



Systems Built to save

**C.S.L. VARISPEED
MILK PUMP
CONTROLLER
INSTRUCTION
&
INSTALLER'S
MANUAL**

These instructions are to be used in conjunction with the Danfoss operating instruction manual provided.



Corkill Systems Ltd
5 Tasman St, PO Box 16 Opunake, New Zealand
Phone 06 761 7531 Fax 06 761 7336
Email : info@corkillsystems.co.nz
Web site : www.corkillsystems.co.nz



Health & Safety
AS/NZS
4801

C.S.L. MILKFLOW

INSTALLERS INSTRUCTIONS

LOCATION OF DRIVE AND OPERATORS STATION

Mount the CSL Controller in an upright position as close as possible above the pump that is being controlled. The enclosure is positively ventilated and is hose proof but will not stand direct pressure hosing from the underside at close quarters or water blasters from any angle.

Locate operators Control Station (if used) where easily accessible by the operator when milking and preferably within view of the receiving can window. This enclosure is hose proof and impact resistant to a reasonable degree.

Install the float in the receiving can by drilling a 20mm hole at a point in the can where the float will not be subjected to direct milk or wash incoming flows and where the float will not restrict outgoing flow to the pump. The height of the float is determined by setting the probe so that the float top stop is at two thirds height of the can diameter (see picture).

Please do not drop or knock the stem against hard surfaces, this stem contains fragile switching mechanisms that may be damaged.

CABLING AND MOTOR

This unit is designed to be permanently wired on a dedicated circuit with protection according to the controller Specification sheet current ratings. **Cables to the electric motor must be screened with both the earth conductor and the screen earthed at both ends**, minimum size 4 cores X 1.5mm, EMC type cable preferred. Cable between the control station and drive to be of minimum 7/0.2mm twisted pair screened. This must not to be run parallel with heavy current carrying cables, **earth the screen at both ends**. BELDEN type cable is recommended (the same as the float cable).

The power supply cable to the drive can be non screened TPS or similar. We recommend all controllers be able to be electrically isolated near the unit. Normally the controller only requires turning off via the controls, this way the drive stays powered up and warm which discourages condensation. Three phase models CSL3SS1, CSL3SS2 and CSL3SS3, etc, all require as a minimum 10 amp circuits wired in 1.5mm cable. Single phase input units and larger three phase controllers require 20 Amp circuits (2.5mm) cable.

A Mains and RF filter is factory fitted internally in all controllers, this has usually been adequate however we recognise there are certain areas within NZ where this filter will not be sufficient to suppress all radio interference, please contact your supplier for more information if this is the case.

In suspect poor power areas, should the incoming voltage drop below the unit tolerance levels, the unit will stop and wait until the voltage level rises above the tolerance level again. The client should talk to their electrician or network supplier if this condition persists as the Electrical Regulations state minimum mains supply voltage levels. This requirement is well above the controller Low Voltage tolerance level, please note that this low voltage condition will not damage the controller but could damage other electrical apparatus.

The voltage tolerance level with three phase controllers is 380 volts, with single phase input controllers the tolerance is 200 volts.

Tip: To help avoid this condition with Single phase input units, select the phase with the highest phase to neutral voltage under washing conditions.

CONNECTIONS

The motor **MUST** be connected in **DELTA** configuration for **Single Phase Controllers** and **STAR** configuration for **Three Phase units**.

Power Connections;

Connect incoming supply to the supply plug at the base of the VLT unit. The supplied Isolating switch or Control Switch is wired permanently from the filter. Connect the motor wires to the marked motor terminal plug, both connection plugs may be unplugged to terminate more conveniently. **DO NOT** put plugs into the brake socket – B+R ! This will cause huge damage to the controller.

Control Connections FS = Float Switch, DF = Danfoss Drive, CB = Control Block terminals

Wire Colour	Float Switch to Controller	or Control Block terminals	description
Blue/White	FS to DF#27	or CB #2	start signal
Orange/White	FS to DF#19	or CB #3	speed down
Green/White	FS to DF#18	or CB #4	speed up
White/Orange	FS to DF#12 (+24vdc)	or CB #1	supply
White/Blue	FS to DF#12 (+24vdc)	or CB #1	supply
White/Green	FS to DF#12 (+24vdc)	or CB #1	supply
Screen	FS to Ground		

Plus wire a link between drive DF#12 and #33

PROGRAMMING

The Danfoss drive has been pre programmed according to specifications as ordered, some refinements to the program may be necessary for individual situations. A full description of programming is contained in the VLT Manual and this should be consulted if contemplating major changes.

The normal parameters that may require alteration are noted below with the normal preset values as dispatched. Program sheets for different types of pump/motor combinations can be provided if required, as all dairies are different, fine tuning may be required.

