Centurion Scientific

Instruction and Technical Manual D

2000 & K/R

INDEX

Part One (This Section must be read and utilised for safety)

Part Two

EB Range:

Part Three

1000 Series:

Part Four

2000 Series, K Series and KR Series:

Part Four

2000 Series, K Series and KR Series:

2030	(6,000rpm Cell Washer centrifuge with rotor)
2050	(2,000rpm Cytology centrifuge with rotor)
2010	(13,300rpm centrifuge with choice of rotor)
2010H	(12,000rpm Haematocrit centrifuge with rotor)
2015	(15,000rpm centrifuge with choice of rotor)
2020	(6,000rpm centrifuge with choice of rotor)
2040	(3,800rpm centrifuge with rotor and adaptors)
2041	(6,000rpm centrifuge with choice of rotor)

MULTI ROTOR CENTRIFUGES:

K2080	(13,300rpm centrifuge with choice of rotor)
K2042	(12,000rpm centrifuge with choice of rotor)
K220	(15,000rpm centrifuge with choice of rotor)
K240	(15,000rpm centrifuge with choice of rotor)
K240R	(15,000rpm refrigerated centrifuge with rotors)
K280R	(15,000rpm refrigerated centrifuge with rotors)

Centurion Scientific

2000 and K MODELS OPERATING MANUAL

Function

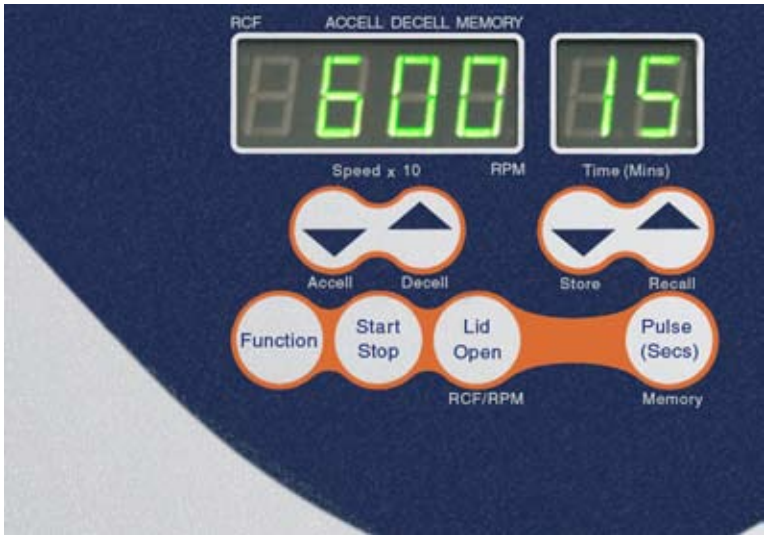
For Rcf/Rpm mode:
Hold down Function and press Lid Open (see correct dot on speed display)

To Increment Memory No's:
Hold down Function and press Pulse (see memory LED on speed display)

To Increment Decel Rate:
Hold down Function and press Speed Down (see Decel LED on speed display)

To Increment Accel Rate:
Hold down Function and press Speed Up (see Accel LED on speed display)

Acceleration/Deceleration **Memory** **Time**



Start/Stop
To start, shut lid and press Start. Centrifuge will run to set time and then automatically brake to STOP.
Press STOP if you need to stop before timer ends

Lid Open
Press when LED display indicates OPEn.

Pulse (secs)
Hold down Pulse to run centrifuge. Time (in seconds) counted up from zero on time display.
Release button when desired time is reached.

Programs

To Set a Program:
e.g in memory number 6

Select Speed and Time parameters.
Hold down Function and press Memory until no. 6 shows in display.

While still holding Function, press Store.

This will save the information to the required number.

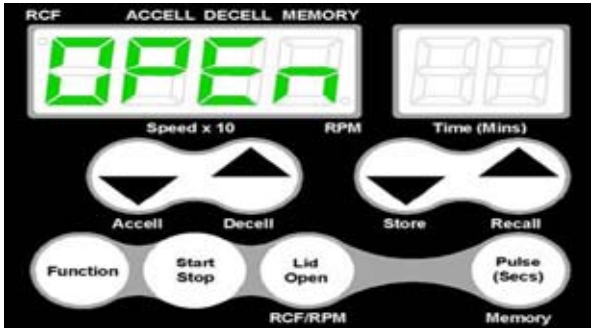
To Recall a Program:
e.g from memory number 6

Hold down Function and press Memory until no. 6 shows in display.

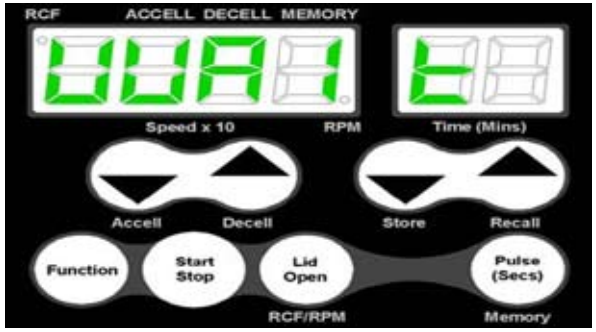
While still holding Function, press Recall.

This will recall the required program.

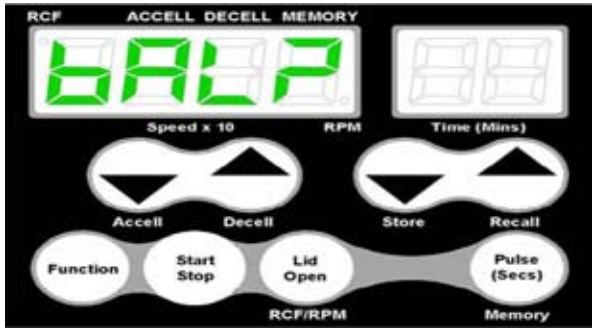
TROUBLESHOOTING



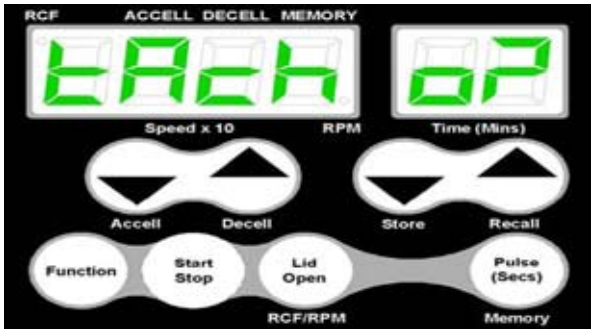
OPEn
The rotor has stopped spinning. You may now open the lid. Press the 'Lid Open' button.



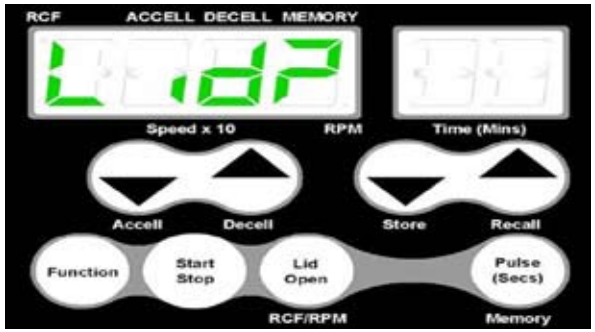
WAIt
You have tried to open the lid. Please wait for 10 seconds and try again. If the lid still does not open: check that the rotor has stopped turning, insert lid release tool into side hole (on right) and lever down. The lid will 'pop' open.



