

# VL500RC 110/130W LED Remote Control Searchlight

## User / Installation Manual

Product Part Number:

A7300 – VL500RC 110/240V 110/130w LED Spot/Flood Variable Speed Remote Control Searchlight

A7302 – VL500RC 24V 110/130w LED Spot/Flood Variable Speed Remote Control Searchlight

### **PLEASE NOTE!**

Please read this manual before installation.

**Francis**  
SEARCHLIGHTS

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# CONTENTS

1. Introduction
2. Safety Precautions
3. Technical Information
4. Unpacking and Installation Instructions
5. Electrical Installation
6. Start-up and Operating
  - 6.1. FBUS Data & Panel Addresses
7. Fault Finding
  - 7.1. Problems After Installation
  - 7.2. Obtaining Fault Status
8. Maintenance and Servicing
9. Wiring Diagram & General Assembly
10. Spare Parts List

## General Information:

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## 1 – Introduction

**It is imperative that this manual is read carefully and understood before installing your equipment. For your future reference please keep this manual in a safe place.**

Thank you for specifying a product from the Francis Searchlights range. All Francis products are designed to give complete customer satisfaction and are manufactured to the highest engineering standards to ensure optimum performance and service life.

The Francis range combines features proven over many years in the most hazardous conditions in both marine and land installations.

To prolong the life and performance of your product, we recommend that you only specify Francis Searchlights spare parts. This will also ensure that any warranties on your equipment will not be invalidated. Information on spares ordering and parts is provided in this manual.

Should you ever need to contact Francis Searchlights Ltd. regarding your equipment, please always quote the Product Number and Serial Number of the product you have, this is located on the driver box name plate.

In order that the searchlight operates correctly it is imperative that competent personnel are responsible for the installation, operation, and servicing of this equipment. Failure to adhere to this advice may cause premature failure or incorrect operation of the searchlight, which may damage the equipment or cause personal injury.

## 2 – Safety Precautions

**The following instructions must be adhered to, to ensure a safe working environment and the safety of the user.**

**Note: When unpacking or manoeuvring the searchlight into its fixing position, suitable lifting points must be used to prevent damage to the equipment or personal injury.**

- Only suitably qualified personnel may install the products.
- Never look directly into an illuminated searchlight as this may cause severe damage to eyesight. If it is necessary to inspect a searchlight whilst in operation, always wear suitable protective goggles.
- Searchlights get hot. Never touch the unit when lit and always allow 15 to 20 minutes for cooling down after turning the searchlight off.
- Never place anything on or cover the searchlight when in use.

### 3 – Technical Information

Electrical				
Input voltage:	110/240VAC	110/240VAC	24VDC	24VDC
Input current:	1A 110v – 0.5A 240v	1.2A 110v – 0.6A 240v	7.2A	7.2A
Driver output voltage:	22.9v DC	43v DC	22.9v DC	43v DC
Driver current:	4.6A	2.9A	4.5A	2.9A
Wattage:	110w	130w	110w	130w
Dimensions				
Searchlight Height:	340mm			
Width:	500mm			
Depth:	533mm			
Weight:	20Kgs			
Driver Box Height:	412mm			
Width:	278mm			
Depth:	130mm (HV) 180mm (LV)			
Weight:	4Kgs			
Searchlight Performance				
LED power:	110w	130w		
Range @ 1 Lux:	1,430m Spot	1,082m Flood		
LED life (approx.)	30,000 hours	30,000 hours		
Divergence:	4°	7°		
Colour temperature:	8,500K	8,500K		
Luminous flux:	7,830 lumens	13,720 lumens		
Searchlight movement				
Pan rotation:	350°			
Tilt elevation:	Up 23° & Down 15°			
Pan speed:	Variable Speed 1 to 36°/sec			
Tilt Speed:	Variable Speed 1 to 3.5°/sec			
Material, colour, IP rating				
Searchlight barrel head:	Aluminium LM6 Die Casting			
Paint finish powder coated & stove enamel paint:	Signal White to RAL 9003			
IP rating, Searchlight, Driver Box:	IP66 Searchlight – IP66 PSU			
Operating temperature:	-20°C to +50°C			
Certification approval:				
Lloyds TA:	IEC 60945: 2002			
Russian Maritime Register of Shipping:	Parts XI & XVII, Part IV			
ISO9001 2015:	Quality Management System			

## 4 – Unpacking and Installation Instructions

The following instructions should be read and fully understood prior to installing the equipment to ensure that the correct procedures are followed, and all safety precautions are observed.

**Note: If the equipment has been in storage for a considerable amount of time, it is advisable to conduct a routine maintenance check on all parts before installation.**

### Safety Precautions

This equipment should not be connected to an electrical supply before being installed. Installation procedures should be adhered to, to ensure a safe working environment and reduce the risk of damage or personal injury.

### Preparing the Mounting Position

Mark out and drill the fixing holes through the deck. If anti-vibration mounts are to be fitted, the fixing holes for the mounts should also be marked out and drilled. Prior to manoeuvring the searchlight into its' fixing position, the AV mounts should be fitted to the base. When in the desired position, bolt the searchlight firmly down. On an uneven surface it may be necessary to use a suitable sealant such as silicone, to ensure a weatherproofed joint.

Please refer to the drawing C29971 for the Joystick Panel cut out size.



**Rear of Searchlight**



**Base Fixings, 4 Holes Ø8.2  
Equally Spaced on a Ø220.00**

## 5 – Electrical Installation

**For safety purposes, only competent personnel should perform the electrical installation. All equipment should be installed to current Electrical Regulations and Standards.**

Referring to wiring diagram C30005 HV or C30006 LV (at the back of the manual), a supply is fed to the driver box, which then provides a common feed to the searchlight and joystick control panel.

The searchlight has been pre-wired with 3 meters of cable from the Searchlight to driver box provided.

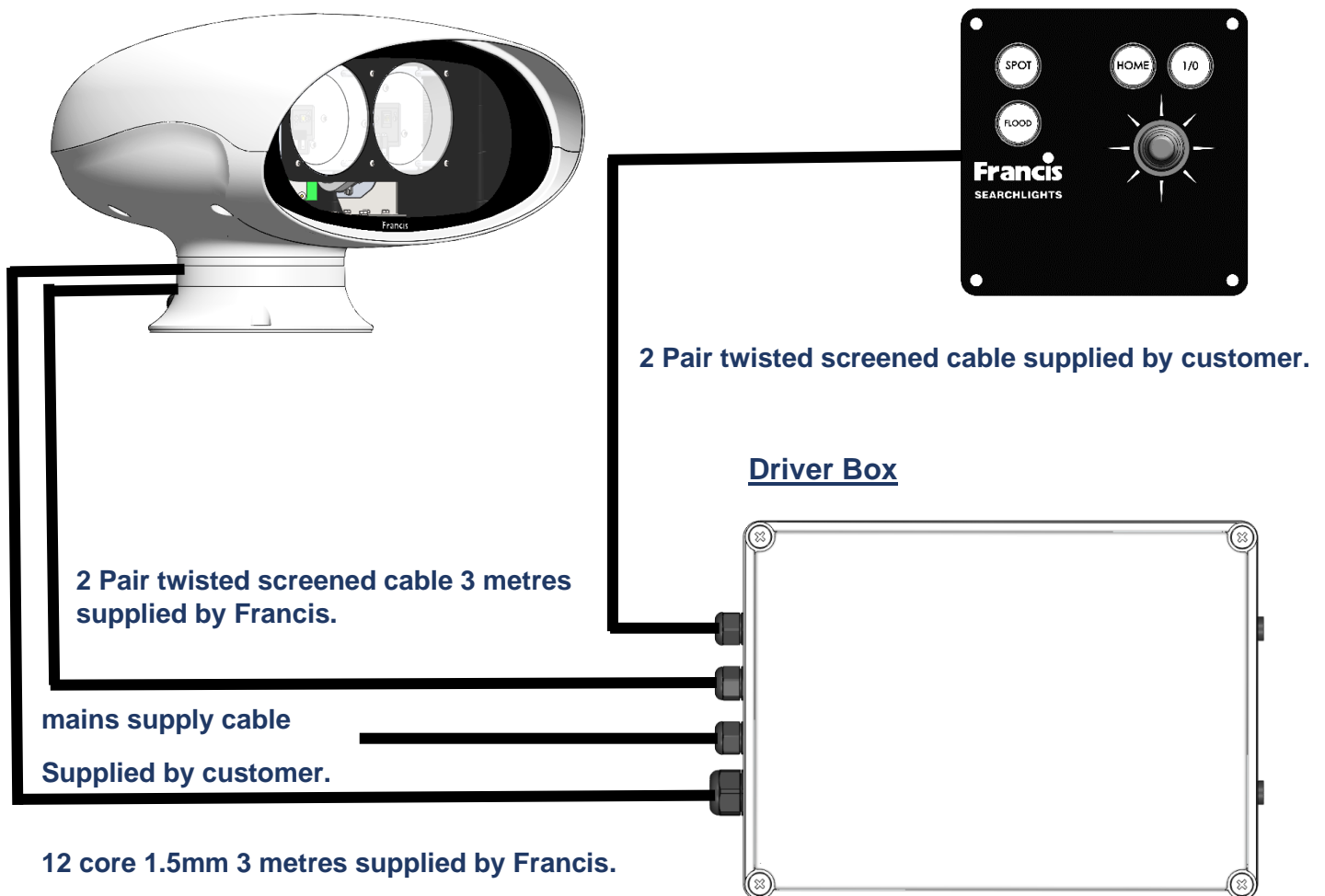
If the installation requires the junction box to be mounted more than 3m away from the searchlight, then we would recommend additional junction box is installed to connect the additional cable. The correct cable should be fitted to compensate for the voltage drop over the distance between both junction boxes.