To alter program parameters, follow the following;

Press "Quick Menu". and "+" simultaneously. Parameter 001 will flash.

To go to the next Parameter, press "+", to go to previous, press "-".

To change data in a parameter, press "Change Data". Data Value will flash.

N.B. If "..." appears as a value, press "Change Data" to read the value.

When data value is flashing, the value can be changed by pressing "+" or "-".

When the data value is correct, press "Change Data" and the display will return to the Parameter number. This must be done within 30 seconds to save the change.

Parameters that may require fine tuning are as follows;

Motor Settings, these need to be set in both "Milk" and "Wash"

Motor size	Kilowatt rating	Parameter 102
	Amps	Parameter 105
	Speed	Parameter 106

Motor Tuning

Once the motor values have been set, change parameter 107 to "2" in "Wash" and carry out AMT (Automatic Motor Tuning) by holding lid switch to "Pump-out" until the display parameter value returns to "0" (takes about 30 seconds).

For any clarification see the Danfoss 2800 manual page #6.

The motor tune is important to reduce motor noise and harmonic effect.

Controller Settings

Milking Settings - set lid switch to "Milk"		Centrifugal	Lobe/FIP
Pump Minimum Speed	Parameter 204	33Hz	20Hz
Pump Maximum Speed	Parameter 205	45Hz	40Hz
Pump Ramp Up Time	Parameter 207	15 Sec's	20 Sec's
Pump Ramp Down Time	Parameter 208	30 Sec's	40 Sec's
Wash settings - set lid switch to "Wash"			
Pump Minimum Speed	Parameter 204	50Hz	40Hz
Pump Maximum Speed	Parameter 205	55Hz	50Hz
Pump Ramp Up Time	Parameter 207	5 Sec's	5 Sec's
Pump Ramp Down Time	Parameter 208	5 Sec's	5 Sec's

NOTE - when setting controller for diaphragm pump, speed parameters are preset at low levels. These will need adjustment depending on motor/pump pulley ratio's. Values can be finely tuned in either menu by selecting "Milk" or "Wash" on the switch. All other parameters will remain as programmed, if a motor size is altered, the new data must be entered in both "Wash" and "Milk" programs.

To return to the normal display, press "Quick Menu". Press "+" to toggle through the quick menu display

With diaphragm type pumps care needs to be taken not to exceed the capabilities of the pump damage to the pump may result if it is run at speeds over 48 strokes per minute.

PROGRAMMABLE RELAY OUTPUT

The relay output, terminals 01/02/03 can be programmed for a variety of functions cooler plate solenoid control etc, this output is normally programmed to be on constantly in "Wash" menu to activate a flushing pulsator.

The relay can be programmed using parameter 323 (see danfoss manual).N.B. this relay is rated at 2 Amps 230 V, **DO NOT** Touch other terminals with 230 V.

With this relay we recommend the use of a sacrificial relay to protect the danfoss control card if a fault arises, this can be done by using the internal 24vdc within the danfoss unit and running it thru the contacts of the 123 relay to drive a small omron g2r1 relay.

DISPLAY READ-OUT

DISPLAY MODE, the drive can display many readouts when running, the normal read-out is in Hertz. If the client wishes to have a customised read-out in RPM for instance, use Parameter 008 for the scaling factor (Page 7 of the VLT2800 hand book).

An example, RPM readout for a Centrifugal milk pump

Motor speed is 2850rpm at 50Hz, the scaling factor is $2850/50 = 57$, enter this figure in 008 in both Menus.

Result; Pump at 33Hz = $57 \times 33 = 1881$ RPM

Pump at 45Hz = $57 \times 45 = 2565$ RPM

"Crouzet Millennium" Programmable Controller (deluxe controller only)

Controls output for wash solenoid, cooler pump, second pump, and cooler plate solenoid special programs to operate other equipment in the shed or for different features can be sent out on a programmer to suit the particular application.

The timers for the various functions can be changed using the “A” and “B” button of the front of the controller.

The wash switch is used to change the different settings with in milk or wash. Press the “A” or “B” button to change back out of the menu.

Milk 2nd pump on delay can be edited by pressing the “A” button while the milk selector is in milk to change the value press the ok button use the up and down keys to modify the value and press the ok button to store it in.

Pressing “B” will return you to the normal display.

Wash 2nd pump off delay can be edited by pressing the “A” button while the milk selector is in wash to change the value press the ok button use the up and down keys to modify the value and press the ok button to store it in.

Pressing “B” will return you to the normal display.

Wash valve on delay can be edited by pressing the “B” button while the milk selector is in milk to change the value press the ok button use the up and down keys to modify the value and press the ok button to store it in.

Pressing “B” will return you to the normal display.

Outputs on the programmable controller operate as follows in the standard program:

During milk when the drive is running (motor spinning) the cooler pump will operate.

