

Duplex Anaesthetic Gas Scavenging System

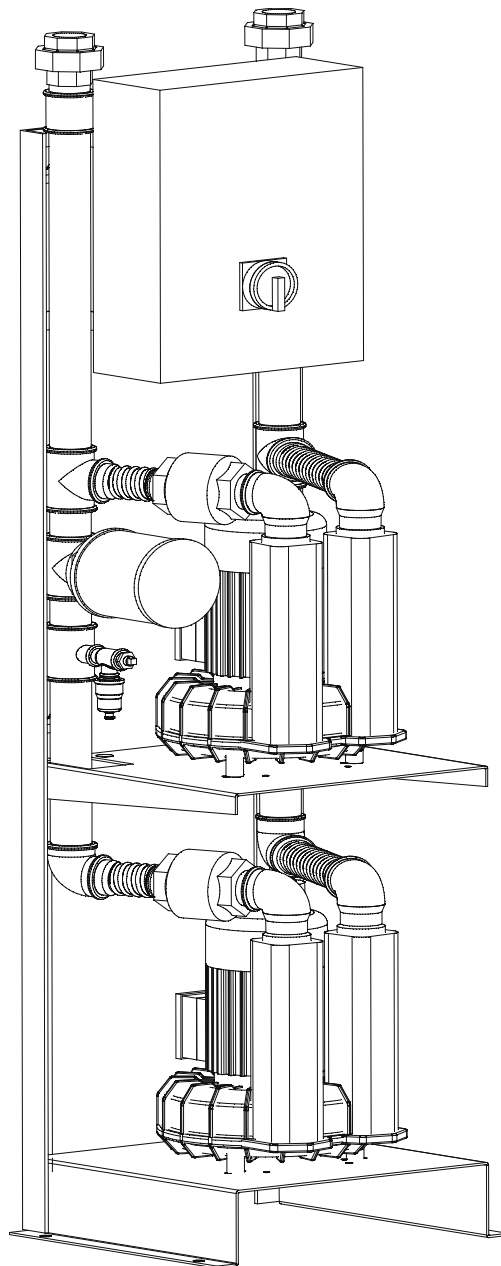
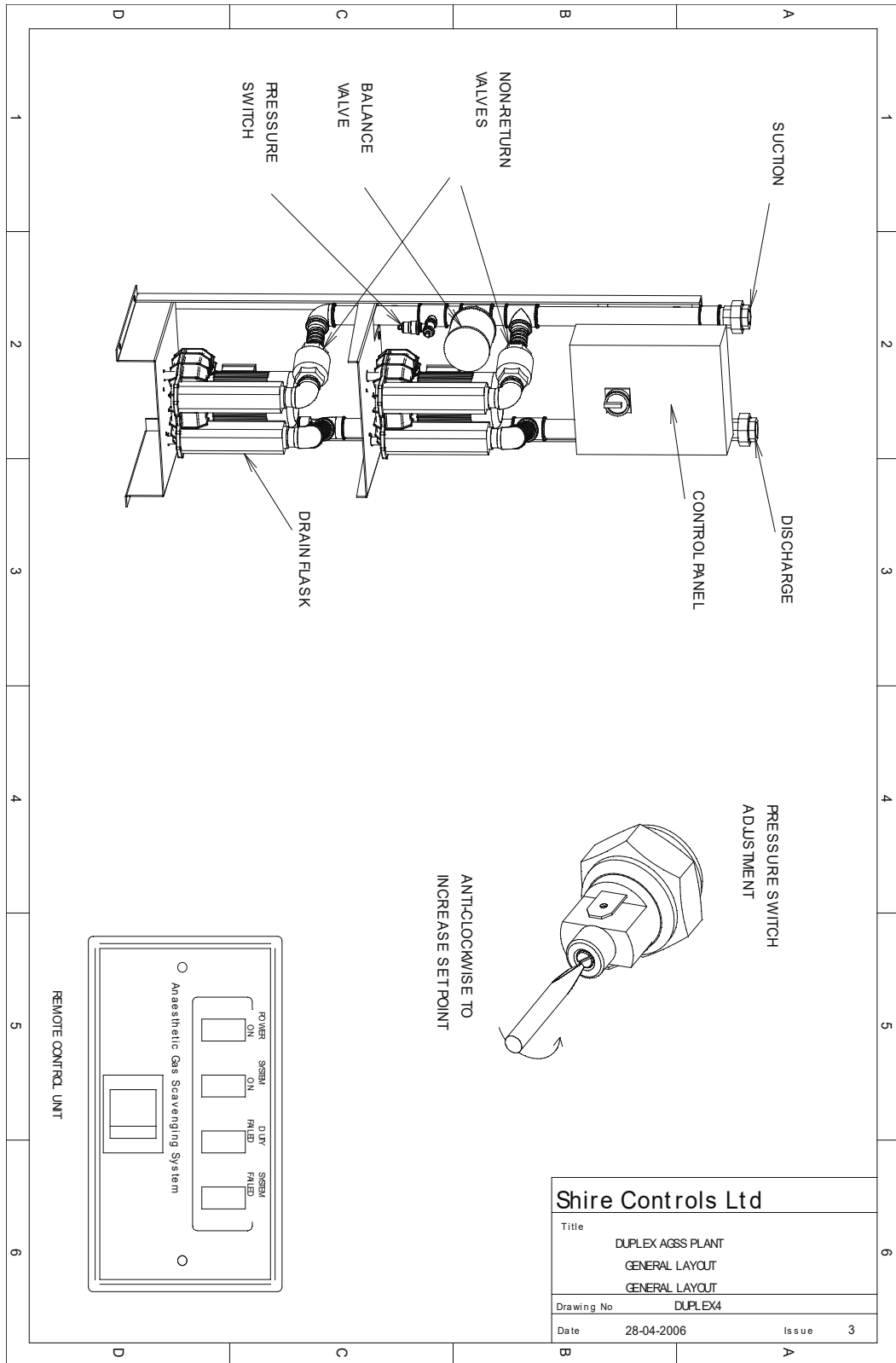