Cables to be supplied by the customer:

- 2 pair twisted 0.22mm 100ohm screened cable from the joystick panel to the driver box.
- Mains supply cable to the driver box.

### Searchlight

### Joystick Panel



To obtain the maximum light output from the searchlight, it is essential that the full operating voltage of the LED fitted be applied to the LED contacts.

## Method of Electrical Connection

- Disconnect the supply before working on the electrical system.
- The searchlight must be connected to a fused electrical supply, using suitably sized cable.
- If the searchlight is located a considerable distance from the supply, provision must be made in the cable size to overcome the voltage drop.

The following table below indicates the maximum length of cable to be used for the supply cable, from the mains supply to the driver box.

Searchlight	115v 130w	230v 130w
Cable Size (mm <sup>2</sup> )	Distance Max	Distance Max
1.5	141M	592M
2.5	239M	1000M

Searchlight	24v 130w
Cable Size (mm <sup>2</sup> )	Distance Max
2.5	8M
4	13M

The following table below indicates the maximum length of cable to be used for the DC cable, from the searchlight to the driver box.

Searchlight	130w
Cable Size (mm <sup>2</sup> )	Distance Max
12 cores 1.5	14M

- Whenever possible cable terminations should be made below deck and with approved terminal devices.
- If a spare auxiliary fuse or circuit breaker is not available, one of the correct type/ratings should be fitted and connected to a positive supply. It is advisable to locate a bus bar or main connection and avoid any direct connection to the supply.
- For 115/240v AC products, the following colour coding system should be used for the customer supply cable:

Brown	-	Live
Blue	-	Negative
Green/Yellow	-	Earth

**Note: This equipment must be earthed.**



## **6 – Start-up and Operating**

### **Start-Up**

When the main power is first applied to the searchlight, the searchlight will carry out a self-test, it will Pan to the left limit and the reflector will Tilt down to the limit, once this is complete, the searchlight will then move to the centre position, during this please do not try and operate the searchlight while this test is being carried out. Once the searchlight is back at centre the searchlight can then be operated normally, by pressing the 1/0 button on the control panel.

### **Operating**

#### **Switch On**

The panel is activated using the 1/0 button. This will illuminate brightly when the panel is active. Alternate operations of the 1/0 button will switch the panel on and off.

#### **Lamp Control**

When the panel is active pressing the SPOT button will switch the right LED on or off. Pressing the FLOOD button will switch the left LED on or off. Both LED cannot be switched on at the same time. If the control panel is switched off with the 1/0 button the LED will switch off.

#### **Beam Direction**

The beam direction can be adjusted using the joystick when the panel is active. Moving the joystick left or right will pan the beam clockwise or anticlockwise. Moving the joystick up or down will move the beam up or down. The speed of movement is proportional to the movement of the joystick. It is possible to move the beam in both directions at once by moving the joystick diagonally.

#### **Home**

The searchlight can be returned to a pre-set home position. By default, this is dead ahead with the beam level although different positions can be programmed as described below. To send the searchlight to the home position press the HOME button.

#### **Set New Home Position**

To set a new home position move the searchlight to the new desired home position. Switch the panel off then press the joystick down to its limit and press the SPOT button. The current position will now be the new home position.

## Adjusting Panel Illumination

The panel illumination and indicators intensity can be adjusted to suit ambient light levels. To adjust the intensity, switch the panel on then switch it off with the 1/0 button and keep the 1/0 button pressed. To increase intensity, move the joystick to the right. To decrease move to the left. Note that the 1/0 button must be kept depressed whilst the joystick is moved. All indicators will illuminate whilst adjustments are performed. Adjustment is complete when the 1/0 button is released.



## 6.1 - FBUS Data & Panel Addresses

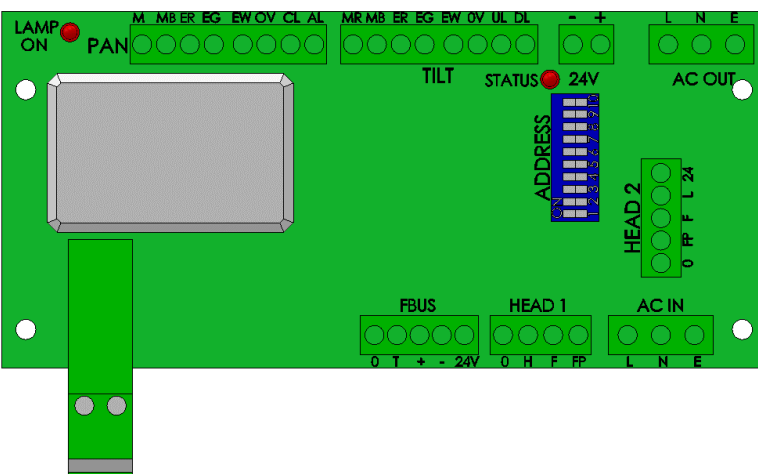
The Francis bus (FBUS) is a custom communication protocol based on RS485 two wire bi-directional communication hardware. The system provides a simple bi-directional link between searchlights and joystick panels. The system allows given panels to communicate with different searchlights and allows several panels to communicate with the same searchlight.

### FBUS Address Switches

#### Setting Searchlight Address Value

The searchlight address is set using the Dip switches on the Speed Controller PCB located inside the Searchlight (see drawing A7300). With the address switches using simple binary input. Each switch has a binary value as details below; -

Dip Switch	Searchlight
10	1
9	2
8	4
7	8
6	16



The diagram shows a green PCB with various components and labels. At the top left, there is a 'LAMP ON' indicator and a 'PAN' label. Below these are two rows of dip switches labeled 'M MB ER EG EW OV CL AL' and 'MR MB ER EG EW OV UL DL'. To the right of these is a 'TILT' label and a 'STATUS' indicator. Further right is a '24V' label and an 'AC OUT' label. In the center, there is a large grey rectangular component. Below it is a green vertical strip with two grey circles. To the right of the strip is a blue 'ADDRESS' label with a vertical stack of 10 switches, numbered 1 to 10. Below the address switches is a 'HEAD 2' label with a vertical stack of 4 switches, numbered 1 to 4. At the bottom, there are three labels: 'FBUS' with a 4-pin connector, 'HEAD 1' with a 4-pin connector, and 'AC IN' with a 3-pin connector. The 'AC IN' connector is labeled 'L N E'.