If the float is held at top switch the second pump will come on after the 2nd pump delay on and won't turn off until the float hits the bottom.

During wash the output for flushing pulsator will be on except when the float is held up at top switch after the wash on delay the flushing pulsator will turn off and the wash solenoid will turn on.

The wash solenoid will turn off and the flushing pulsator will turn back on when float comes of the top.

The 2nd pump will come on with top switch and won't turn off until the wash delay off time has passed after it comes of the top switch.

BACK FLUSH SYSTEM (APPROPRIATE CONTROLLERS ONLY)

This special controller has a special feature to turn the float stem off when switched in the off position when doing a back flush.

When cleaning with hot water after a back rinse turn the controller into wash and the pump will run at full speed to clean the pump and plant.

WARRANTY

All units are warranted twelve (12) months from the date of purchase by the dealer subject to the following conditions;

- * All electrical equipment to be installed and commissioned by qualified trade-persons.
- * Adequate measures to be taken against moisture and/or mechanical damage.
- * Recommended cabling procedures to be followed and circuit protection to be provided.

* Unauthorised dismantling/repairs/modifications will void this warranty.

* All faulty components must be returned prior.

* The unit has been paid for in full.

In the event of a unit or component failure, all faulty parts will be repaired or replaced free of charge, consequential equipment damage and/or labour and/or travelling will not be subsidised.

Trouble Shooting

All faults will be displayed in number codes on the VLT screen. The error message will flash on the display, a list of these messages is in the VLT2800 Handbook on pages 55 and 56. All faults will be displayed in English text when using the optional LCD External control station.

RUNNING FIRST TIME FAULTS Drive won't start.

Start switch not wired properly on float stem, drive in local stop after performing "Automatic Motor Tune".

Cause/Remedy: After doing an "Automatic Motor Tune" the drive will need to be reset, it may show local stop on the display, press "STOP/RESET" and then "START" on the control panel on the Danfoss Drive.

RUNNING FIRST TIME FAULTS Drive won't switch setups or runs at wash or milk speeds all the time. Drive is forced into a setup, or remote milk wash switch wired incorrectly.

Cause/Remedy: check that drive is switching setups by switching the milk wash switch while holding the pump out button in and note the speeds indicated on the display. If drive is not switching setups need to go into parameter 4 and select multi setup.

Common Error Messages

WARNING/ALARM 4 Phase fault (MAIN PHASE FAULT).

A phase is missing on the supply side or the mains voltage imbalance is too great. This message can also appear if there is a fault in the input rectifier on the frequency converter.

Cause/Remedy: Check to make sure all 3 Phases are OK to the milk pump controller, if these are OK check other 3 Phase equipment in the Dairy. Eg to make sure your power supply is OK to the Dairy. Turn off the milk pump controller completely for 40 sec then back on, "RESET" and then "START" may need to be pressed on the control panel on the Danfoss Drive.

WARNING 6 Voltage warning low (DC LINK VOLTAGE LOW).

The intermediate circuit voltage (DC) is below the under voltage limit of the control system.

Cause/Remedy: The incoming voltage to the milk pump controller is too low for it to operate. Example - there could be a fault with the power lines, transformer high tension fuse out. The voltage will need to be returned to normal for the milk pump controller to operate

WARNING/ALARM 9 Inverter Overload (INVERTER TIME).

The electronic, thermal inverter protection reports that the frequency converter is about to cut out because of an overload (too high current for too long). The counter for electronic, thermal inverter protection gives a warning at 98% and trips at 100%, while giving an alarm. The frequency converter cannot be reset until the counter is below 90%.

The fault is that the frequency converter is overloaded by more than 100% for too long.

Cause/Remedy incorrect motor data has been put into the drive. Turn off the milk pump controller completely for 40 sec then back on, "RESET" and then "START" may need to be pressed on the control panel on the Danfoss Drive.

WARNING/ALARM 13 Over current (OVERCURRENT).

The inverter peak current limit (approx. 200% of the rated current) has been exceeded. The warning will last approx 1 – 2 seconds, following which the frequency converter will trip, while giving an alarm. Turn off the frequency converter and check whether the motor shaft can be turned and whether the motor size matches the frequency converter. If extended mechanical brake control is selected, trip can be reset externally.

Cause/Remedy: incorrect motor data has been put into the drive. Turn off the milk pump controller completely for 40 sec then back on, “RESET” and then “START” may need to be pressed on the control panel on the Danfoss Drive.

ALARM 14 Earth fault (EARTH FAULT).

There is a discharge from the output phases to earth, either in the cable between the frequency converter and the motor or in the motor itself. Make sure no power factor capacitor is fitted to the motor.