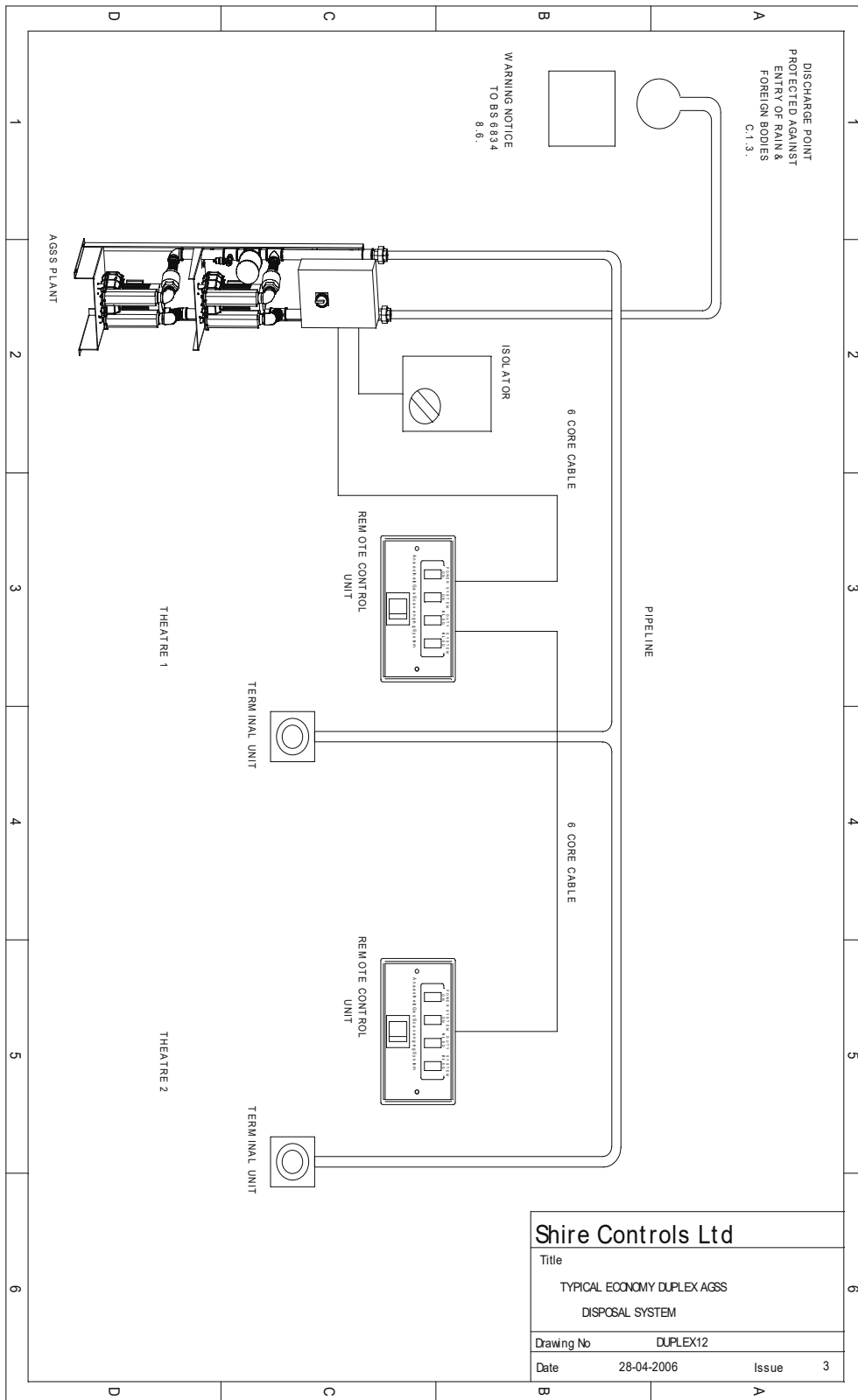
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Shire Controls Ltd