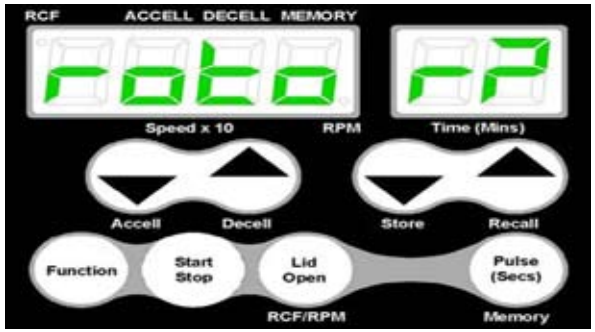
baL?
An imbalance has occurred. Check that the tubes are correctly placed in the rotor. If tubes are correctly placed and baL? still showing please contact your service department.



tAcho?
The rotor has not turned in 5 seconds. Check that nothing is preventing the rotor from turning i.e tall tubes or packaging. If tAcho? still showing please contact your service department.



Lid?
The lid has opened during the run. The motor will now brake. After it has come to a complete stop you may open the lid. Check that the lid is correctly shut. If Lid? still showing please contact your service department.



rotor?
K2 Series only.
The rotor has not been recognised. Safety speed will automatically be selected. Try and run again, check its max speed. If rotor? still showing please contact your service department.

Centurion Scientific

K SERIES REFRIGERATED MODELS OPERATING MANUAL

Function

For Rcf/Rpm mode:
Hold down Function and press Lid Open (see correct dot on speed display)

To Increment Memory No's:
Hold down Function and press Pulse (see memory LED on speed display)

To Increment Decell Rate:
Hold down Function and press Speed Down (see Decel LED on speed display)

To Increment Accell Rate:
Hold down Function and press Speed Up (see Accel LED on speed display)

Temperature Up/Down **Acceleration/ Deceleration** **Memory** **Time**

Start/Stop
To start, shut lid and press Start. Centrifuge will run to set time and then automatically brake to STOP.
Press STOP if you need to stop before timer ends

Lid Open
Press when LED display indicates OPEn.

Pulse (secs)
Hold down Pulse to run centrifuge. Time (in seconds) counted up from zero on time display.
Release button when desired time is reached.

Programs

To Set a Program:
e.g in memory number 6

Select Speed and Time parameters.
Hold down Function and press Memory until no. 6 shows in display.

While still holding Function, press Store.

This will save the information to the required number.

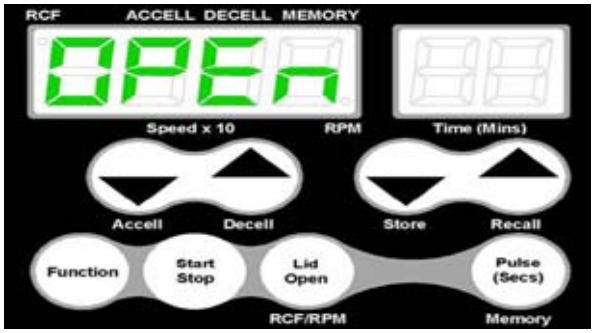
To Recall a Program:
e.g from memory number 6

Hold down Function and press Memory until no. 6 shows in display.

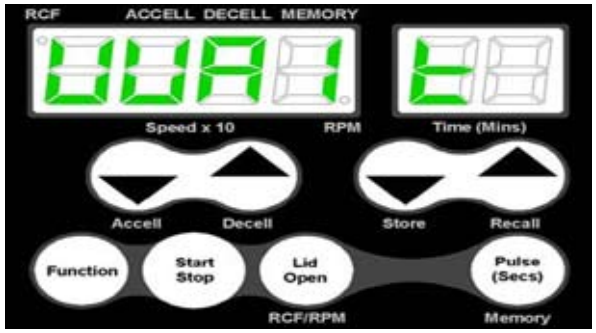
While still holding Function, press Recall.

This will recall the required program.

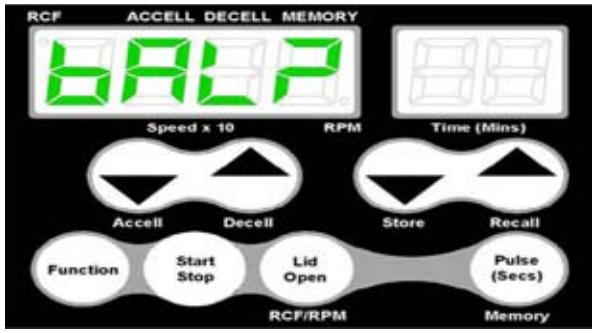
TROUBLESHOOTING



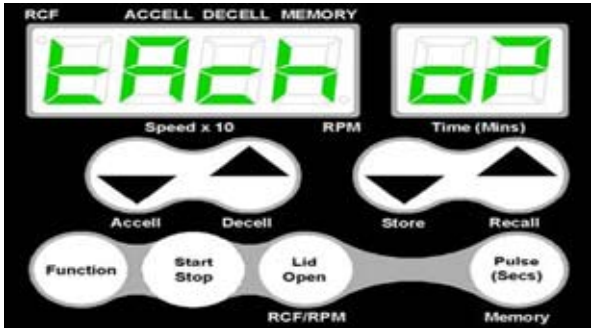
OPEn
The rotor has stopped spinning. You may now open the lid. Press the 'Lid Open' button.



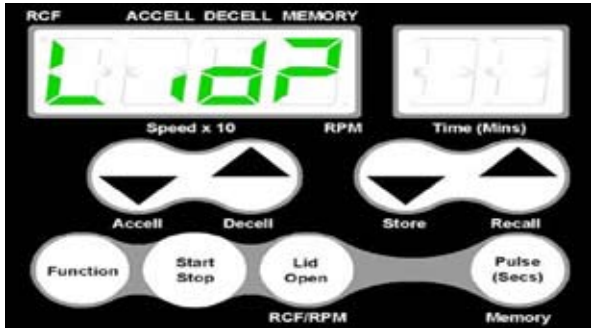
WAIt
You have tried to open the lid. Please wait for 10 seconds and try again. If the lid still does not open: check that the rotor has stopped turning, insert lid release tool into side hole (on right) and lever down. The lid will 'pop' open.



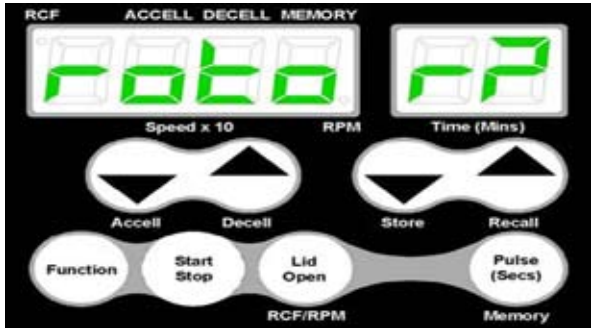
baL?
An imbalance has occurred. Check that the tubes are correctly placed in the rotor. If tubes are correctly placed and baL? still showing please contact your service department.