Cause/Remedy: Either the motor or the cable to the motor has a short to earth in it. An Electrician will have to check this. Turn off the Varivac completely for 40 sec then back on, “RESET” and then “START” may need to be pressed on the control panel on the Danfoss Drive.

ALARM 16 Short-circuit (CURR.SHORT CIRCUIT):

There is a short circuit on the drive output, this could be in the cable, isolator or motor terminals or windings.

Cause/Remedy: Either the motor or the cable to the motor has a short to earth in it. An Electrician will have to check this. Disconnect the drive at the motor output terminals and turn the milk pump controller back on to prove the controller is OK. Turn off the milk pump controller completely for 40 sec then back on, “RESET” and then “START” may need to be pressed on the control panel on the Danfoss Drive.

If problems are encountered that cannot be overcome, phone the following 24 hr number, and state that you have a C.S.L. MILKFLOW problem, we will be happy to assist.

Please record the fault number or message before phoning for assistance to help us help you. “Trip-lock” faults require the controller to be shut down for one minute and restarted to clear. The reset on the keyboard may also need to be pressed after repowering with some faults, followed by pressing ‘START’.

(06) 761 7531

Corkill Systems Limited - TERMS AND CONDITIONS OF SALE

GENERAL

All quotations, orders and contracts for the sale or supply of goods or services by Corkill Systems Limited shall unless, otherwise agreed in writing, be subject to the following terms and conditions:

1. **ORDERS** All orders are made and accepted on the terms and conditions here stated. Order cancellations are subject to terms agreed as at time of cancellation.

2. **PRICES** Prices quoted remain firm for 30 days but beyond that time prices may be adjusted.

3. DELIVERY

Delivery dates given by Corkill Systems Limited are approximate and rely on prompt receipt of all necessary information regarding the order. Corkill Systems Limited will use their best effort to meet the estimated date but will not be held liable for any delay due to circumstances arising in the industry generally or within Corkill Systems Limited work due to delay in receipt of supplies from sub-contractor or any other circumstances beyond Corkill Systems Limited control. No liability will be taken for any late deliveries unless delivery date has been guaranteed by Corkill Systems Limited in writing. Otherwise Corkill Systems Limited will use its best endeavour to meet delivery dates.

4. DELIVERY CHARGES

Unless otherwise agreed in writing or at the discretion of Corkill Systems Limited, all freight will be charged to the Purchaser's account.

5. RETURN OF GOODS

No goods may be returned without prior written approval of Corkill Systems Limited and may be subject to a restocking fee.

Approval will be contemplated by Corkill Systems Limited only in circumstances where:

- 5.1 Advice of any proposed return is given within 30 days following the date of the invoice.
- 5.2 Transportation and other costs for return are prepaid by the Purchaser
- 5.3 Goods to be accompanied by a copy of Corkill Systems Limited Packing Slip or Invoice
- 5.4 Goods to be accompanied by a written explanation of reasons for return.
- 5.5 Corkill Systems Limited may charge for handling, inspection, disassembly or reconditioning stock items.
- 5.6 Units manufactured, modified or imported as special or unique units will only be accepted for credit less the cost of converting the unit back to a standard saleable unit.

6. TERMS OF PAYMENT

All goods shall be paid for on the 20th day of the month following delivery. Corkill Systems Limited may at any time require full or part payment in advance of delivery and the purchaser shall not be entitled to any damages or compensation arising from such requirement. Goods on time payment shall be subject to the conditions on the Time Payment contract in addition to the terms contained within this document.

7. PRODUCT SAFETY

Corkill Systems Limited products are supplied and manufactured to high standards but no electrical equipment is failsafe within itself. When risk to person or property may be involved a fail-safe device should be an integral part of the equipment, the entire responsibility for which rests with the Purchaser.

8. OWNERSHIP OF GOODS

The goods shall remain the property of Corkill Systems Limited until they have been fully paid for. Risk shall pass to the purchaser on delivery. The purchaser will insure the goods. The purchaser acknowledges that it is in possession as agent and bailee for Corkill Systems Limited and owes a fiduciary duty to Corkill Systems Limited until such time as legal and equitable title shall transfer. The purchaser's right to possession of unpaid goods shall terminate on demand by Corkill Systems Limited, which may enter or authorise an agent to enter the purchaser's premises to recover the goods.