If only 1 Searchlight is used, then all switches will be set to off.

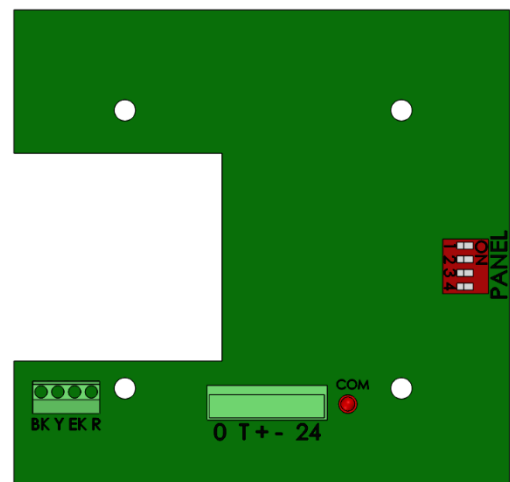
The address value is the sum of the numbers above which are active when the switch is on.

For example, if dip switches 8 and 10 are on, and all others are off, the address value would be 5.

Note that switches 1-3 are not used for address selection and should be switched off.

### Standard Joystick Panel – Control (Panel) Address

Dip Switch	Control Panel
1	8
2	4
3	2
4	1



### EXAMPLES

Standard joystick panel – panel address set to 5

Switch 1 = Off

Switch 2 = On (Value 4 added to address)

Switch 3 = Off

Switch 4 = On (Value 1 added to address)

$$4 + 1 = 5$$

Speed control card - lamp address set to 11

Switch 6 = Off

Switch 7 = On (Value 8 added to address)

Switch 8 = Off

Switch 9 = On (Value 2 added to address)

Switch 10 = On (Value 1 added to address)

$$8 + 2 + 1 = 11$$

## **ADDRESSING SYSTEM**

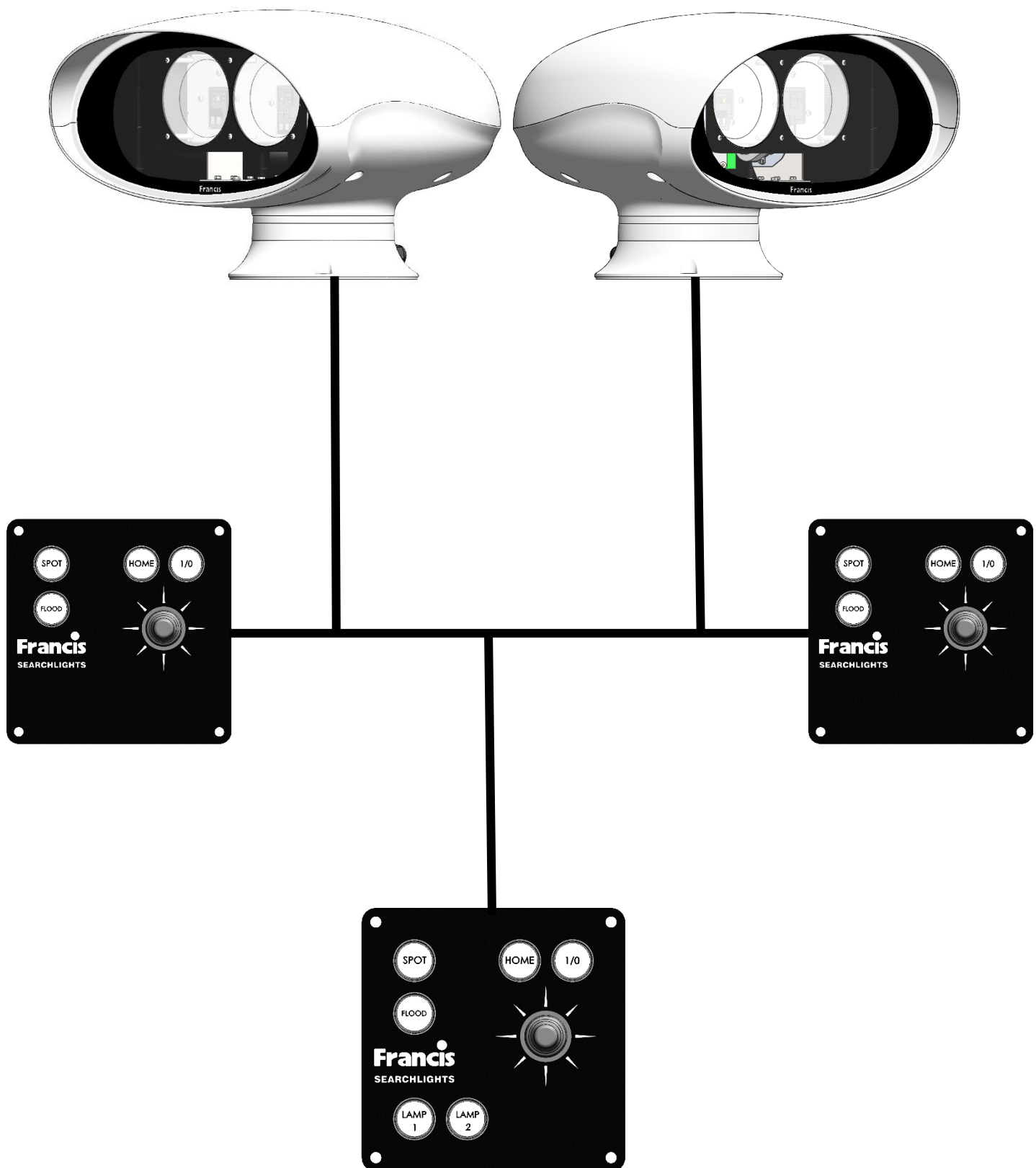
Every searchlight must have a unique address. The addresses should be sequential and should start from zero. If there were three searchlights in a system the addresses should be set to 0, 1 and 2.

Control panel – panel addresses use the same system being sequential and start from zero.

It is essential that all panels have a unique address with no duplication however note that searchlights and panels can be the same address. For example, on a system with two panels and two searchlights, the panel addresses will be 0 and 1 and the lamps addresses will be 0 and 1.

Control panel lamp addresses are defined by the system configuration. If two panels are used to control the same light, they must still have individual panel addresses, but the lamp addresses can be set to the same address value as the lamp which is to be controlled. Any number of panels can control the same light.