| | | |
|------------|--|---------|
| Title | DUPLX AGSS PLANT GENERAL LAYOUT GENERAL LAYOUT | |
| Drawing No | DUPLX4 | |
| Date | 28-04-2006 | Issue 3 |



Shire Controls Ltd

Title

TYPICAL ECONOMY DUPLEX AGSS
DISPOSAL SYSTEM

Drawing No DUPLEX12

Date 28-04-2006

Issue 3

About this manual



When you see this symbol, the associated text in bold type refers to something which may cause danger or damage.

Environment

This plant is designed to be used in a dry environment with no abnormal levels of airborne dust. It is designed to work within the following parameters.

Temperature +5 to +35 deg. C. (+40 deg. C. maximum)

Max. Humidity 90% RH

Max. Altitude 1000m above sea level

Mounting



Consideration should be given to the likelihood of the plant being struck by passing traffic & additional protection provided if necessary. The plant must be fixed by means of the four mounting holes in the frame of the plant. Ensure a free flow of air to the motor. If the plant is mounted in an enclosure, allow a minimum of 3 cubic metres per kilowatt of motor power of air space within the enclosure.

Electrical Connections



The prospective fault current must not exceed 1.5kA. The earth fault loop impedance of the supply at the plant terminals must not exceed 1 ohm.

| Type | Power (kW) | Current (1 ph) | Current (3 ph) | Noise dB(A) @ 1 metre |
|--------|------------|----------------|----------------|--------------------------|
| AGS120 | 0.4 | 3.1 | NA | 58 |
| AGS120 | 0.4 | NA | 1.4 | 58 |
| AGS130 | 0.75 | 5.5 | NA | 64 |
| AGS130 | 0.85 | 6.0 | NA | 64 |
| AGS130 | 0.75 | NA | 2.7 | 64 |
| AGS130 | 1.1 | NA | 3.0 | 64 |
| AGS141 | 1.1 | 7.6 | N/A | 71 |

| | | | | |
|--------|-----|------|-----|----|
| AGS141 | 1.5 | 10.0 | N/A | 71 |
| AGS142 | 1.5 | N/A | 4.0 | 68 |
| AGS152 | 2.2 | N/A | 5.2 | 72 |

Three phase plant.

Note. This plant requires a neutral. See Drawing DUPLEX8

Single phase plant.

See Drawing DUPLEX10

All plant.