9. PRODUCT WARRANTY

Provided that the product has been subjected to normal and proper use only, all new products supplied by the company are warranted to be free from defects in materials and workmanship from the date of shipment to the Purchaser either for one year or the Manufacturers warranty term subject to the following conditions:

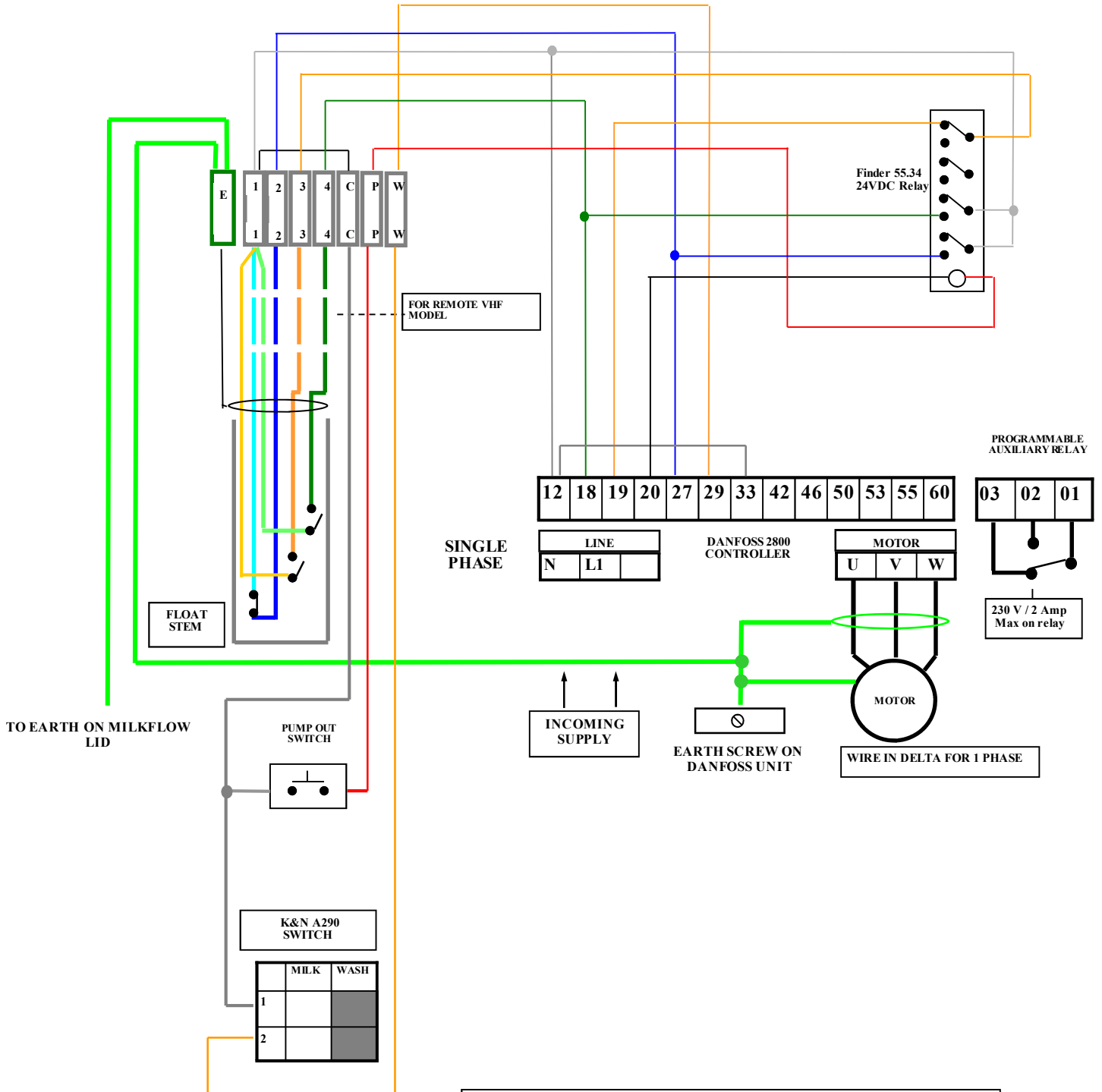
- 10.1 All electrical equipment to be installed and commissioned by qualified trade-persons.
- 10.2 Adequate measures to be taken against moisture and/or mechanical damage.
- 10.3 Recommended cabling procedures and/or circuitry protection must be provided.
- 10.4 Suitable overload protection be provided and installed where required.
- 10.5 All faulty components to be returned to Corkill Systems Limited before a credit can be made.

In the event of equipment failure, all faulty components will be repaired or replaced free of charge, consequential loss/equipment damage and/or labour and/or travelling will not be subsidised. Any unauthorised dismantling, repair or modification voids this warranty.

10. LIABILITY UNDER WARRANTY

Corkill Systems Limited liability under this warranty or any other warranty whether express or implied in law or fact shall be limited to the repair or replacement of defective material and workmanship and in no event shall Corkill Systems Limited be liable for consequential or indirect damages.

11. **GOVERNING LAW** This agreement shall be construed according to the laws of New Zealand.