## Multiple Searchlights, Joystick Panels and Master Joystick Panel.



## 7 – Fault Finding

### 7.1 Problems at Installation

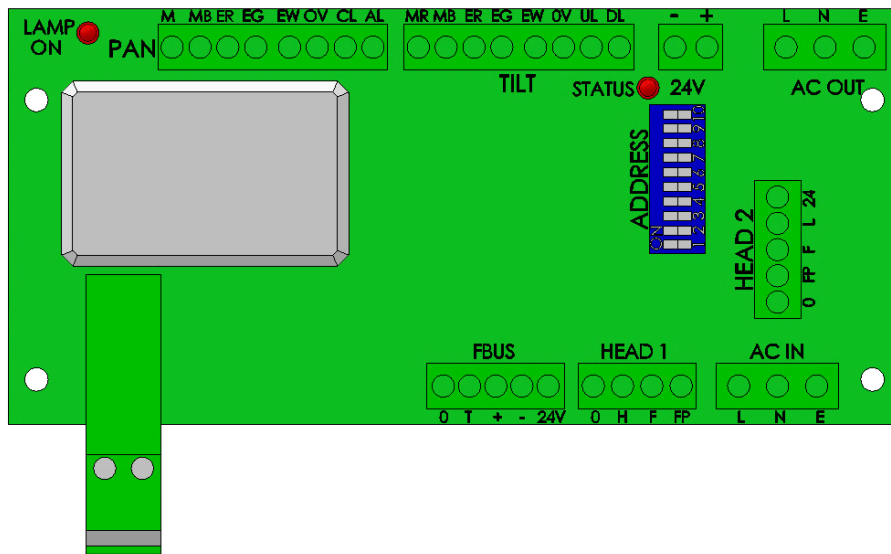
- If the searchlight completes the Self-Test, e.g., Pan left, Tilts down then returns to centre and the LEDs on the joystick panel are not illuminate, then please check the 4 data cables connections on the FBUS connector located on the back of the control panel assembly, as these data cables could be swapped around, you can check the voltages on the 4 connections, you should get as shown below:
  - 24 & + = 18-24v DC
  - 24 & - = 18-24v DC
  - 0 & + = 2.2v DC
  - 0 & - = 2.2v DC
  - 24 & 0 = 18-24v DC
- If the searchlight completes the Self-Test, e.g., Pan left, Tilts down then returns to centre and the LEDs on the joystick panel are illuminated, but you are unable to control the searchlight via the joystick panel, then please check the data + & - connections on the FBUS connector located on the back of the joystick panel assembly, as these data cables could be swapped around.
- If you have more than 1 searchlight in the installation and 2 or more searchlights are moving at the same time in the same direction, then please check the dip switch settings on the speed controller PCB, see **Setting Searchlight Address Value**.

## 7.2 - Problems After Installation

Please note, if the searchlight does not complete the self-test, you will not be able to operate the searchlight in any direction or switch the lamp on. Please refer to section **7.3 Obtaining Fault Status** below, to confirm the fault.

Once you have confirmed the fault via the joystick panel, please contact Francis Searchlights for ordering the required parts, [sales@francis.co.uk](mailto:sales@francis.co.uk)

If the joystick panel is not communicating with the searchlight and none of the LED's on the joystick panel are lighting up, then you will need to access the speed controller PCB inside the searchlight (see drawing A7300), to access the speed controller PCB, you will need to remove the 5 off M8 bolts & washers, that are located beneath the searchlight head, then you can access the speed controller PCB, the Status LED located near the top of the card (labelled "STATUS") on the speed controller PCB, as shown below.



During faults normal status LED operation is overridden. The status LED will flash red several times with the number of flashes corresponding to the specific fault. If there are multiple faults the LED will flash accordingly with a gap between each fault flash sequence. Fault details are provided on the next page, with the number of flashes indicated on the left.

The Status LED has several functions as detailed below.

### Software Version

When power is applied to the speed control card the status LED will flash green. The number of flashes corresponds to the software version.

### FBUS Normal operation

When the system is operating from FBUS the status LED will illuminate static green. When a valid FBUS data signal is received the LED will switch off momentarily to indicate data reception. If data is continuous the LED will flash green slowly.

If the Status LED does not light up, then please check the 24v DC supply from the PSU within the driver box, as shown on drawing C30013 Item 7 HV only, if there is no output from the PSU then this will need to be replaced.

## 7.3 - Obtaining Fault Status

Fault codes can be accessed, with the joystick panel switched off, press the 1/0 button and keeping the 1/0 button pressed for 10 seconds. Fault codes are indicated by the 1/0 button flashing several times related to the fault. Fault codes are detailed below. If more than one fault is present the PANEL button will indicate them in sequence.

1. Pan Limit. – Either of the pan limit switches operated. Note that this may not actually be a fault. The LED will flash when a limit switch is operated under normal circumstances i.e., the light is at the limit of travel. This will also indicate when a variable limit is reached.
2. Tilt Limit. – Either of the tilt limit switches operated. Note that this may not actually be a fault. The LED will flash when a limit switch is operated under normal circumstances i.e., the light is at the limit of travel. This will also indicate when a variable limit is reached.
3. Focus motor over current. – The focus motor is taking excessive current. The motor will be disabled for a period when this occurs. Fault indication will remain until power is removed or the fault is corrected.
4. FBUS interface over current. – The speed control card supplies 24VDC to the remote-control panels. This fault indicates the 24VDC output is taking excessive current. The FBUS supply output will switch off. To restore this output, remove the supply from the speed control card for a period.
5. Anti-condensation heater output over current. – The 24VDC anti condensation heater output is taking excessive current. The heater output will switch off. To restore this output, remove the supply from the speed control card for a period.
6. Limit Switch Error. Some lamp types do not use all or some limit switches. If an invalid limit switch input is detected it is probable the speed control card is set to the wrong product or there is a wiring error.
7. Datum Error. The start-up datum system has not completed correctly.
8. Product type not set or corrupt. The product type has not been set, has been set incorrectly or is corrupt.
9. Supply voltage out of tolerance. The 24V supply is outside the range 18-30V.



## 8 - Maintenance and Servicing

To prolong the service life and performance of your searchlight, the following maintenance guidelines are recommended:

- Maintenance checks should be conducted before every voyage or at least every three months.
- Before checking, disconnect the equipment from the supply.
- Visually inspect the condition of the equipment.
- Any major or minor structural damage should be rectified immediately to reduce sympathetic wear.
- After inspection it may be necessary to clean the searchlight. The following procedure should be adhered to:
  - Clean the front glass using a proprietary glass cleaner.
  - Clean the lenses if required.
- It is advisable to check all seals and gaskets for signs of degradation. Renew if necessary.
- The searchlight is fitted with two breather units. This ensures a steady airflow to prevent any vacuum forming within the head.
- Upon completing all maintenance requirements, the searchlight should be tested for full working order (approximately 20 minutes).

**If in any doubt as to the correct servicing procedures to adopt, please contact your distributor/agent or Francis who will be able to advise the best course of action for your product.**

## 9 - Wiring Diagram & General Assembly

Drawing No:	Description
A7300	VL500RC 110/130W General Assembly
C30005	Wiring Diagram 115/240v
C30006	Wiring Diagram 24v
C29971	Joystick Panel Assembly
C30013	Driver Box Assembly 115/240v
C30017	Driver Box Assembly 24v

ITEM	PART No.	DRG No.	DESCRIPTION	QTY
1	C30014	C30014	COMPONENT PLATE ASSY	1
2	C30008	C30008	LED ASSY	1
3	C29520	C29520	PAN GEAR HOUSING ASSY	1
4	C22268	C22268	BREATHER ASSY	2
5	C28859	C28859	PROXIMITY SWITCH ASSY	1
6	C25050	C25050	HOUSING UPPER	1
7	C25051	C25051	HOUSING LOWER	1
8	C26139	C26139	FRONT GLASS	1
9	C26184	C26184	FRONT GLASS GASKET	1
10	C26183	C26183	SEALING STRIP (RM)	1
11	C26475	C26475	BASE GASKET	1
12	C29986	C29986	SPEED CONTROLLER PCB	1
13	C28128	C28128	DUAL CONTROL PCB	1
14	C16436	C16436	PILLAR	8
15	C12415	C12415	M20 CABLE GLAND	1
16	C27121	C27121	M20 CABLE GLAND	1
17	C20349	C20349	M20 BLANKING PLUG	2
18	C17022	C17022	0.75mm SILICONE CABLE RED	400
19	C17023	C17023	0.75mm SILICONE CABLE BLACK	400
20	C12841	C12841	CABLE SLEEVE BLACK	2
21	C16215	C16215	M5 UN-INSULATED CRIMP	1
22	C26474	C26474	M8 x 90 CAP HD SCREW	5
23	C16335	C16335	M5 x 12 HEX HD SCREW	11
24	C14644	C14644	M4 x 8 HEX HD SCREW	3
25	C26464	C26464	M3 x 8 HEX HD SCREW	8
26	C15275	C15275	M8 NYLON WASHER	2
27	C21344	C21344	M8 DUBO WASHER	5
28	C08392	C08392	M5 PLAIN WASHER	11
29	C08231	C08231	M5 S/C SPRING WASHER	11
30	004376	004376	M4 PLAIN WASHER	2
31	C08793	C08793	M4 S/C SPRING WASHER	3
32	C26637	C26637	M4 x 12 O/D WASHER	1
33	C08028	C08028	M3 PLAIN WASHER	8
34	C10747	C10747	M3 S/C SPRING WASHER	8
35	C12039	C12039	CLEAR RTV	A/R
36	C08906	C08906	GREASE	A/R
37	C13853	C13853	LOCTITE TL42	A/R

FRANCIS SEARCHLIGHTS LIMITED · UNION ROAD · BOLTON · BL2 2HU

VOYAGER 2 110/130W LED GA 2023

STANDARD PRACTICE  
Debur all cut/machined edges  
Break corners R0.2(Max) U.O.S.