Replace fuses only with motor rated fuses, rated at the motor full load current. Do not use this plant with any control, indication or interface system other than that supplied by the manufacturers.

A relay interface is available giving volt-free contacts rated at 5 amps, 240 volts resistive, for Power on, System on, Duty Failed and System Failed signals, and providing input terminals for control from volt-free contacts.

When using remote control units or relay interfaces, connect the terminals on the lower edge of the printed circuit board in the control panel marked RUN, SF, SIU, -Ve, +Ve & CTL to the corresponding terminals on the remote-control units or relay interfaces.

A maximum of 6 remote control units may be used with a control panel. The voltage drop on the cable to the remote-control units should not exceed 1.2 volts (the current drawn is .017 amps per remote control unit + .03 amps. 6 remote control units could be used on 300 M of 1.5mm cable) Cable exceeding 2.5mm should not be used.



When using a relay interface, connect the terminals marked "Local" on the relay interface to the contacts which will control the plant e.g. theatre panel switch. These contacts must be volt-free.



Use the contacts on the relay interface to switch other circuits as required. When using the relay interface to switch indicator lamps on theatre panels etc. we strongly recommend that System On, Duty Failed and System Failed conditions are displayed

as a minimum, and that lamps are used which are of equal brightness and reliability to the lamps used on the standard remote-control unit,

When not using remote control units or relay interfaces, link the terminals on the main control PCB marked +Ve & CTL. This pulls the CTRL input high and call the Duty Pump permanently.

Setting Up

Check the rotation of the motors on three phase plant (see arrow on Pump chassis). If the rotation is incorrect, isolate the supply and reverse two phases.

With all remote-control units switched off, check that the pumps are not running and that all remote-control units and the control panel show a Power On lamp only.

Switch on each remote-control unit in turn. As the pump switches on, the System Failed lamp will come on momentarily as the pump produces vacuum in the pipeline, followed by the System On lamp. Switch off this remote-control unit & continue to the next.

If the System Failure lamp does not operate correctly, reset the pressure switch as follows:

- Disconnect the suction hoses from the plant.
- Switch on the plant.
 - If the System Failure lamp is on, turn the pressure switch adjusting screw (see drawing DUPLEX4) clockwise until the System Failure lamp goes out. Turn the adjusting screw anti-clockwise until the System Failure lamp comes on and continue for 3/4 turn (If the system is operated at a very low vacuum, it may be necessary to use a lower setting).
- Replace the suction hose and pressure switch cover.
- Disconnect the suction pipework assembly from the pipeline.
- Switch on a remote-control unit.
 - The duty pump should start with the System Failed lamp showing.
- Wait until the stand-by pump starts.
- Reconnect the suction pipework assembly.
- Go to each remote-control unit in turn.
 - Switch on and check that the Duty Failed lamp is on.
- Reset the control panel with the reset button and check that the stand-by pump stops.

Set up the system flow as described in current standards, using the balance valve to set the operation vacuum in the pipeline.

