START
ARE ALL WIPERS NOT RUNNING
YES
GO TO KEYPAD - GO TO PAGE 2
NO
ARE ALL WIPERS IN ONE GROUP NOT RUNNING
YES
GO TO 1ST MODULE IN THE FAULTY GROUP – GO TO PAGE 3
NO
IS IT JUST ONE WIPER NOT RUNNING
YES
GO TO MODULE OF THE FAULTY WIPER – GO TO PAGE 3
NO
IS THE WASH AND/OR PURGE NOT WORKING
YES
GO TO THE MODULE CONNECTED TO THE WASH/PURGE SOLENOIDS – GO TO PAGE 4
NO
ARE THE WINDOW OR WIPER HEATERS NOT WORKING
YES
GO TO THE MODULE CONNECTED TO THE HEATER/AUX RELAY – GO TO PAGE 5
NO
THE WIPERS RUN BUT DON'T BEHAVE AS EXPECTED
YES
GO TO THE MODULE CONNECTED TO THE WIPER – GO TO PAGE 6
NO
WHAT IS WRONG THEN

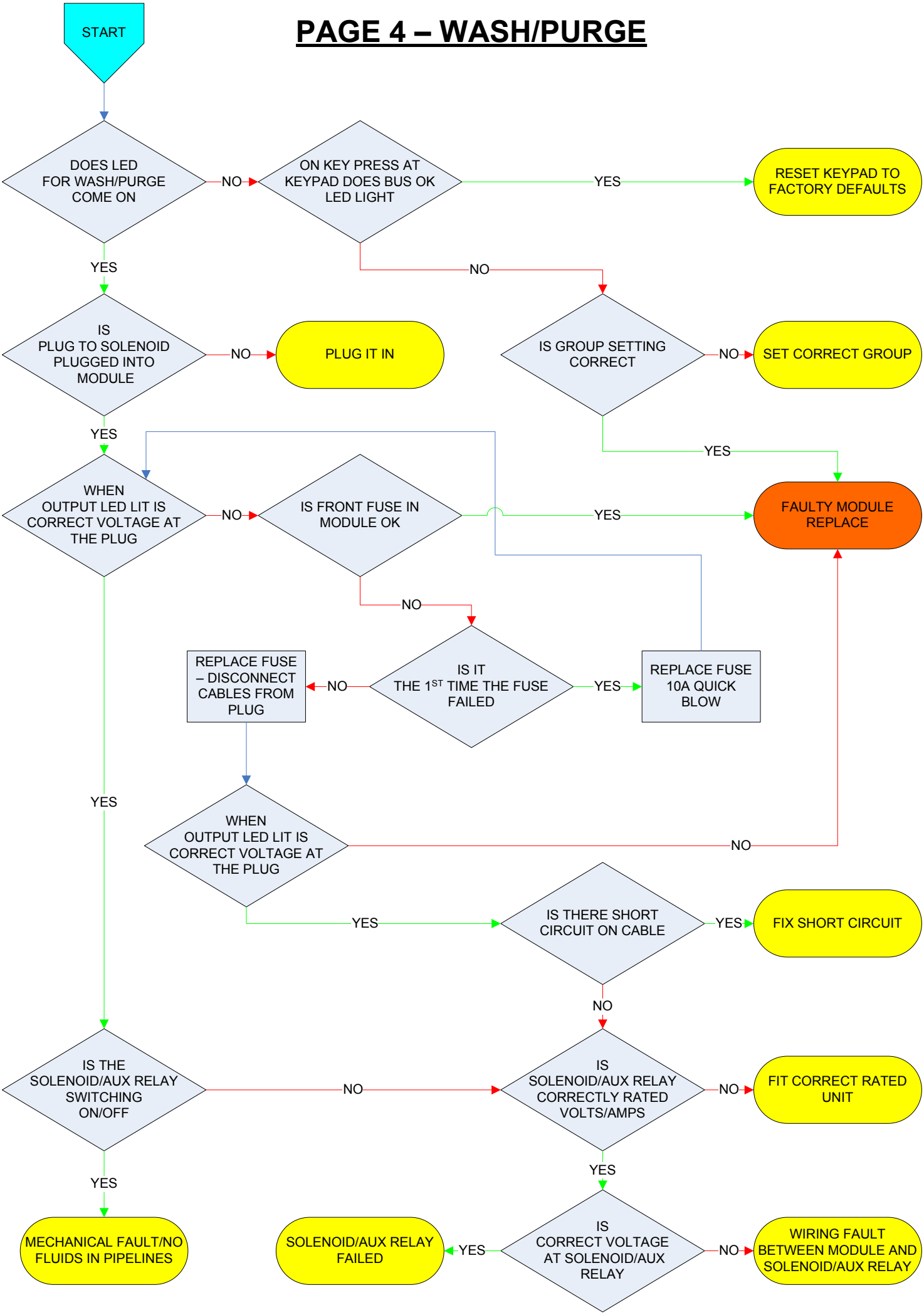
PAGE 2 - KEYPADS



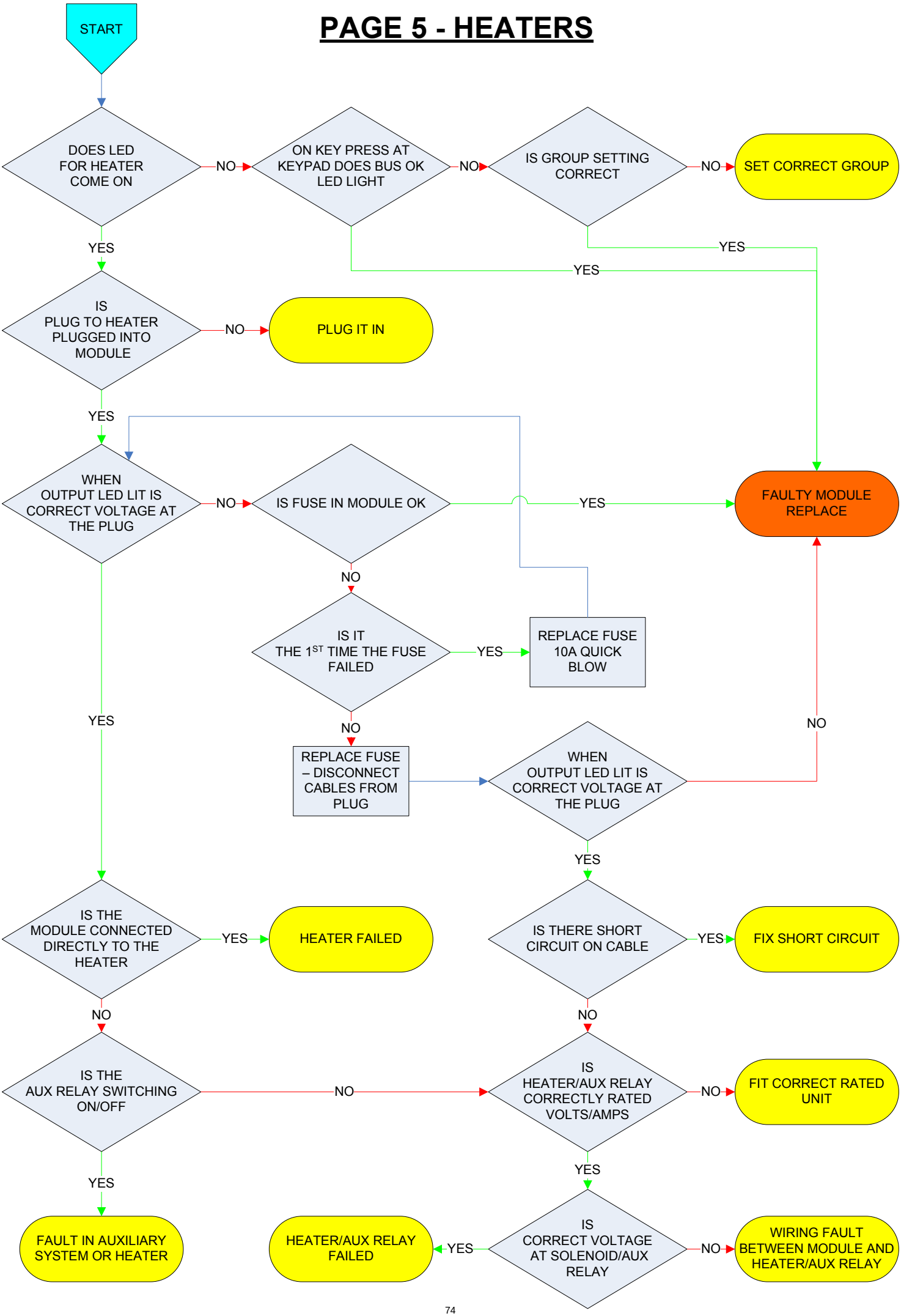
PAGE 3 - MODULE



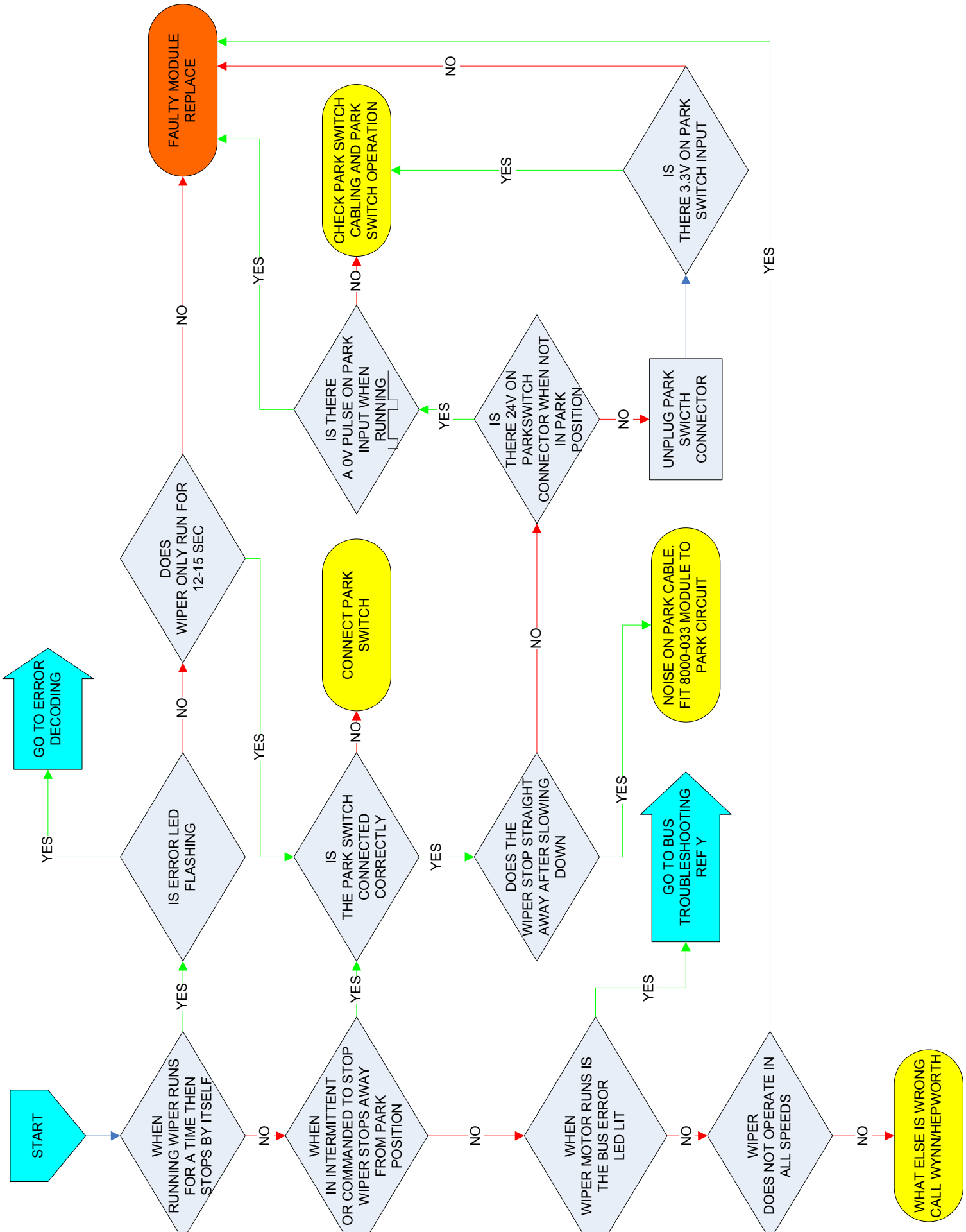
PAGE 4 – WASH/PURGE



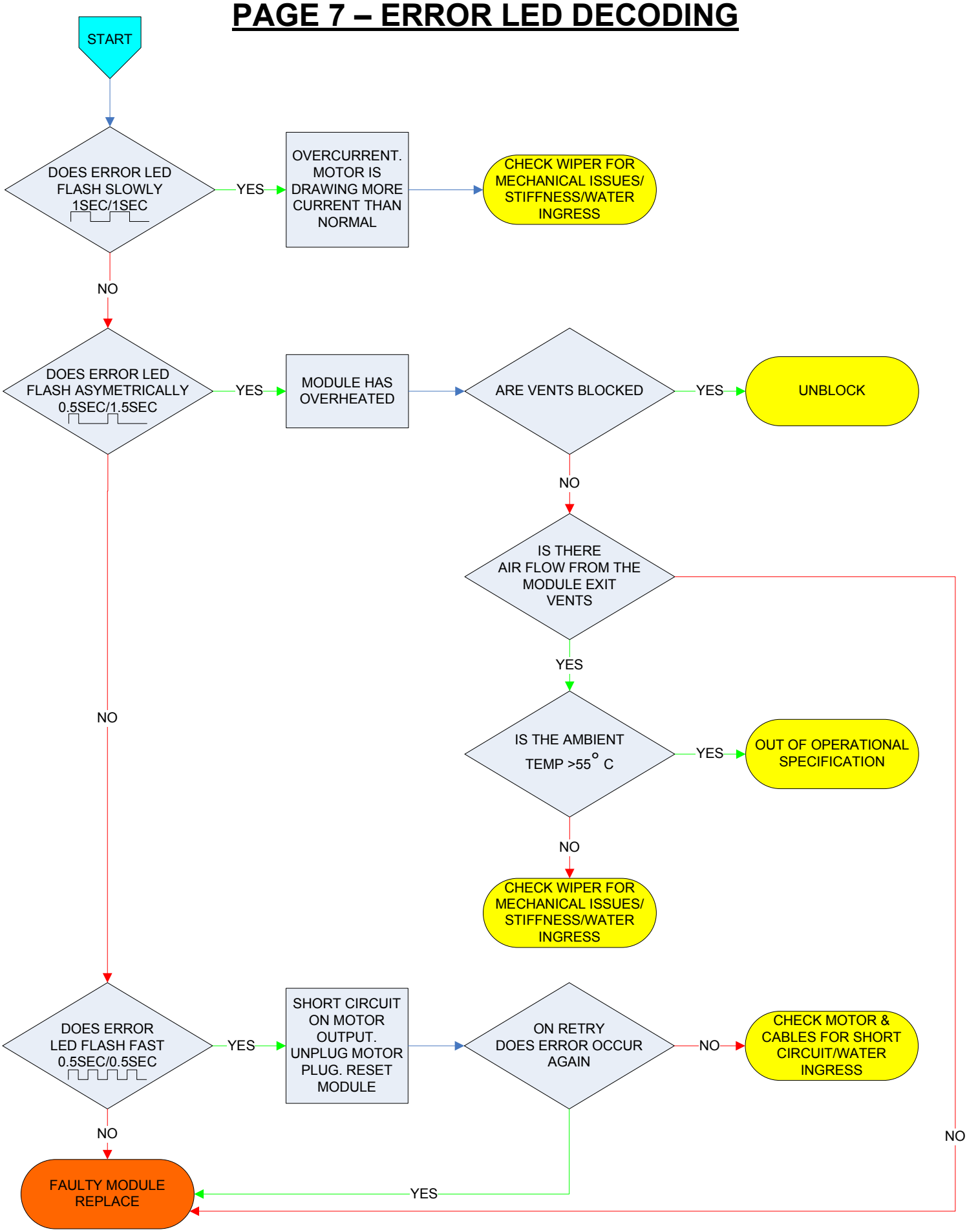
PAGE 5 - HEATERS



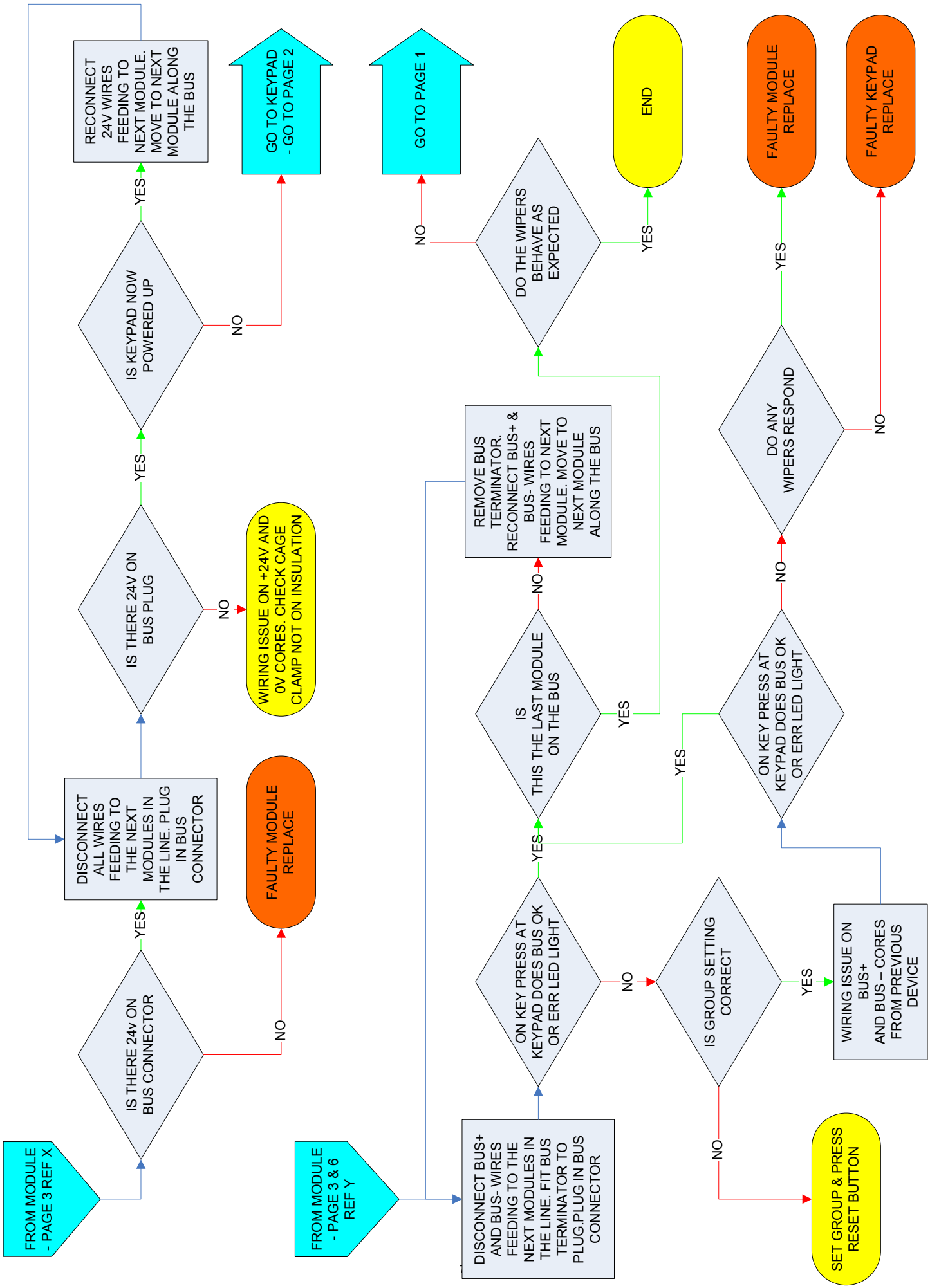
PAGE 6 – UNEXPECTED BEHAVIOUR