Francis  
FRANCIS SEARCHLIGHTS LIMITED

DATE: 21.7.23  
SCALE: 1:2  
TOLERANCES:  
Hole centres & parts: ±  
Die casting: To ISO 8062 C18  
Said Center: To ISO 8062 C110

ALL DIMENSIONS IN MILLIMETRES

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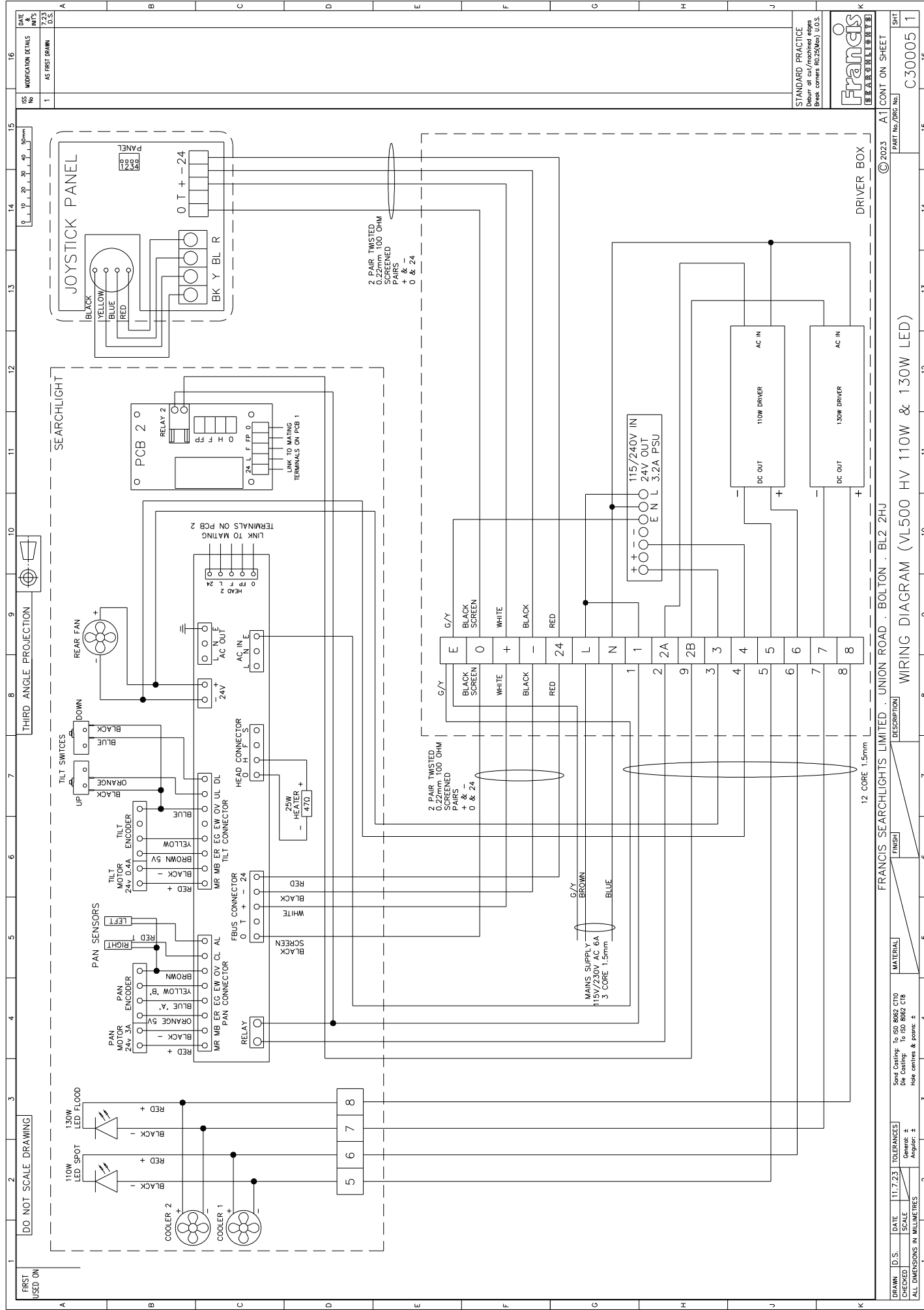
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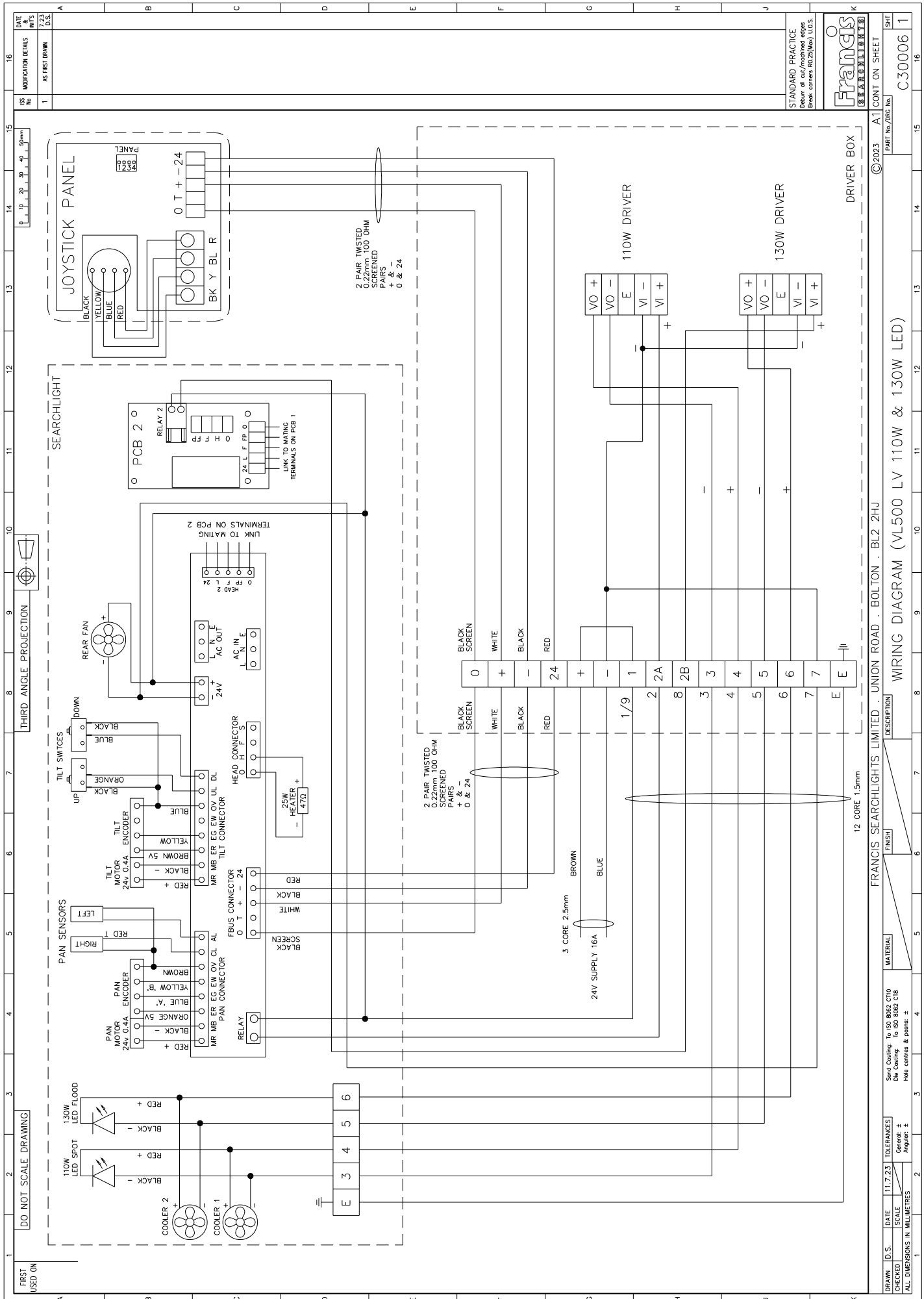
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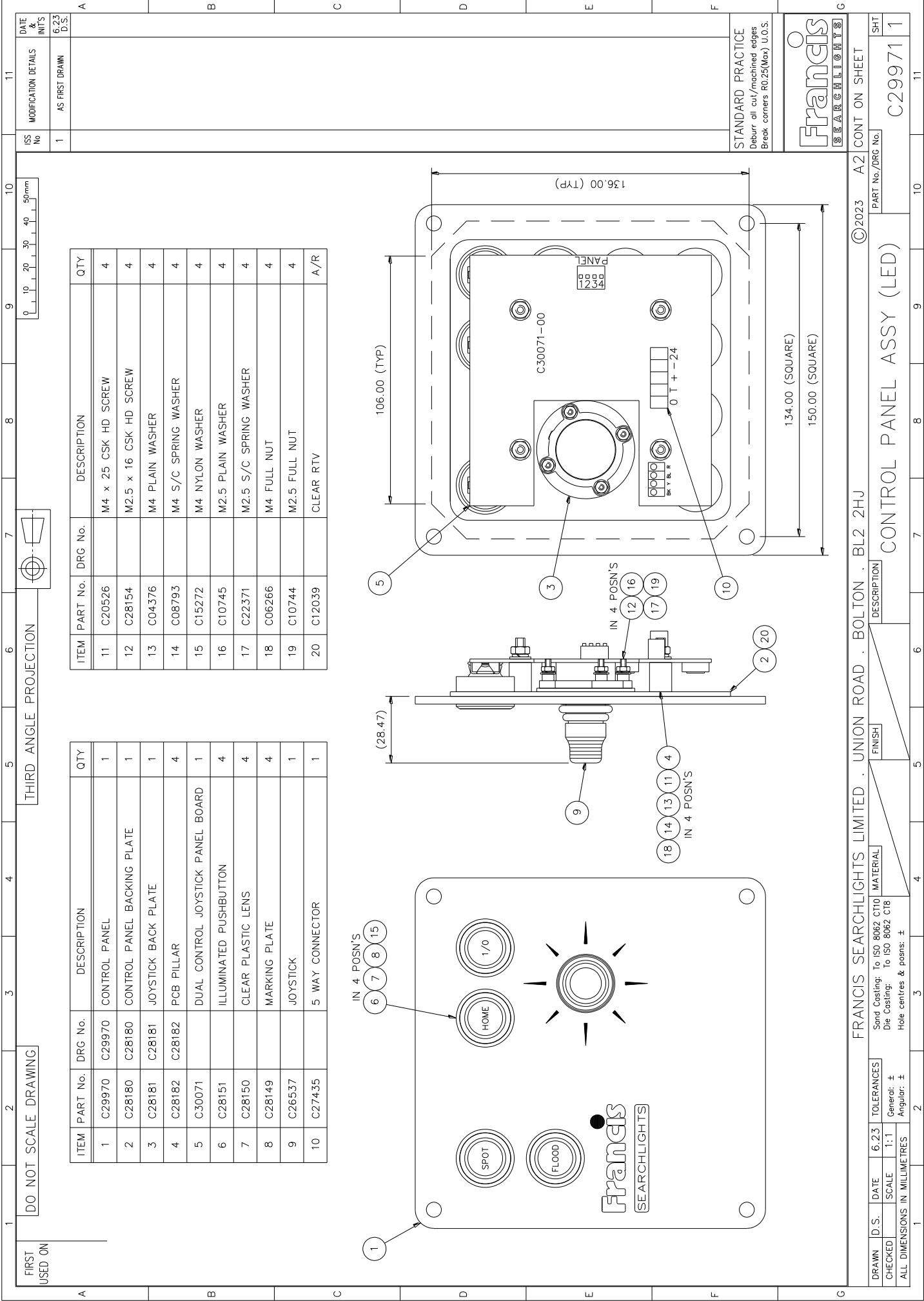