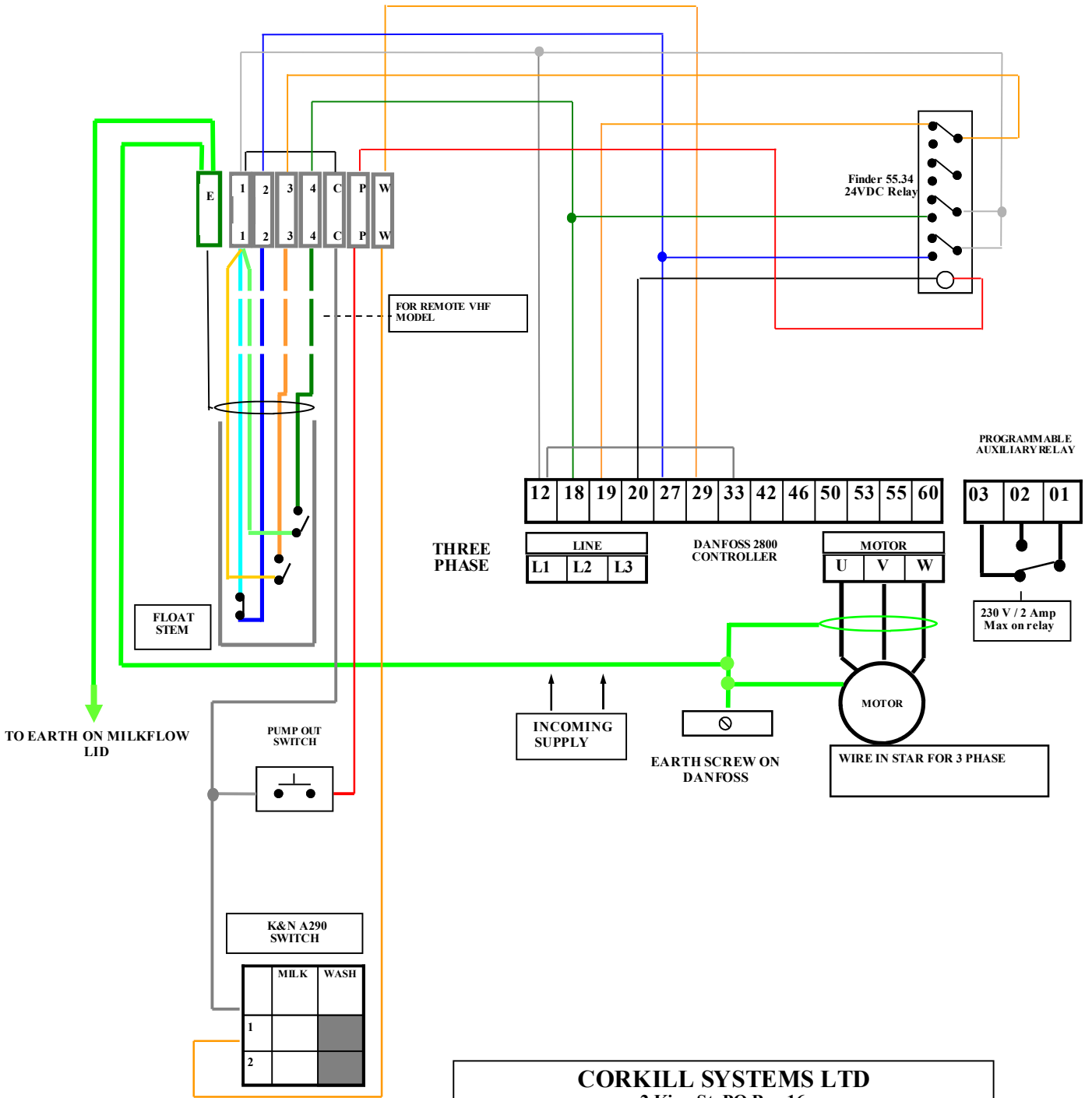
TO EARTH ON MILKFLOW LID

—	WHITE
—	GREEN
—	ORANGE
—	BLUE
—	WHT/GRN
—	WHT/ORG
—	WHT/BL

CORKILL SYSTEMS LTD
 2 King St, PO Box 16
OPUNAKE, TARANAKI. NEW ZEALAND
 Ph (06) 761 7531 Fax (06) 761 7336

**CIRCUIT DIAGRAM FOR
 BASIC
 VARIABLE SPEED CONTROLLERS
 MODEL # CSL1SS1/1.5/2/3/4/5B
 1 PHASE**

CSL1SSXXB-WIRE.PUB COPYRIGHT JUNE2001 STEV ECORKILL Wednesday, 6 June 2007