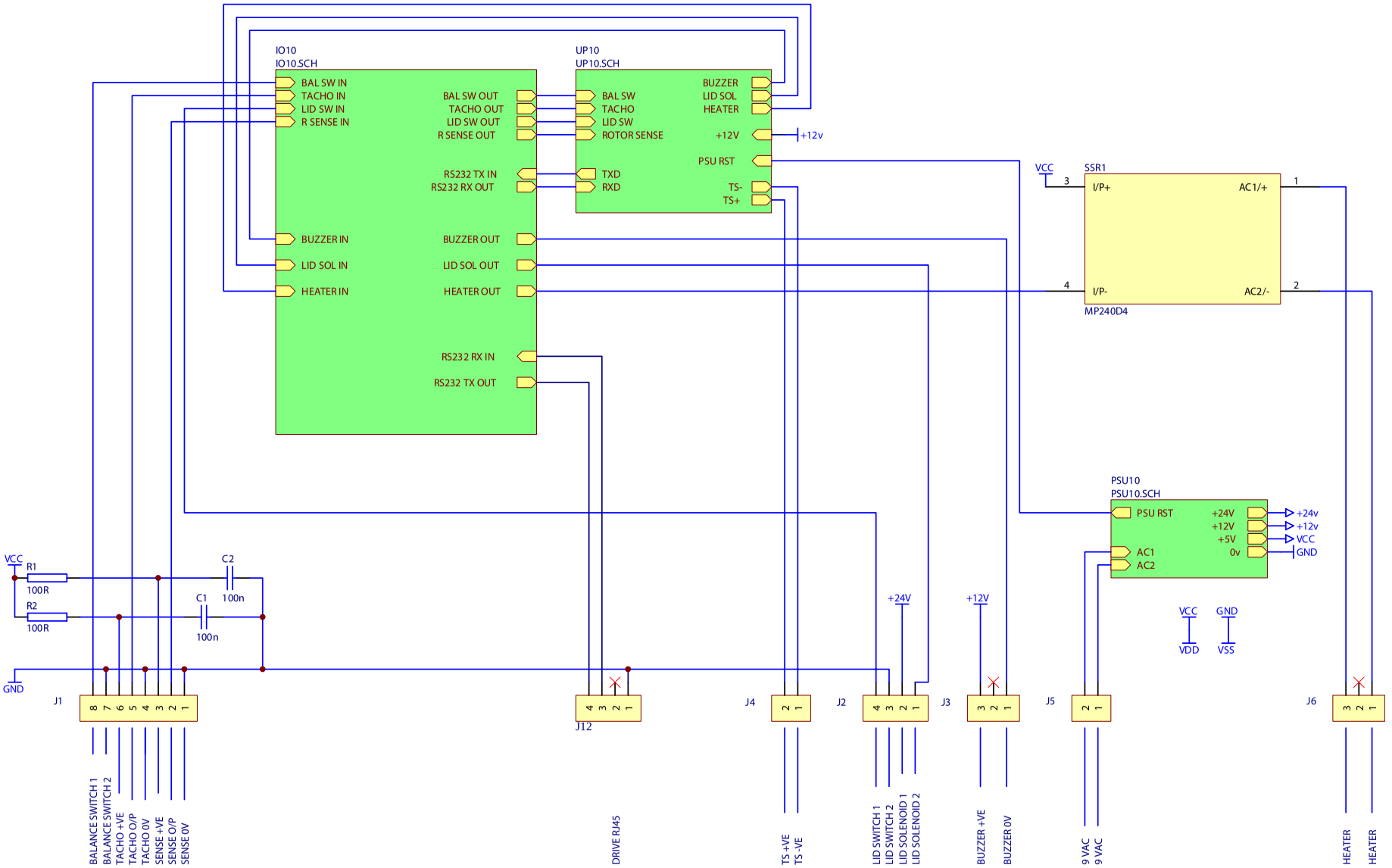
tAcho?
The rotor has not turned in 5 seconds. Check that nothing is preventing the rotor from turning i.e tall tubes or packaging. If tAcho? still showing please contact your service department.



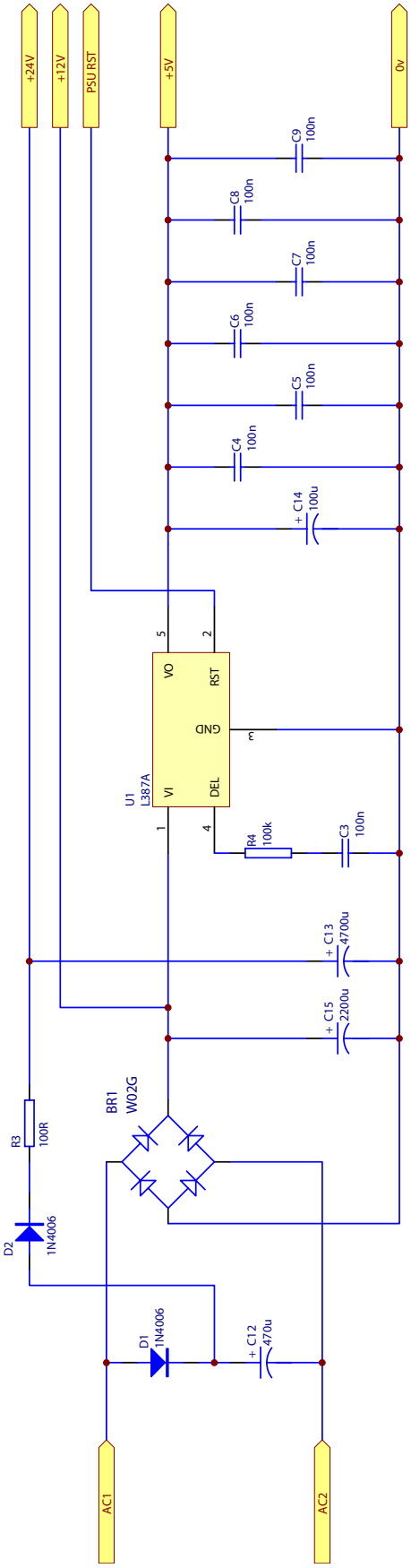
Lid?
The lid has opened during the run. The motor will now brake. After it has come to a complete stop you may open the lid. Check that the lid is correctly shut. If Lid? still showing please contact your service department.



rotor?
K2 Series only.
The rotor has not been recognised. Safety speed will automatically be selected. Try and run again, check its max speed. If rotor? still showing please contact your service department.