PAGE 7 – ERROR LED DECODING



PAGE 8 – BUS


FROM MODULE - PAGE 3 REF X
IS THERE 24v ON BUS CONNECTOR
NO
FAULTY MODULE REPLACE
YES
DISCONNECT ALL WIRES FEEDING TO THE NEXT MODULES IN THE LINE. PLUG IN BUS CONNECTOR
IS THERE 24V ON BUS PLUG
NO
WIRING ISSUE ON +24V AND 0V CORES. CHECK CAGE CLAMP NOT ON INSULATION
YES
IS KEYPAD NOW POWERED UP
NO
GO TO KEYPAD - GO TO PAGE 2
YES
RECONNECT 24V WIRES FEEDING TO NEXT MODULE. MOVE TO NEXT MODULE ALONG THE BUS
FROM MODULE - PAGE 3 & 6 REF Y
DISCONNECT BUS+ AND BUS- WIRES FEEDING TO THE NEXT MODULES IN THE LINE. FIT BUS TERMINATOR TO PLUG.PLUG IN BUS CONNECTOR
ON KEY PRESS AT KEYPAD DOES BUS OK OR ERR LED LIGHT
NO
IS GROUP SETTING CORRECT
YES
WIRING ISSUE ON BUS+ AND BUS – CORES FROM PREVIOUS DEVICE
NO
SET GROUP & PRESS RESET BUTTON
YES
IS THIS THE LAST MODULE ON THE BUS
NO
REMOVE BUS TERMINATOR. RECONNECT BUS+ & BUS- WIRES FEEDING TO NEXT MODULE. MOVE TO NEXT MODULE ALONG THE BUS