Operator

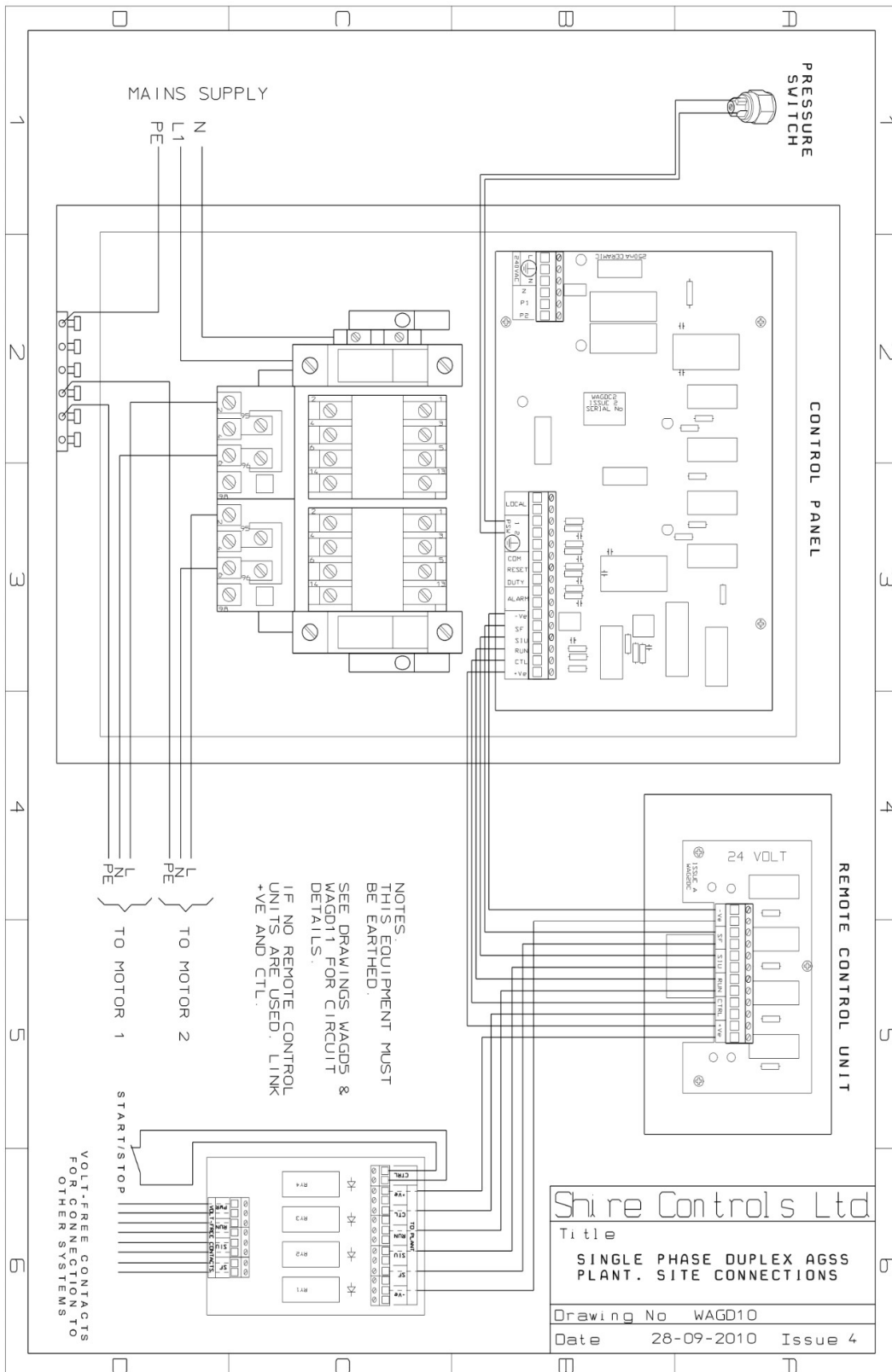
Typically, the operator should be at one of the 6no Remote Control Switches. Technical servicing and monitoring would be at the Control Panel at the main plant.