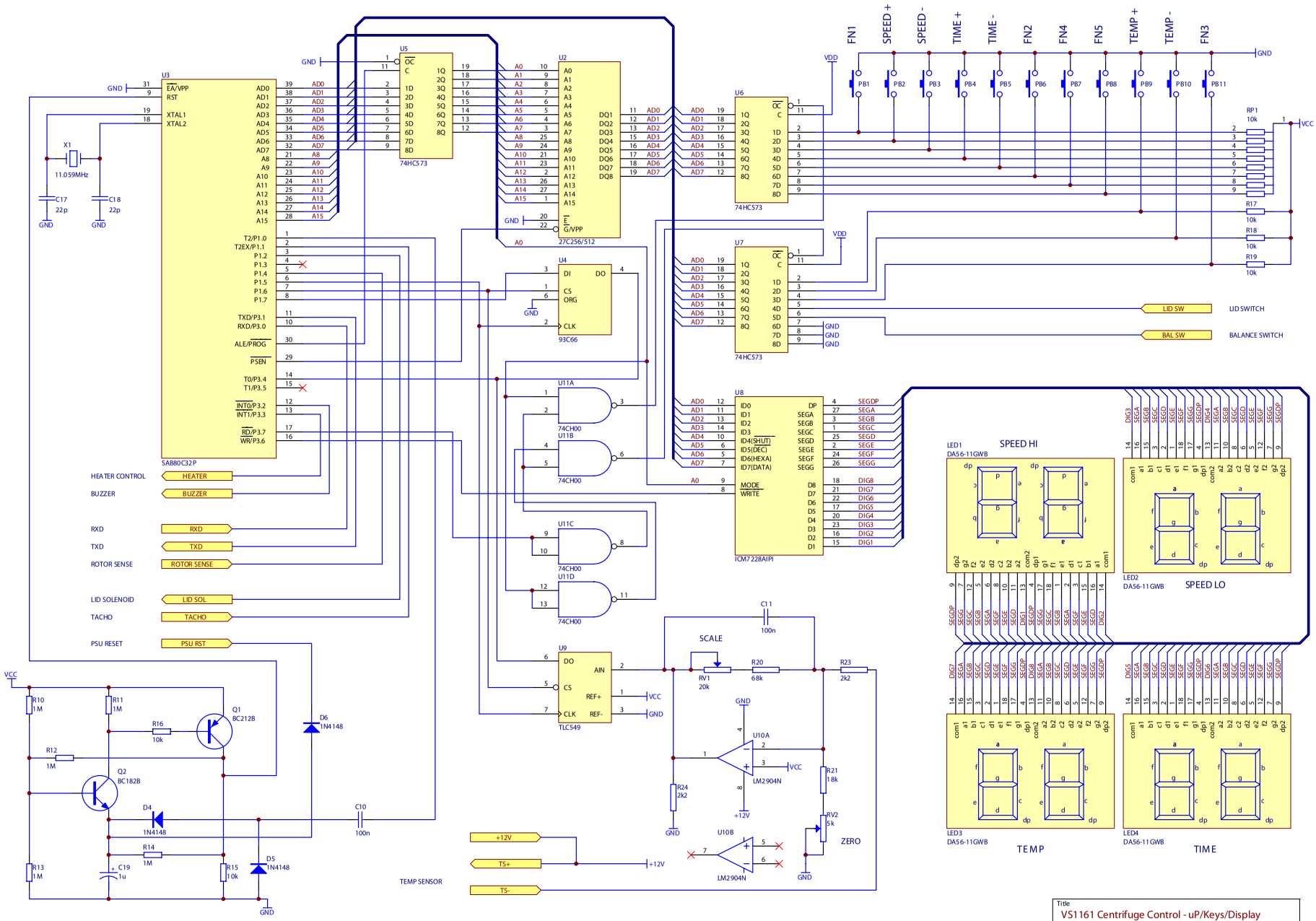


Title		
VS1161 Centrifuge Control - Main		
Size: A4	Number: VS1161/C1	Revision: 1.0

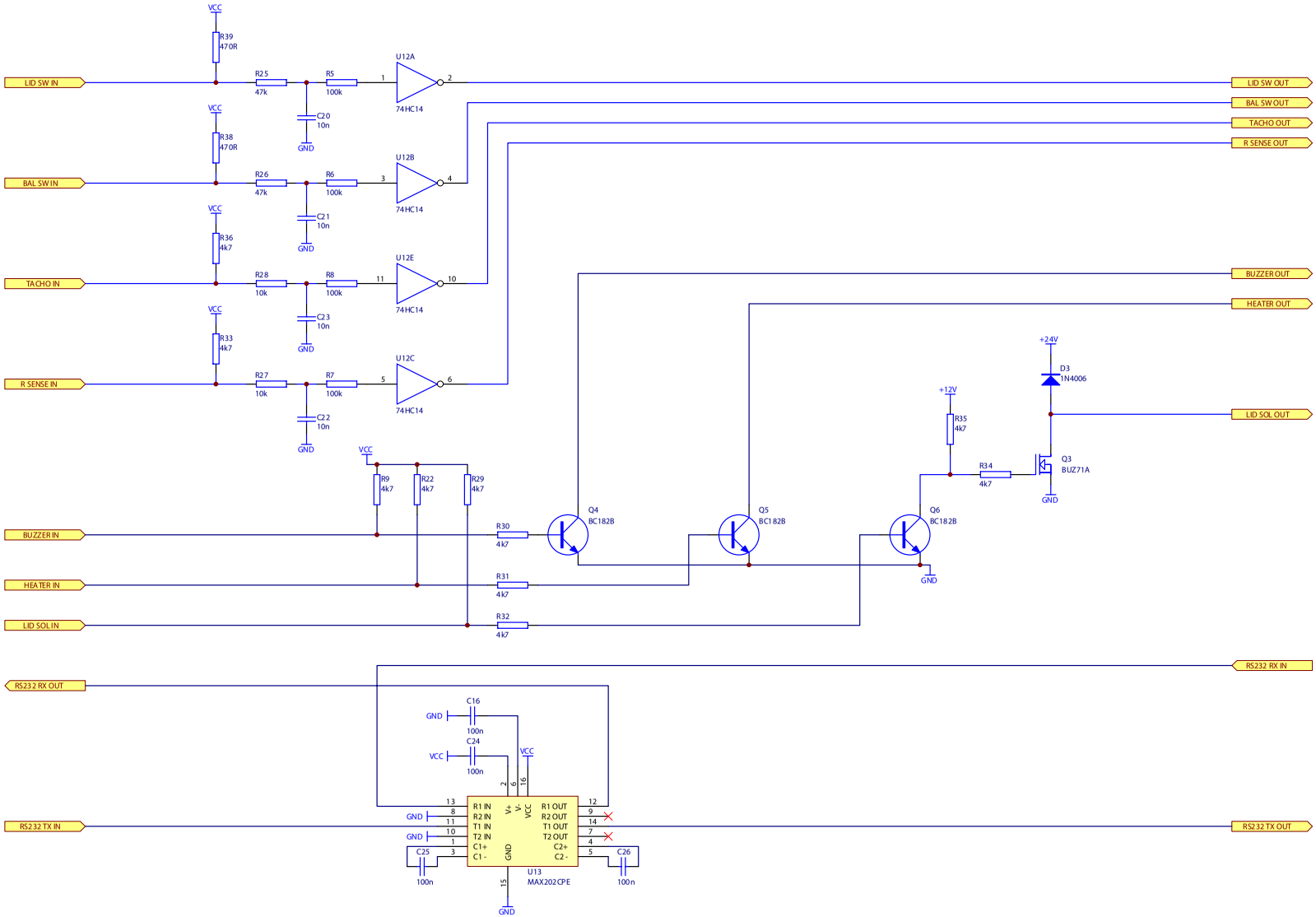


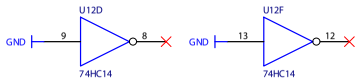
Title
VS1161 Centrifuge Control - PSU

Size: A4	Number: VS1161/PSU	Revision:1.0



Title		
VS1161 Centrifuge Control - uP/Keys/Display		
Size: A3	Number: VS1161/UP	Revision:1.0