YES
DO THE WIPERS BEHAVE AS EXPECTED
NO
GO TO PAGE 1
YES
END
ON KEY PRESS AT KEYPAD DOES BUS OK OR ERR LED LIGHT
NO
DO ANY WIPERS RESPOND
YES
FAULTY MODULE REPLACE
NO
FAULTY KEYPAD REPLACE

DOCUMENTATION

Whilst every effort is made to provide accurate information in good faith, no responsibility can be accepted by Wynn for inaccuracies and Wynn reserves the right to alter and amend specifications and designs without prior notice in line with our policy of continued improvement.

Spares Parts

To enable technical troubleshooting and ordering of spare parts, this manual should be kept in a safe place on board. It is also advisable to keep one set of spare parts on board for emergency use. Please contact Wynn directly or your local distributor / service centre for all order requirements.

Maintenance Schedules

Plan your maintenance work according to the schedule in this manual.

Our Commitment

We are committed to a 10 year product support programme. This ensures that any spare part will be available for any wiper at least 10 years after its purchase. It is strongly recommended that only genuine replacement parts manufactured by WYNN be used. This will guarantee that only suitable materials have been used and will ensure interchangeability of parts.

Quality and Testing

We are committed to the principles of Total Quality Management, ISO 9000. We manufacture our range of marine products to the highest standard and quality. We therefore maintain an ongoing schedule of product improvement and testing. To help us sustain such standards we maintain a salt-water test rig on which our products are taken, at random from the production line, and subjected to 3,000 hour continuous testing. We are sure you will receive many years trouble-free service from your Wynn product and hope you find this information pack comprehensive.