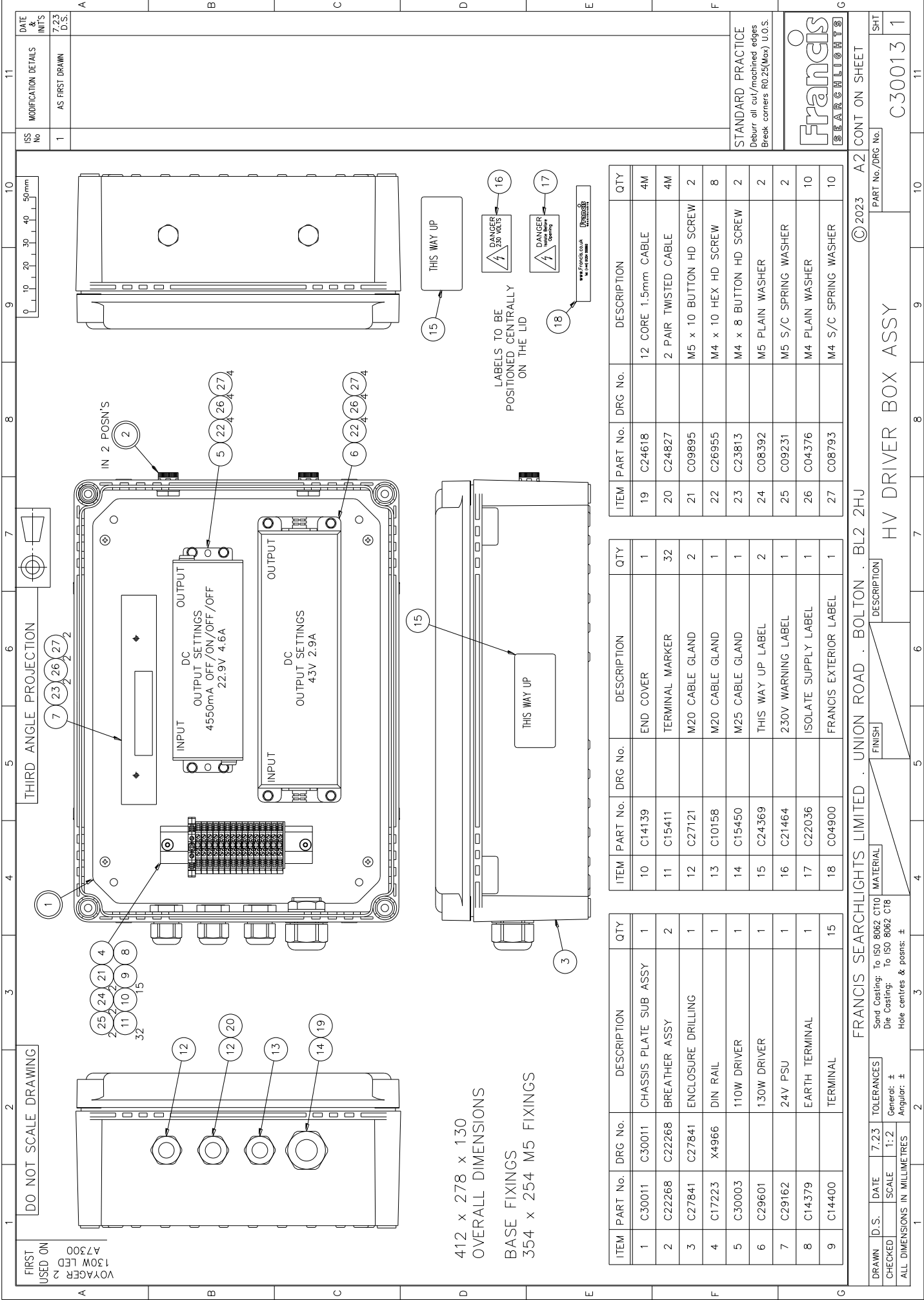


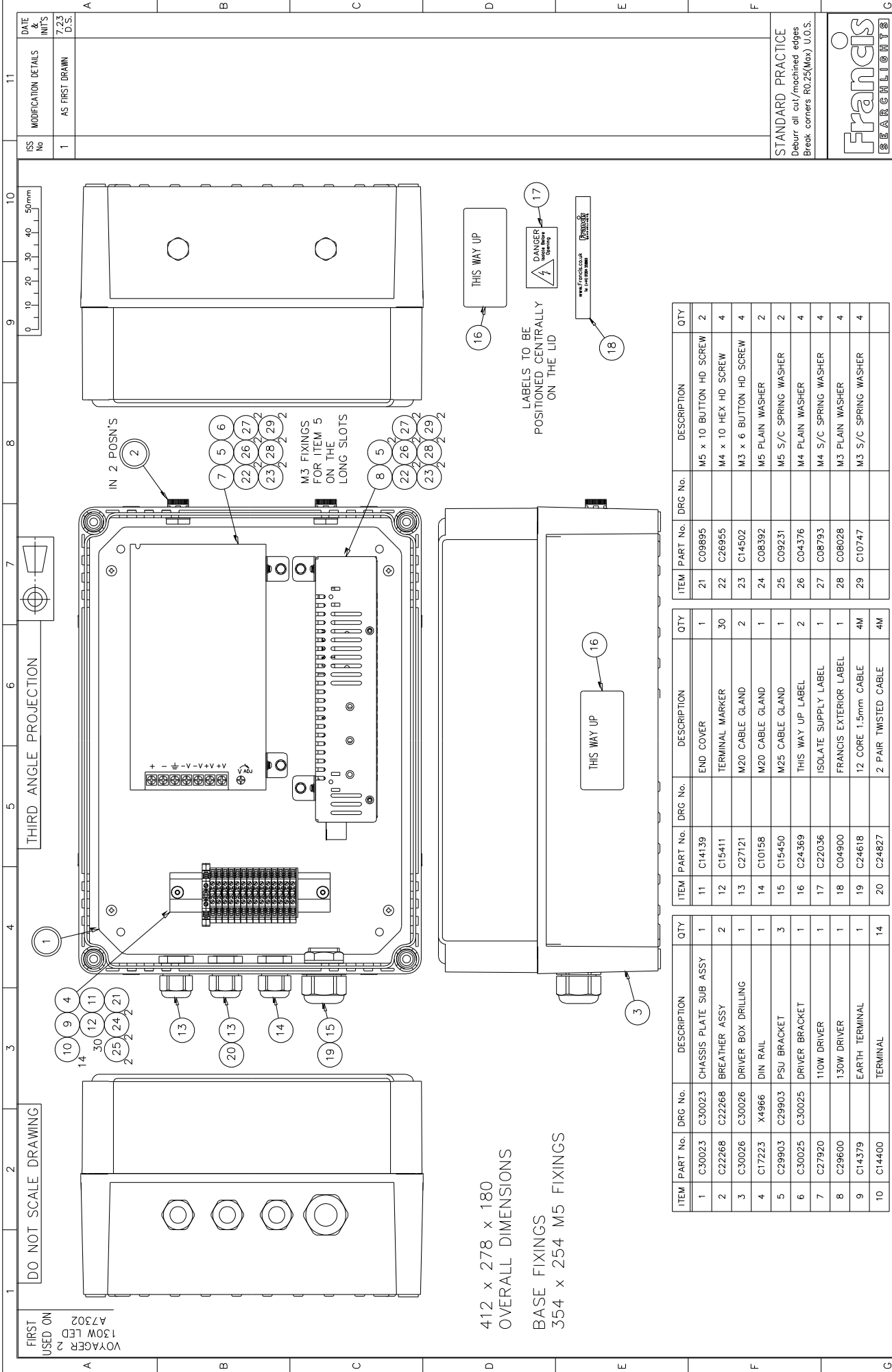
STANDARD PRACTICE  
Debur all cut/machined edges  
Break corners R0.25(Min) U.O.S.

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DATE	11.7.23	TOLERANCES	See Drawing To ISO 8013 C10	FRN5J	DESCRIPTION	WIRING DIAGRAM (VL500 LV 110W & 130W LED)	CONT ON SHEET	1
CHECKED	SCALE	ALL DIMENSIONS IN MILLIMETRES	Die Casting To ISO 8062 C18	MATERIAL			PART No/200 No	C30006
Angular	Angular	Angular	Hole centres & points					