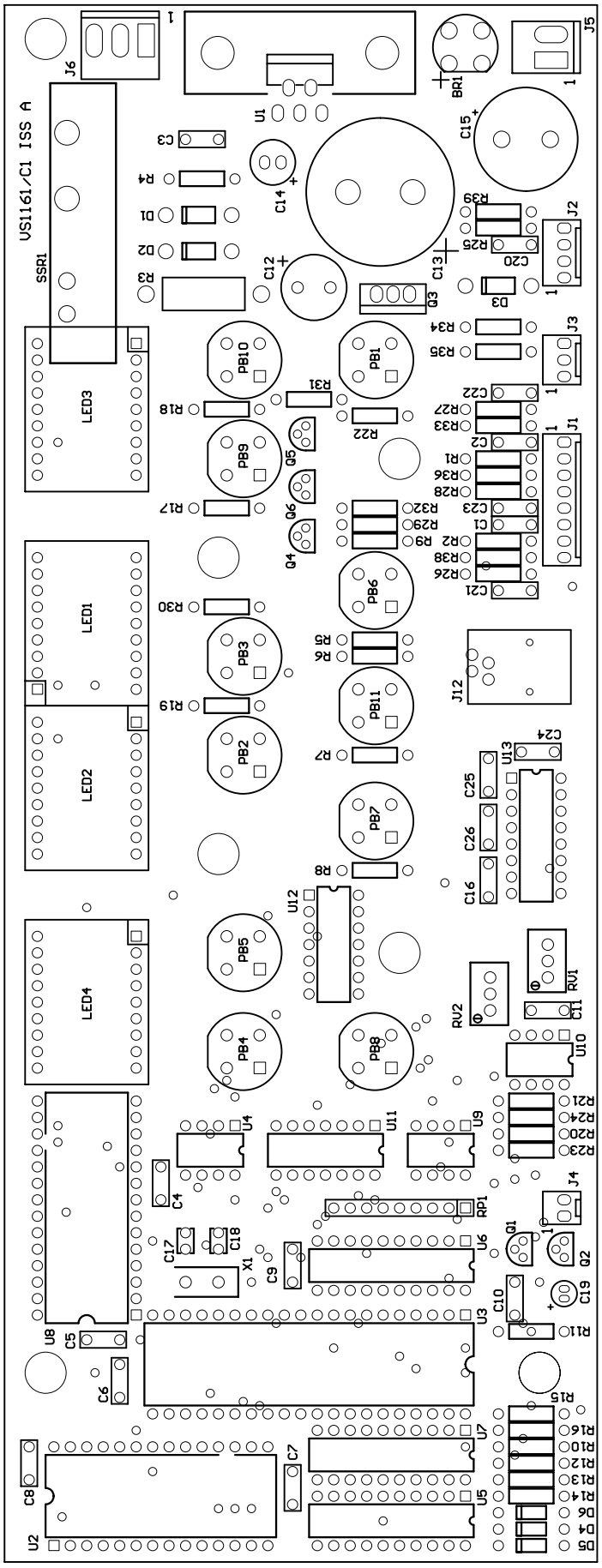
Title		
VS1161 Centrifuge Control - I/O		
Size: A3	Number: VS1161/IO	Revision: 1.0

VS1161/C1 ISS A Part list

Itm	Qty	References	Description
1	1	BR1	Bridge Rectifier 1.5A 200V Glass pass, W02G, Any, W02G (RS 659-826)
2	2	C17	C18 Capacitor Min Ceramic Plate, 22p, Phillips, 680 34229 (RS 167-0442)
3	14	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C16 C24 C25 C26	Capacitor Multilayer Ceramic 50v, 100n, Any, (RS 264-4949)
4	1	C11	Capacitor Multilayer Ceramic 50v, 100n, Any, (RS 264-4949) [RF]
5	4	C20 C21 C22 C23	Capacitor Multilayer Ceramic 50v, 10n, Any, (RS 264-4832)
6	1	C14	Capacitor Radial Al Elec (low ESR) 25v, 100u, ELNA RSH Series, (FEC 108-834)
7	1	C15	Capacitor Radial Al Elec 25v, 2200u, Rubcon YXF series, (RS 191-7791)
8	1	C12	Capacitor Radial Al Elec 25v, 470u, Rubicon YXF series, (RS 191-7779)
9	1	C13	Capacitor Radial Snap in 35V, 4700u, Any, (RS 127-458)
10	1	C19	Capacitor sub min Radial Al Elec 50v , 1u, Any, (RS 205-1959)
11	1	J12	Connector RJ45 4/4 Vertical, CON4, Stewart Connector Systems Inc, SS-6544-NF (RS 437-187)
12	1	X1	Crystal HC18U AT Cut, 11.059MHz, Any, (RS 226-1774)
13	3	D1 D2 D3	Diode Power 1A 800v, 1N4006, Any, (RS 261-974)
14	3	D4 D5 D6	Diode Signal, 1N4148, Any, (RS 271-606)
15	1	J3	Header 0.1" 3W Friction Lock, CON3, AMP, MTA series (RS 132-0361) [N]
16	1	J5	Header Pin PCB 2W, CON2, Molex, 26-48-1245 (part) (FEC 151-899)
17	1	J6	Header Pin PCB 3W, CON3, Molex, 26-48-1245 (part) (FEC 151-899) [RF]
18	1	J4	Header straight 0.1" 2W , CON2, AMP, MTA series (RS 132--0355) [RF]
19	1	J2	Header straight 0.1" 4W , CON4, AMP, MTA series (RS 132-0377)
20	1	J1	Header straight 0.1" 8W , CON8, AMP, MTA series (RS 132-0377)
21	1	U9	IC ADC 8 bit serial, TLC549, Texas Inst, TLC549IP (RS 650-093) [RF]
22	1	U2	IC CMOS EPROM 256k 200ns, 27C256/512, Any,(Any)
23	1	U4	IC CMOS Serial EEPROM 4k, 93C66, SGS, ST93C66B1 (RS 322-3874)
24	1	U12	IC HC CMOS Hex Schmitt Inverter, 74HC14, Any, (RS 300-568)
25	3	U5 U6 U7	IC HC CMOS Octal transparent latch, 74HC573, Any, (RS 300-754)
26	1	U11	IC HC CMOS Quad NAND, 74CH00, Any, (RS 301-224)
27	1	U8	IC LED Display driver, ICM7228AIPI, Intersil, (RS 648-696)
28	1	U3	IC Microprocessor 80C32 12MHz, SAB80C32P, Any, (RS 427-720)
29	1	U13	IC RS232 Transceiver, MAX202CPE, Any, (Any)
30	1	U1	IC Voltage Regulator +5v with reset output, L387A, SGS, L387A (RS 263-267)
31	1	U10	IC dual op-amp, LM2904N, Nati Semi, LM2904N (RS 810-273) [RF]
32	3	LED1 LED2 LED4	LED Dual 7 Segment Display Green Common Anode, DA56-11GWB, Kingbright, DA56-11GWB (????)
33	1	LED3	LED Dual 7 Segment Display Green Common Anode, DA56-11GWB, Kingbright, DA56-11GWB (????) [RF]
34	1	Q3	MOSFET N Channel 50v 16A, BUZ71A, Any, (RS 325-9479)
35	1	RP1	R Pack 8 commoned 9 pin SIL 5%, 10k, Any, (RS 140-978)
36	1	SSR1	Relay Solid state 4A 240vac, MP240D4, CRYDOM, MP240D4 (RS 291-1823) [RF]
37	1	R3	Resistor Carbon Film 1W 5%, 100R, Any, (RS 131-772)
38	2	R1 R2	Resistor Metal Film 0.25W 1%, 100R, Any, (RS 148-269)
39	5	R4 R5 R6 R7 R8	Resistor Metal Film 0.25W 1%, 100k, Any, (RS 148-972)
40	7	R15 R16 R17 R18 R19	Resistor Metal Film 0.25W 1%, 10k, Any, (RS R27 R28 148-736)
41	1	R21	Resistor Metal Film 0.25W 1%, 18k, Any, (RS 148-792) [RF]
42	5	R10 R11 R12 R13 R14	Resistor Metal Film 0.25W 1%, 1M, Any, (RS 149-228)
43	2	R23 R24	Resistor Metal Film 0.25W 1%, 2k2, Any, (RS 148-584) [RF]
44	2	R38 R39	Resistor Metal Film 0.25W 1%, 470R, Any, (RS 148-427)
45	2	R25 R26	Resistor Metal Film 0.25W 1%, 47k, Any, (RS 148-893)
46	8	R9 R29 R30 R32 R33	Resistor Metal Film 0.25W 1%, 4k7, Any, (RS R34 R35 R36 148-663)
47	2	R22 R31	Resistor Metal Film 0.25W 1%, 4k7, Any, (RS 148-663) [RF]
48	1	R20	Resistor Metal Film 0.25W 1%, 68k, Any, (RS 148-938) [RF]
49	1	RV1	Resistor POT vertical 20T, 20k, Bourns, 3296W (RS 160-102) [RF]
50	1	RV2	Resistor POT vertical 20T, 5k, Bourns, 3296W (RS 160-089) [RF]
51	7	PB2 PB3 PB4 PB5 PB6	Switch Push Button , SW-PB, ITT, D6 Flat PB7 PB8 (Arrow 525017)
52	1	PB11	Switch Push Button , SW-PB, ITT, D6 Flat (Arrow 525017) [N]
53	3	PB1 PB9 PB10	Switch Push Button , SW-PB, ITT, D6 Flat (Arrow 525017) [RF]
54	3	Q2 Q4 Q6	Transistor Small Signal NPN, BC182B, Any, (Any)
55	1	Q5	Transistor Small Signal NPN, BC182B, Any, (Any) [RF]
56	1	Q1	Transistor Small Signal PNP, BC212B, Any, (Any)