Guarantee

All Wynn equipment is tested before despatch from our works. The Windscreen Wiper System supplied has a 1 year warranty period provided the installation of the system and the subsequent maintenance is in accordance with the installation/maintenance instructions.

We cannot accept any responsibility for the installation of equipment, or damage to the equipment during installation, or normal wear and tear. The guarantee is negated if the equipment is not installed strictly observing the instructions set out in this manual, or not maintained as specified.

The Wiper System is very reliable but to ensure its continued smooth running we recommend that the following guidelines are adhered to:-

Monthly

- Check for wear on all parts subject to friction

- Visual inspection should be made of the blades to ensure that they are still in good condition and replace as soon as there are signs of wear or damage

Annually

- It is recommended that the blades are changed every 12 months

After the Wiper System has been operating in severe weather conditions it is advisable to thoroughly check the unit for signs of wear or damage.

This warranty excludes the wiper blades which are a consumable item and any replacements that are detailed in the manual as part of any regular maintenance requirement.

This guarantee is expressly in lieu of all other guarantees expressed or implied and of all other obligations of liabilities on our part, and we neither assume nor authorise any other person to assume for us any other liability in connection with the sale of our equipment. Faulty equipment must be returned, carriage paid, to our works for examination. Any legal action must be settled in the English courts under English law.

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