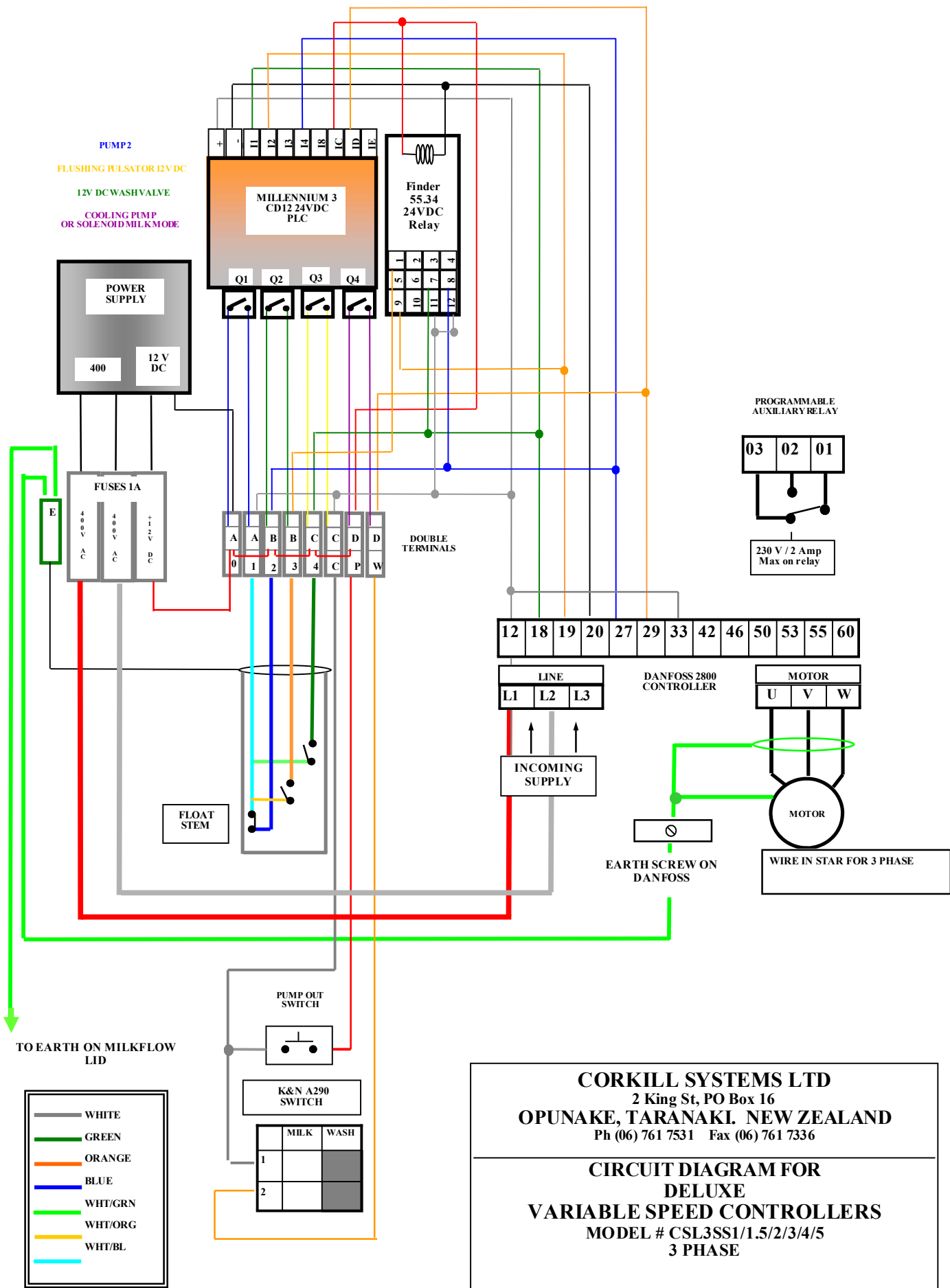


—	WHITE
—	GREEN
—	ORANGE
—	BLUE
—	WHT/GRN
—	WHT/ORG
—	WHT/BL
—	

CORKILL SYSTEMS LTD
 2 King St, PO Box 16
OPUNAKE, TARANAKI, NEW ZEALAND
 Ph (06) 761 7531 Fax (06) 761 7336

CIRCUIT DIAGRAM FOR
BASIC
VARIABLE SPEED CONTROLLERS
 MODEL # CSL3SS1/1.5/2/3/4/5B
 3 PHASE

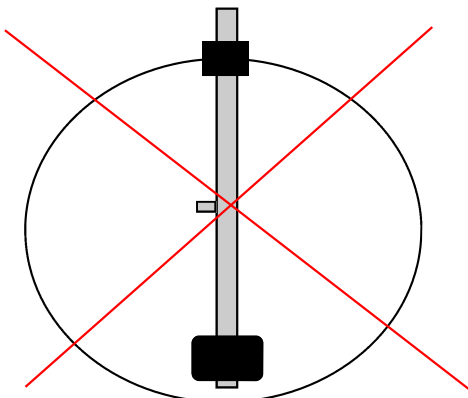
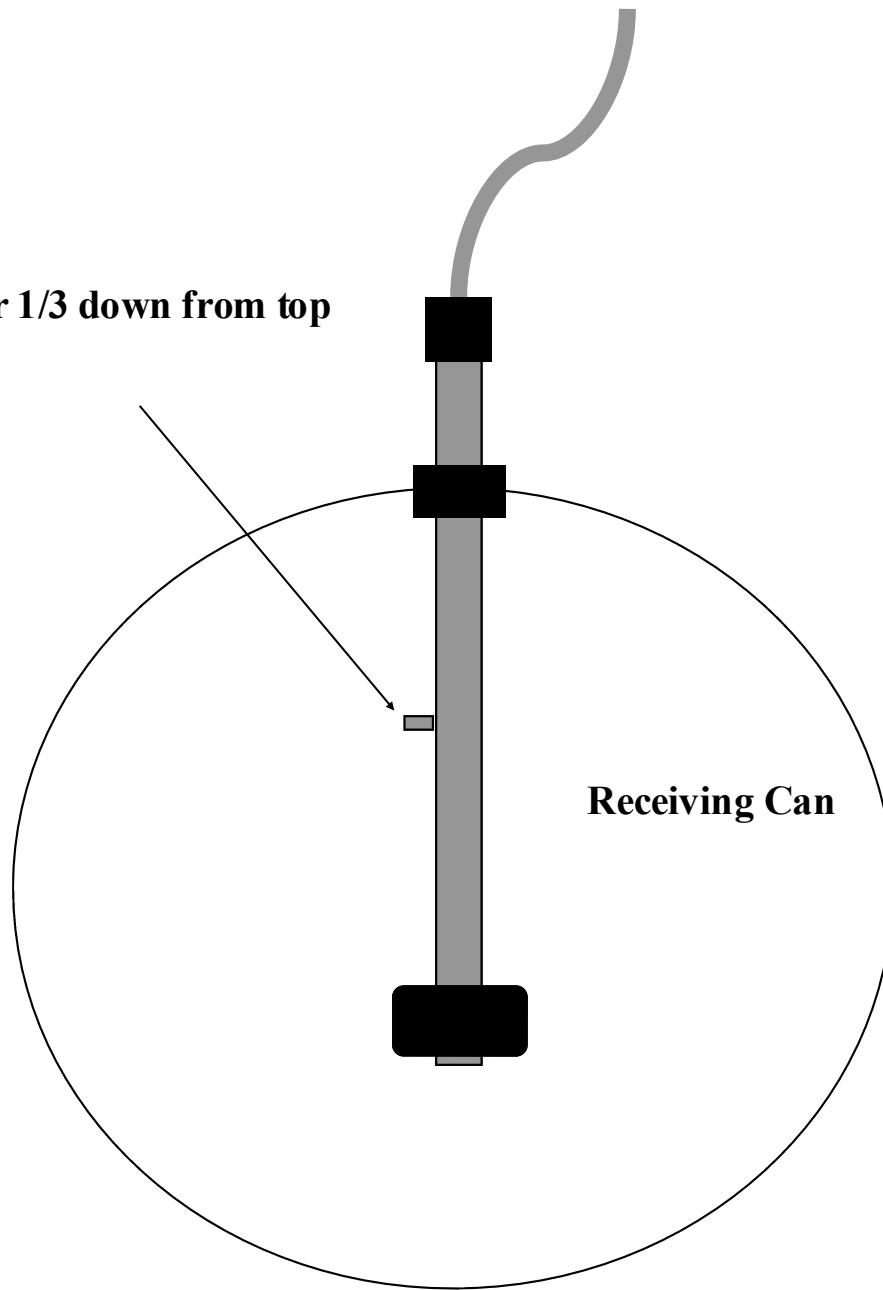
CSL3SSXXB-WIRE.PUB COPYRIGHT JUNE 2001 STEV E CORKILL 6 June 2007



CORKILL SYSTEMS LTD
 2 King St, PO Box 16
OPUNAKE, TARANAKI. NEW ZEALAND
 Ph (06) 761 7531 Fax (06) 761 7336

**CIRCUIT DIAGRAM FOR
 DELUXE
 VARIABLE SPEED CONTROLLERS
 MODEL # CSL3SS1/1.5/2/3/4/5
 3 PHASE**

**Stopper 1/3 down from top
Of can.**



TOO LOW IN CAN

CORKILL SYSTEMS Ltd
2 King St, PO Box 16
OPUNAKE, TARANAKI, NEW ZEALAND
Ph (06) 761 7531 Fax (06) 761 7336

C.S.L. FLOAT POSITION DIAGRAM