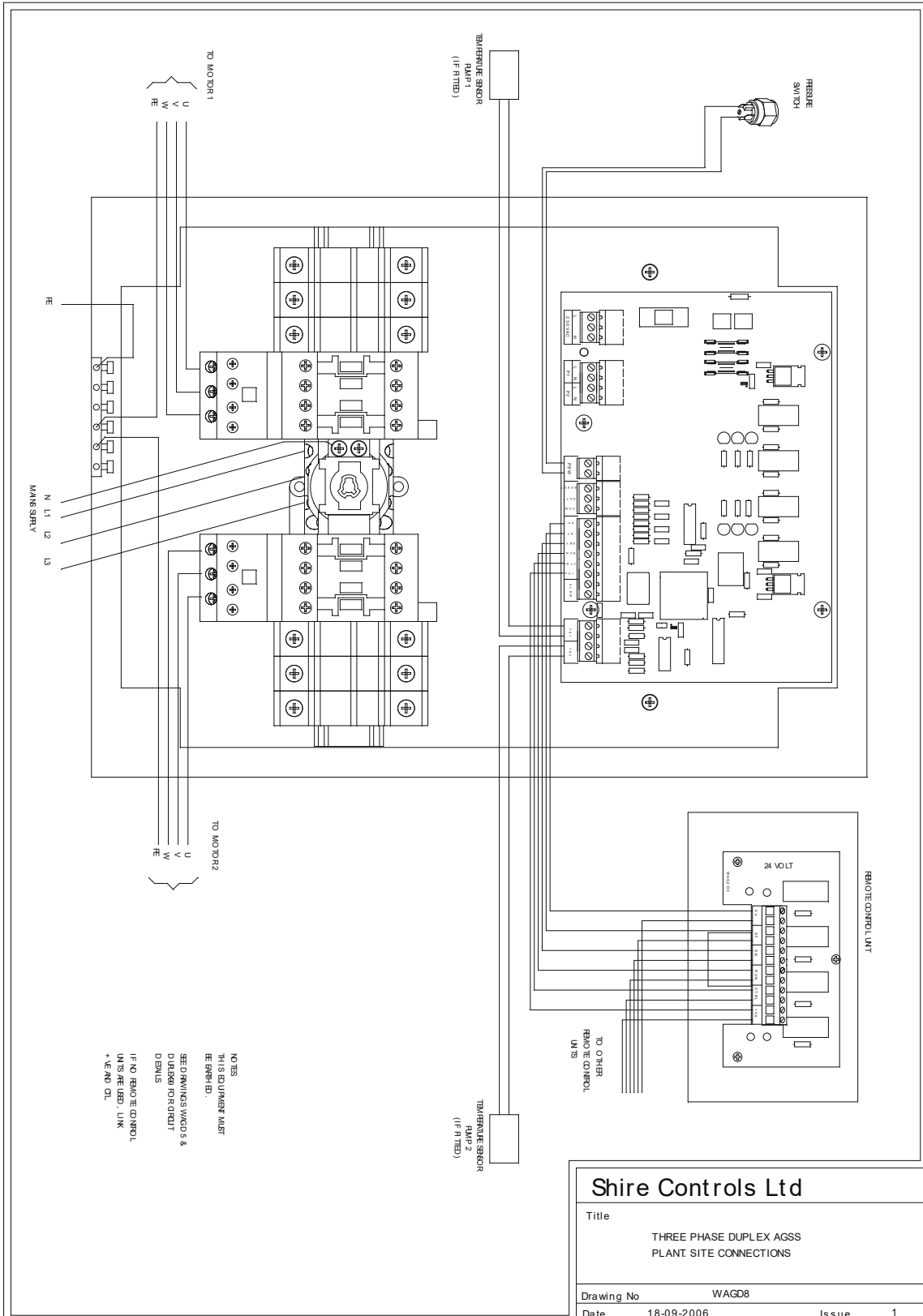
Each Remote-Control Switch Unit includes:

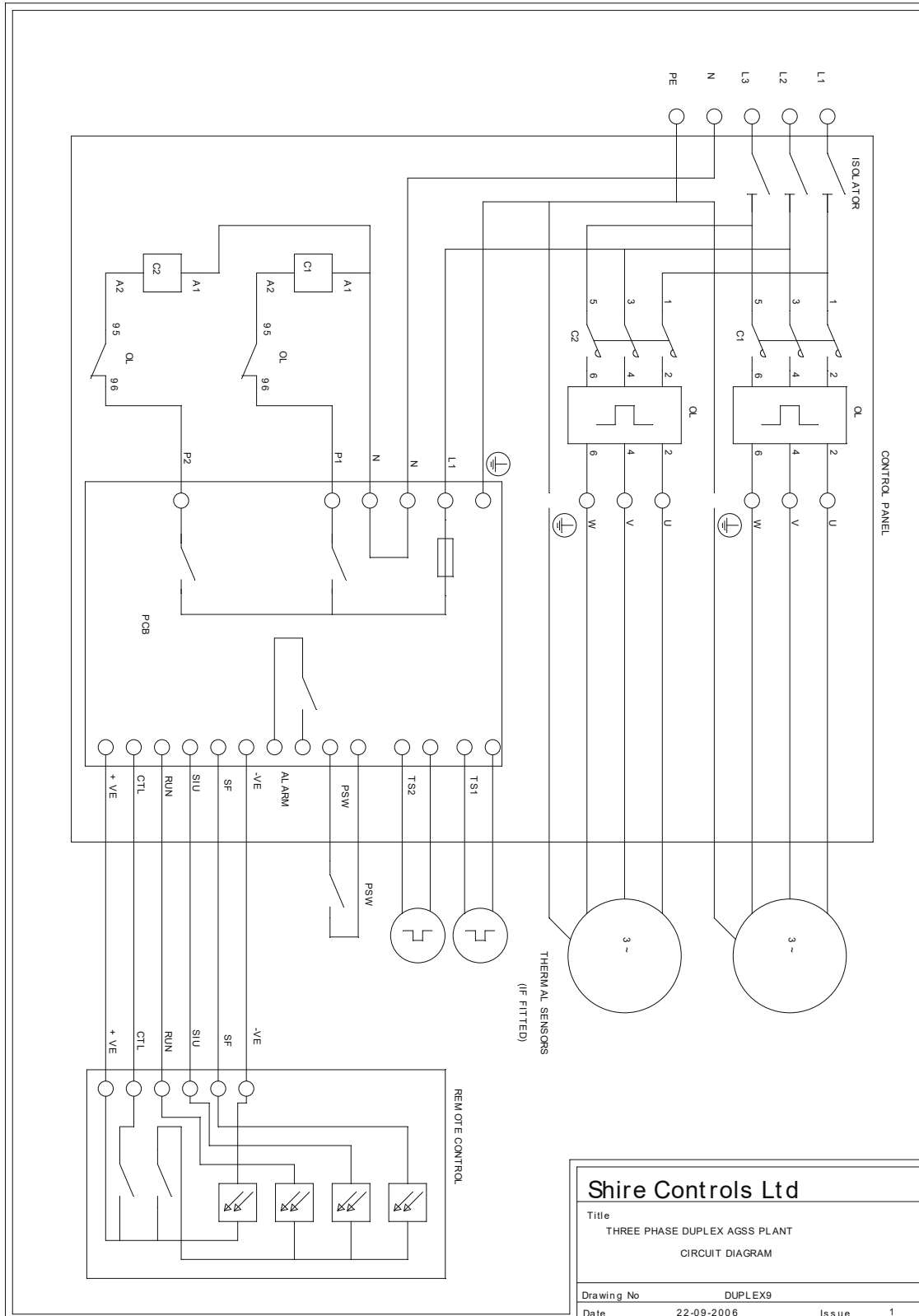
- Four long-life, block LEDs which show the conditions of the service through a wipe-clean membrane. The inherent design includes Red/Yellow/Green LED variations as per industry HTM guidelines and the use of colour recognition ensures that the unit can be monitored comfortably from a distance of 3-4 metres.
- A On/Off rocker switch. This comprises two poles.
 - One pole to 'call' the pump and switches on the vacuum, by bring the CTRL to +Ve.
 - One pole to enable the Duty Run, Standby In Use or System Fault LEDs.
 - (the Power ON LED will be ON whenever the Plant Isolator is ON)

The Central Plant Control Panel Includes:

- Power Supply Isolator (the Panel cannot be Opened when the Isolator is Switched ON).
- Four long-life, block LEDs which show the conditions of the service through a wipe-clean membrane. The inherent design includes Red/Yellow/Green LED variations as per industry HTM guidelines and the use of colour recognition ensures that the unit can be monitored comfortably from a distance of 3-4 metres.
- Reset push-button. This is a momentary action single pole switch which can be used to clear any Status Fault (i.e. Duty Failed (Standby In Use) or Thermal Trip warnings).
- Duty push-button. The is also a momentary action single pole switch which swaps the Duty designation of the pumps from either.
 - Pump 1 (top) to Pump 2 (bottom) or
 - Pump 2 (bottom) to Pump 1 (top)
- Duty Selected LEDs. There are two 5mm round green LEDs to indicate which Pump is currently designated as Duty (one should be ON, and one should be OFF at all times when Isolator is ON).
- Pump Running LEDs. Again, there are two 5mm green round LEDs. Here, they indicate which Pump is currently running to achieve vacuum (one should be ON, and one should be OFF at all times when Isolator is ON).
- Thermal Trip LEDs. Two 5mm red round LEDs. Where the pump chassis has reached 85deg C (or higher) this LED for the overheated pump will switch on and that same pump will switch off (if Duty pump thermally trips the standby pump will start, if standby thermally trips both pumps will be off, to protect against fire risk).