Additional parts

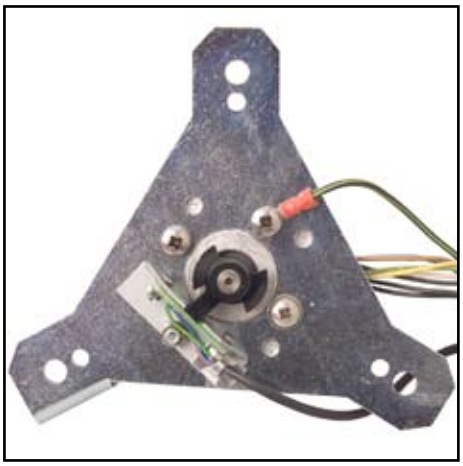
Socket for U2
Heatsink and clip for U1
Build Options
[RF] = refrigerated version only
[N] = normal version only



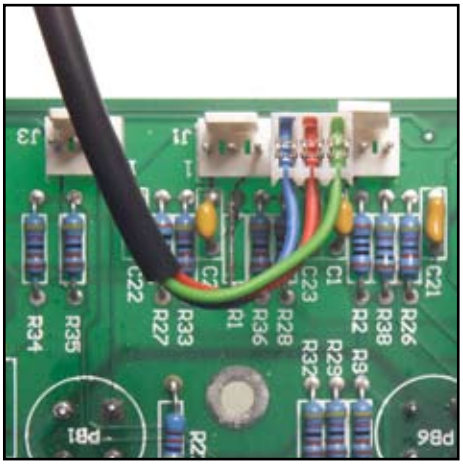
Tachometer

- The Tachometer is a horseshoe LED type, 5volt, sensing dark and light current off the butterfly interrupter.
- The only adjustment necessary is to make sure the sensor is central to the horseshoe array.
- Apart from a light haired brush to the sensors, to remove dust no other maintenance is necessary.

Tacho sensor



Tacho connection to J1 (near C1/C23)

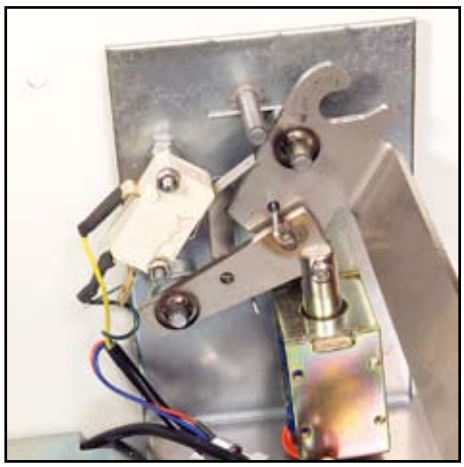


Lid Locking Mechanism and Solenoid

- The two point locking mechanism is released by a 12-volt solenoid, capacitor at 20 volts, for a brief period.
- This method gives maximum power for a short period without the possibility of burning out the Solenoid Coil, by remaining on, thus by constantly pressing the lid open button, a wait message appears on the LED this is while the capacitor charges (approximately 4 seconds).
- The lid open sensor is a V3 microswitch, wired normally open.
- The actuation is on the latch arm; adjustments can be made only by removing the front panel and trimming the V3 microswitch arm. The switch is situated front right above the Solenoid (see Picture below).
- The Solenoid plug is a 4 way connection to J5 on the Circuit Board (see Picture below)
- Apart from adjustment to the Microswitch, or Lid latches (on the lid) dependant on wear.
- No other maintenance is necessary

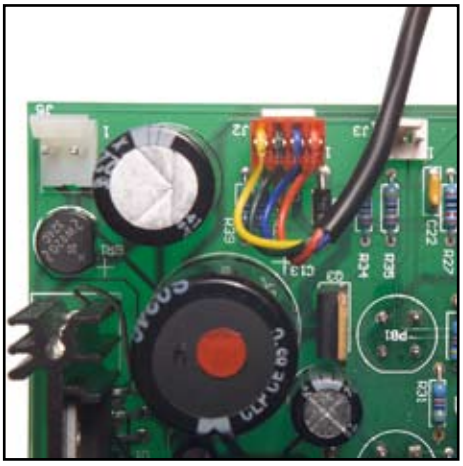
Solenoid and Microswitch:

Microswitch arm



Lid latch to lid
(correct position aligned to side)

Lid System Connection:



Lid system plug J2

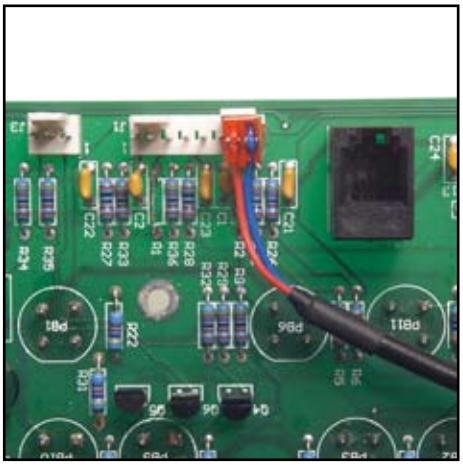
Imbalance Detector

- The imbalance Detector is a V3 microswitch wired normally closed.
- A break in the circuit actuates the motor brake and the rotor comes to a safe stop.
- The circuit is 5 volt from the main board.
- The adjustment is by two pozihead screws on the underside of the base plate.
- Release and push forward or backwards to adjust.