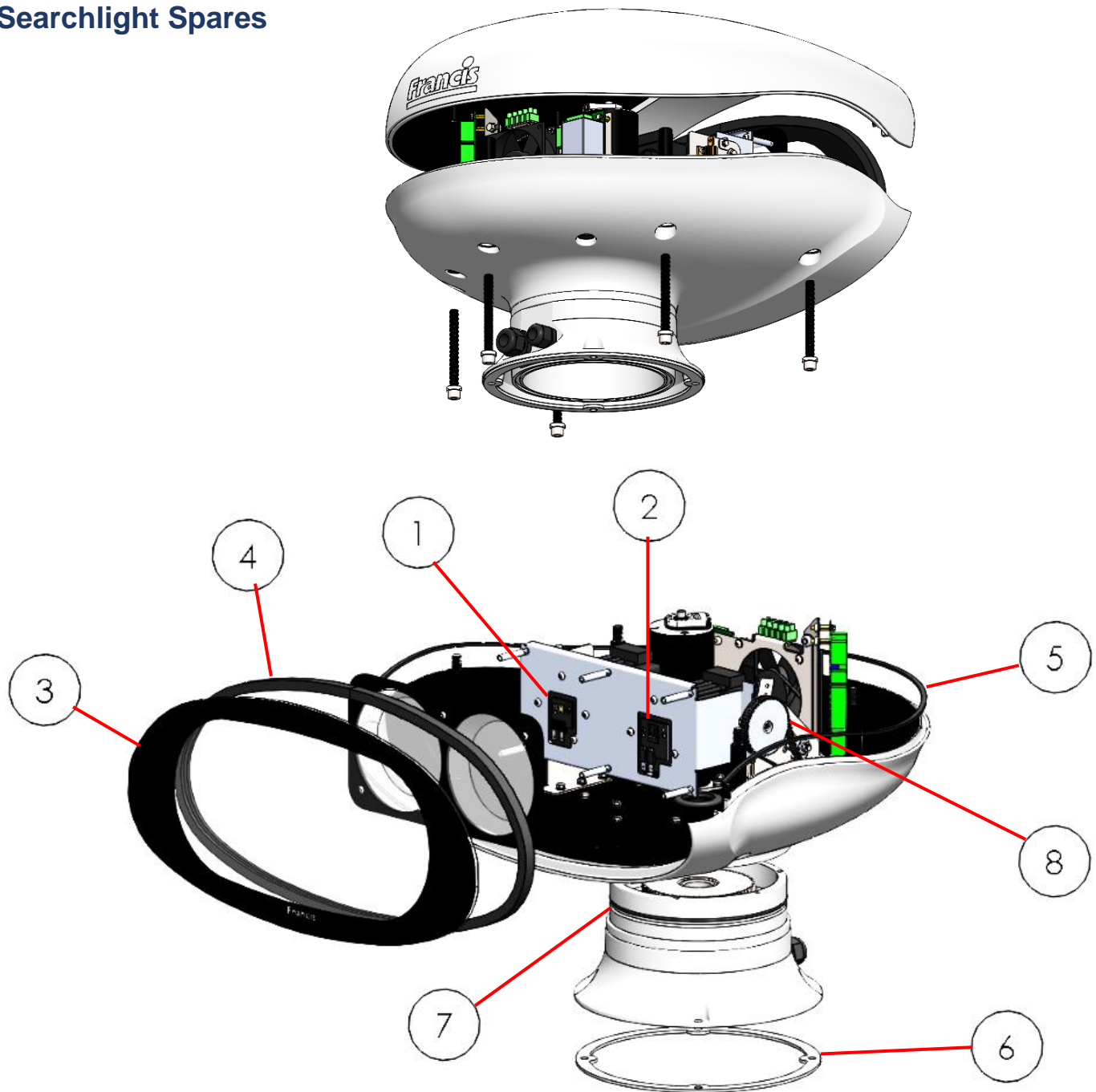




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DRAWN		D.S.		DATE		7.23		TOLERANCES		MATERIAL		FINISH		DESCRIPTION		PART No./DRG No.		SHT			
CHECKED		SCALE		1:2		General: ±		Die Casting: To ISO 8062 CT8		To ISO 8062 CT10				LV DRIVER BOX ASSY		C30017		1			
ALL DIMENSIONS IN MILLIMETRES				Angular: ±		Hole centres & posns: ±															
1		2		3		4		5		6		7		8		10				11	

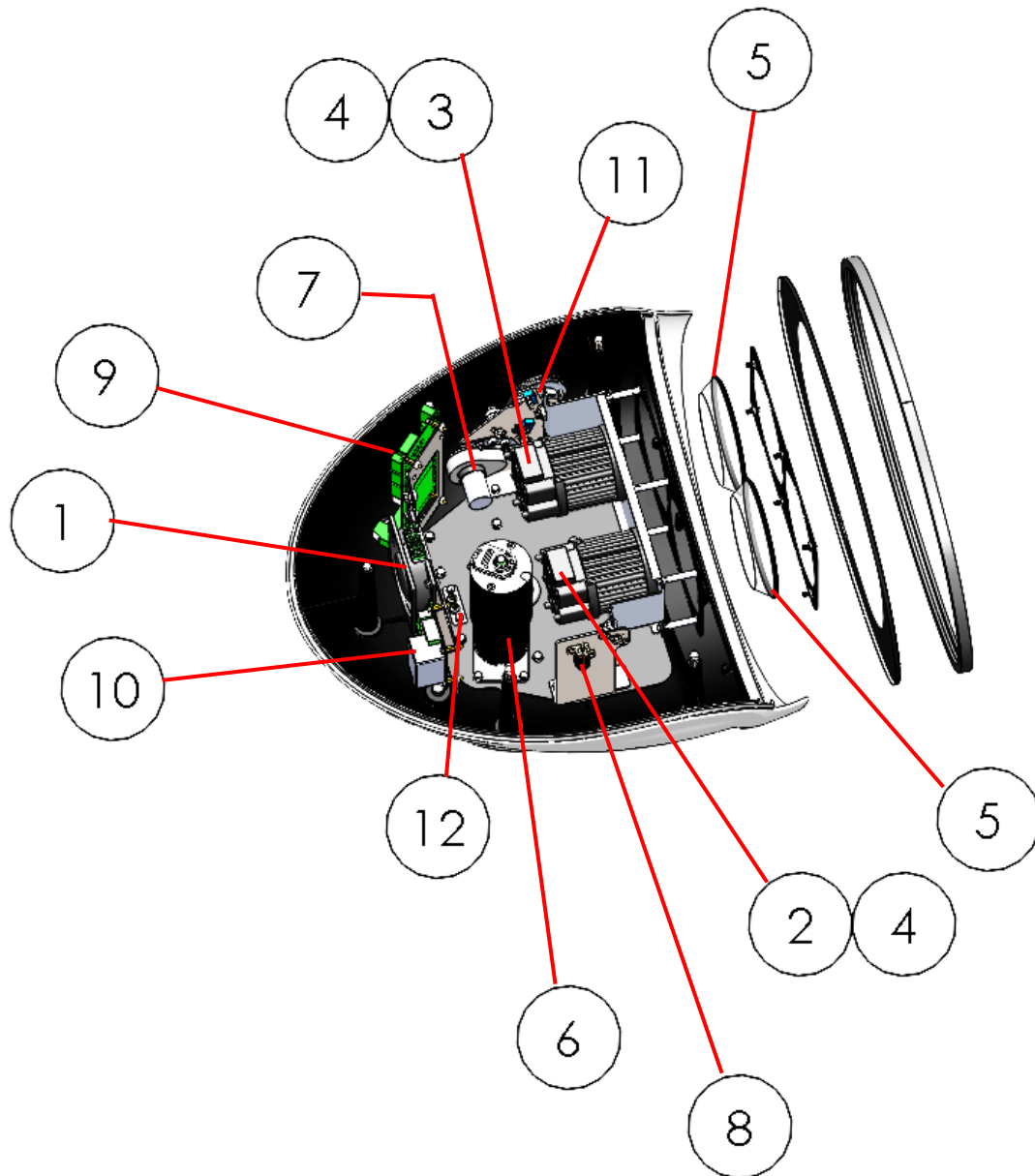


## Searchlight Spares



Item Number	Part Number	Description	Quantity
1	C29429-00	110w LED	1
2	C29462-00	130w LED	1
3	C26139-00	Front Glass	1
4	C26184-00	Front Glass Gasket	1
5	C26183-00	Sealing Strip Gasket	1
6	C26475-00	Base Gasket	1
7	C23808-00	Base 'O' Ring	1
8	C26843-00	Pulley Belt	1

## Searchlight Spares



Item Number	Part Number	Description	Quantity
1	C27820-00	Fan	1
2	C29994-01	110w Cooler	1
3	C29995-01	130w Cooler	1
4	C28083-00	Cooler Wiring Harness	2
5	C29428-00	Fresnel Lens	2
6	C29521-01	Pan Motor Assembly	1
7	C28654-01	Tilt Motor Assembly	1
8	C27288-00	Heater	1
9	C29986-01	Speed Controller PCB	1
10	C28128-00	Dual Control PCB	1
11	C27650-00	Tilt Microswitch	2
12	C25022-00	Proximity Switch	2

## 10 - Spare Parts List

The following spare parts can be ordered directly from the manufacturer:

Part Number	Description
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### Searchlight Spares

C29994-01	110w Cooler
C29995-01	130w Cooler
C28083-00	Cooler Wiring Harness
C29428-00	Fresnel Lens
C29429-00	110w LED
C29462-00	130w LED
C27820-00	Fan
C26139-00	Front Glass
C26184-00	Front Glass Gasket
C26183-00	Sealing Strip Gasket
C26475-00	Mounting Base Gasket
C23808-00	Base 'O' Ring
C28654-01	Tilt Motor Assembly
C29521-01	Pan Motor Assembly
C27288-00	Heater
C26843-00	Pulley Belt
C29986-01	Speed Controller PCB
C28128-00	Dual Control PCB
C27650-00	Tilt Micro Switch
C25022-00	Proximity Switch (Pan)

### Driver Box Spares

C30003-01	110w Driver 110/240v Model
C29601-01	130w Driver 110/240v Model
C27920-01	110w Driver 24v Model
C29600-01	130w Driver 24v Model
C29162-00	24v PSU Converter 110/240v Model Only

### Joystick Panel Spares

C26537-01	Joystick
C30071-00	Dual Control Joystick Controller PCB

To prolong the life and performance of your product, we recommend that you only specify Francis Searchlights spare parts. This will ensure that any warranties on your equipment will not be invalidated.

When ordering spare parts please contact the Sales Department at Francis Searchlights Limited [sales@francis.co.uk](mailto:sales@francis.co.uk) . Please always quote searchlight model and serial number, which you can find on the driver box name plate. This will enable a fast response to your spares' requirements.