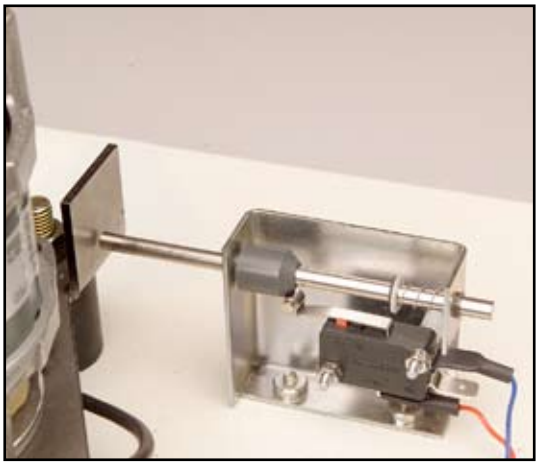
Imbalance arm

NOTE: a 3mm gap should be between the stop and the detector arm for normal use.

Imbalance plug to board position J1 (near C21)



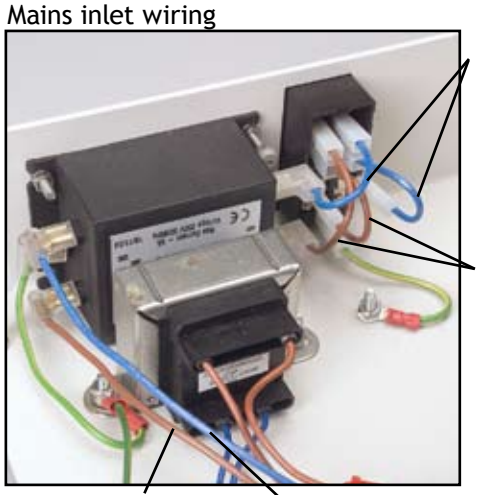
Correct gap (3mm)



Mains Inlet Filter

- The Mains inlet is double fused, with an IEC Socket for the power source.
- It is held in place with 2 Countersunk M3 Screws.
- Fuses are 5 x 20mm 6.3 (TA) Slow blow only. R Version is 10 amp (TA)
- Wiring to filter is shown as below.
- Wiring to Inverter is EARTH to EARTH, BROWN to L1 and BLUE to L2/N

Mains inlet wiring

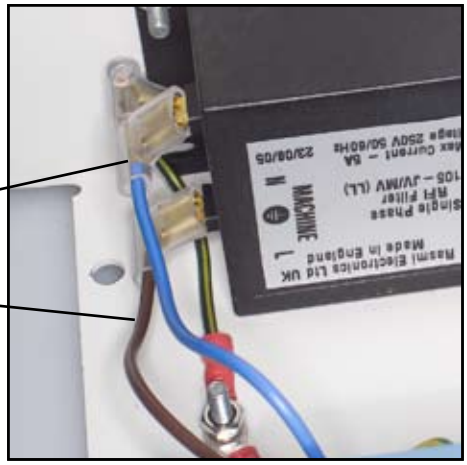


Mains connection to Inverter

Filter

To comply with EMC regulations a 5 amp filter is fitted.
This has been tested and complies with radiated and transmitted specifications.

Connections are as on the Filter and should NOT be reversed (see photograph)



Buzzer and Fitment (optional extra)

- The buzzer is a 12 volt type, fitted to the front panel by a tape backing.
- The connection is to J3, a 3 pin connector.
- The buzzer sounds at the end of the run, stays on for a few minutes and then shuts off (so as not to be intrusive)
- No maintenance is necessary.

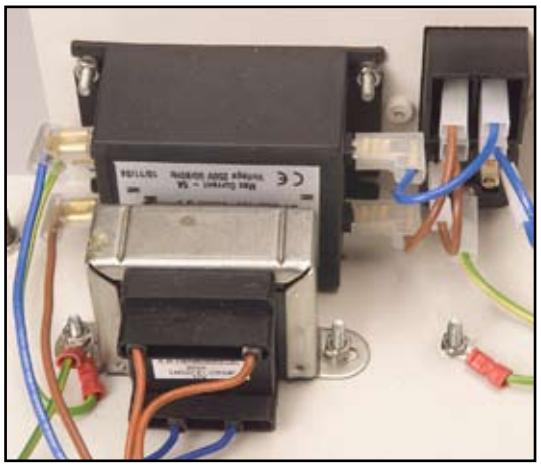
Motor Connection to Inverter

BLACK 11 to TH1A	BLACK to M1/U	YELLOW	}	GROUP CONNECTOR
BLACK 12 to TH1B	BROWN to M2/V	GREEN		
	BLUE to M3/W	WHITE		

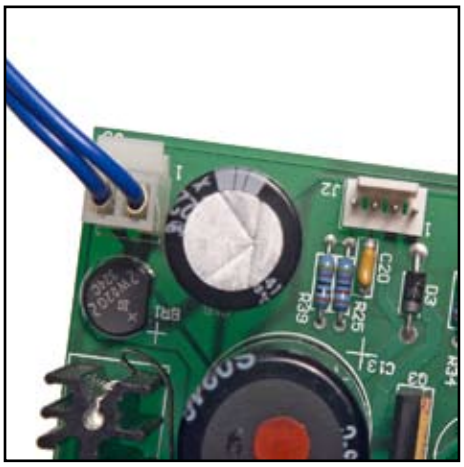
Transformer and Connection

- The transformer is a 12 volt 20Va type, held in position with two flat washers, spring washers and M4 nuts. This unit powers the circuit board (regulated down further to 5 volts), lid lock and buzzer.
- The wiring from the top is Mains voltage (brown wires). Area dependent.
- The two lower wires (as marked are 12 volt) DO NOT USE mains power here.
- These 12 volt (blue wires) pass into a Molex two pin plug to J5 on the circuit board.

Transformer position



Transformer plug position J5

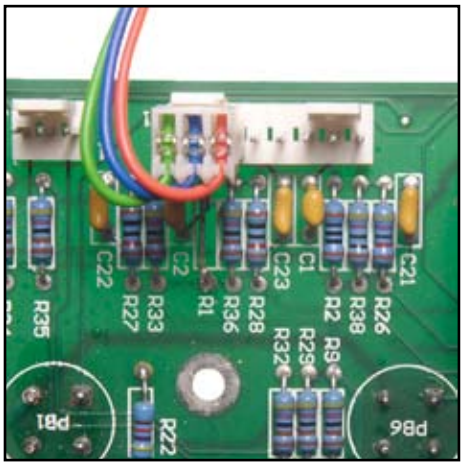


Rotor Recognition Sensor (K series only)

- A Hall effect sensor, fixed to the motor top, senses magnet flux from placed magnets in the required rotor.
- A Rotor must be used with the K Series.
- The amount of small magnets per rotor are pertinent to the maximum speed of each rotor.
- The sensor counts the flux number per rotation, advising a look up table and setting the rotors paramaters for safety.
- Maintenance. Other than checking the distance from sensor to magnet (2-6mm max) no other maintenance is necessary.

Rotor recognition sensor

Connections to J1 near C22



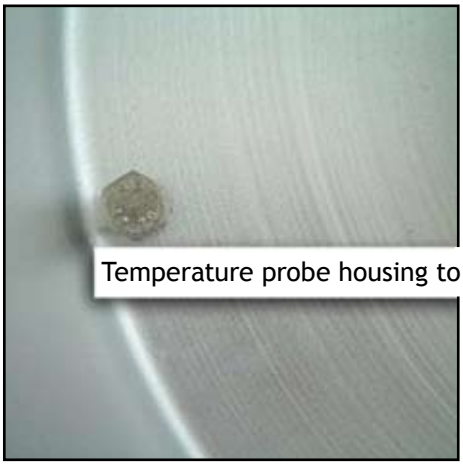
K Refrigerated Series only:

Temperature Probe

- The Temperature probe is an AD592AN: IC Transducer.
- Wiring is to the two outer legs only, the centre leg is removed.
- The transducer is mounted in a Stainless steel M8 Shroud with Heat sink compound. The Assembly is then bolted in position to the outer rim of the bowl (as shown).
- Twin wires are taken forward to the Circuit Board to socket J4

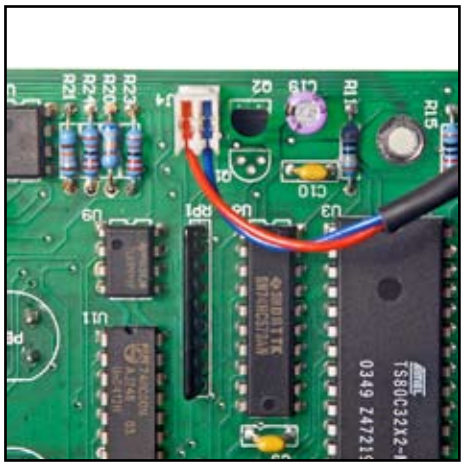
Replacement of Probe

- After extracting the probe and replacing, the new probe will require calibrating.
- RV1 and RV2 on the circuit Board will require “trimming” to the correct temperature.
- A thermometer accurate to 0.5°C will be required.
- By placing the thermometer near the probe in the bowl, calibrate RV1 to 0°C then RV2 to ambient, go back to RV1 to recheck.
- For K280R a 7°C offset is required and the K240R a 5°C offset. These offsets are to allow for bowl mixing of temperature variation over its depth.



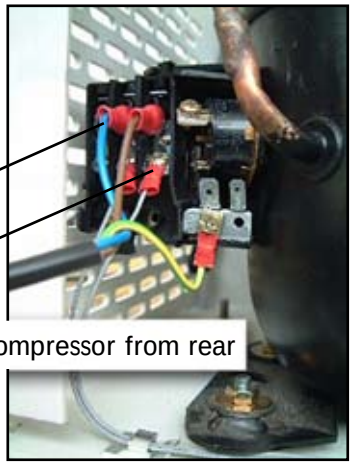
Temperature probe housing to bowl

Temperature probe connection to J4



Refrigeration (KR Series only)

- The Compressor is a standard unit Electrolux GL60 PB charged with R134A gas at a charge 120Gms. An equivalent can be used that has the same footprint.
- Capillary length is 3 metres of .031mm bore.
- Suction line length is 76Cm of 5/16” tubing, the dryer is a 10gm type.
- Fan is a standard mains type.
- Wiring to the compressor is shown here.

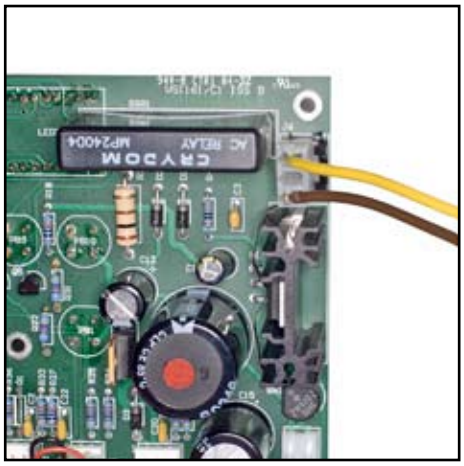


Refrigerated unit compressor from rear

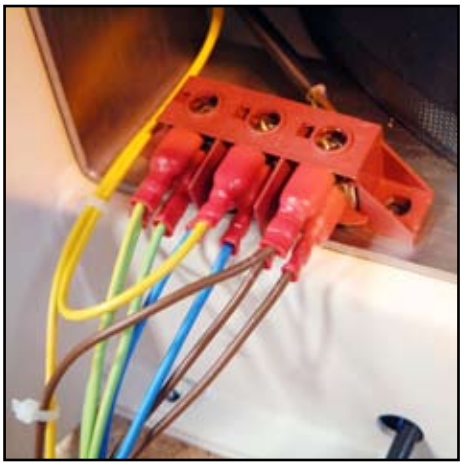
Heater Wiring (KR Series only)

- The Heater is a 5.77 metre coil of 30 Ohm shrouded wire.
- This is wound between the Cooling coils and controls the temperature by pulsing on off via a solid-state relay (SSR1).
- This is controlled by a PID system (Proportional, Integral, Derivative) for accuracy.

Connection to board is as below. Mains wiring to connector is also shown.



Heater wire plug to J6

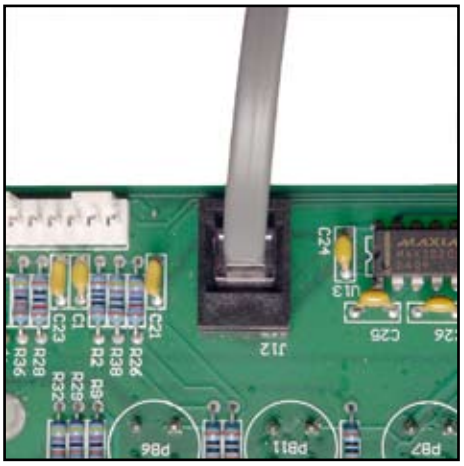


Mains plug for compressor fan and heater

Inverter Connections 2000, K & KR series only

- By Stuart Plug connections

Inverter connection



Board connection J12

Distributed by:

Manufactured by:

Centurion Scientific Ltd
Unit A2 Ford Airfield Industrial Estate,
Ford, Arundel, West Sussex. BN18 OHY. UK

Tel: +44 (0) 1903 721020
Fax: +44 (0) 1903 725496

e-mail: info@centurionscientific.co.uk

www.centurionscientific.co.uk