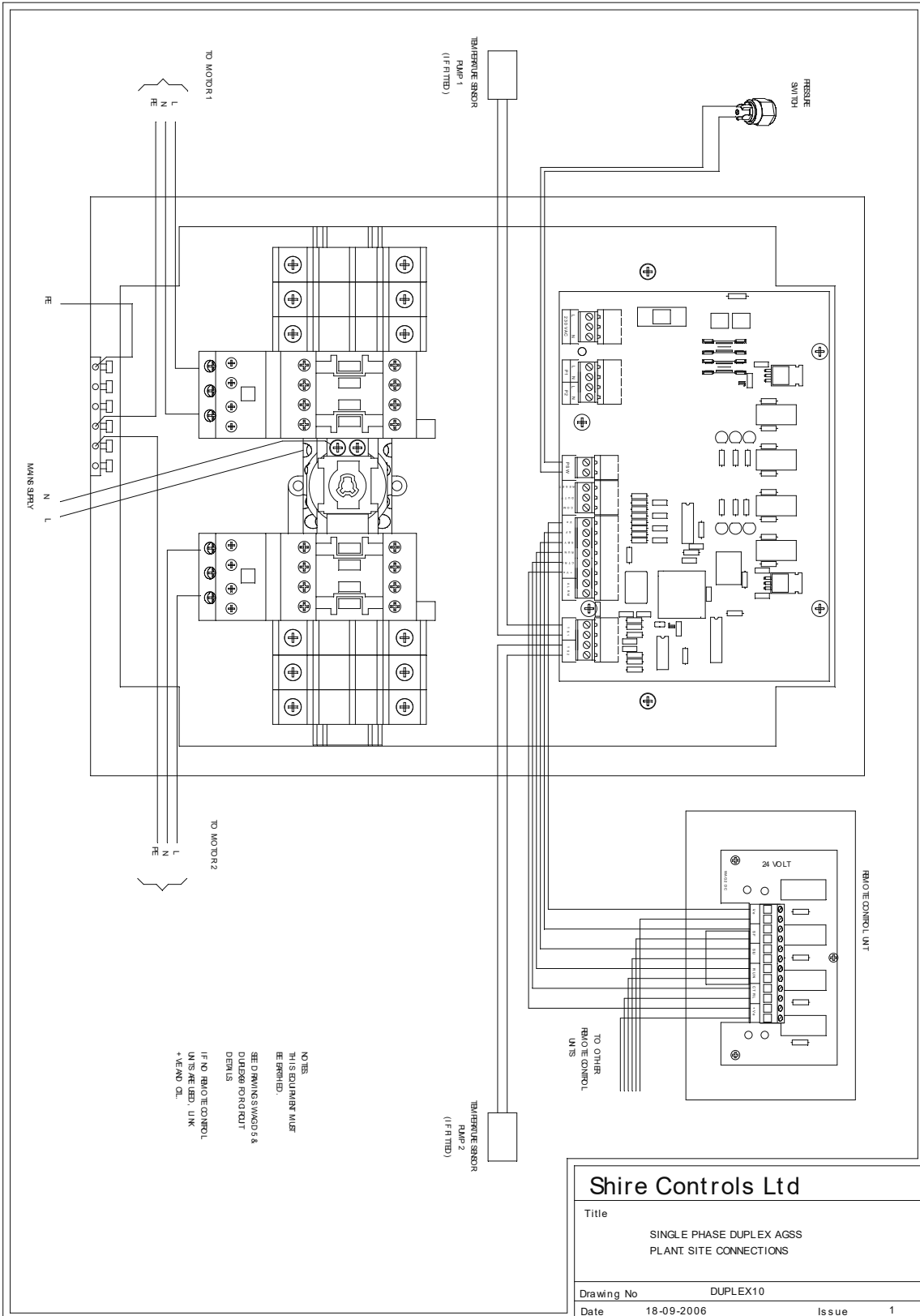
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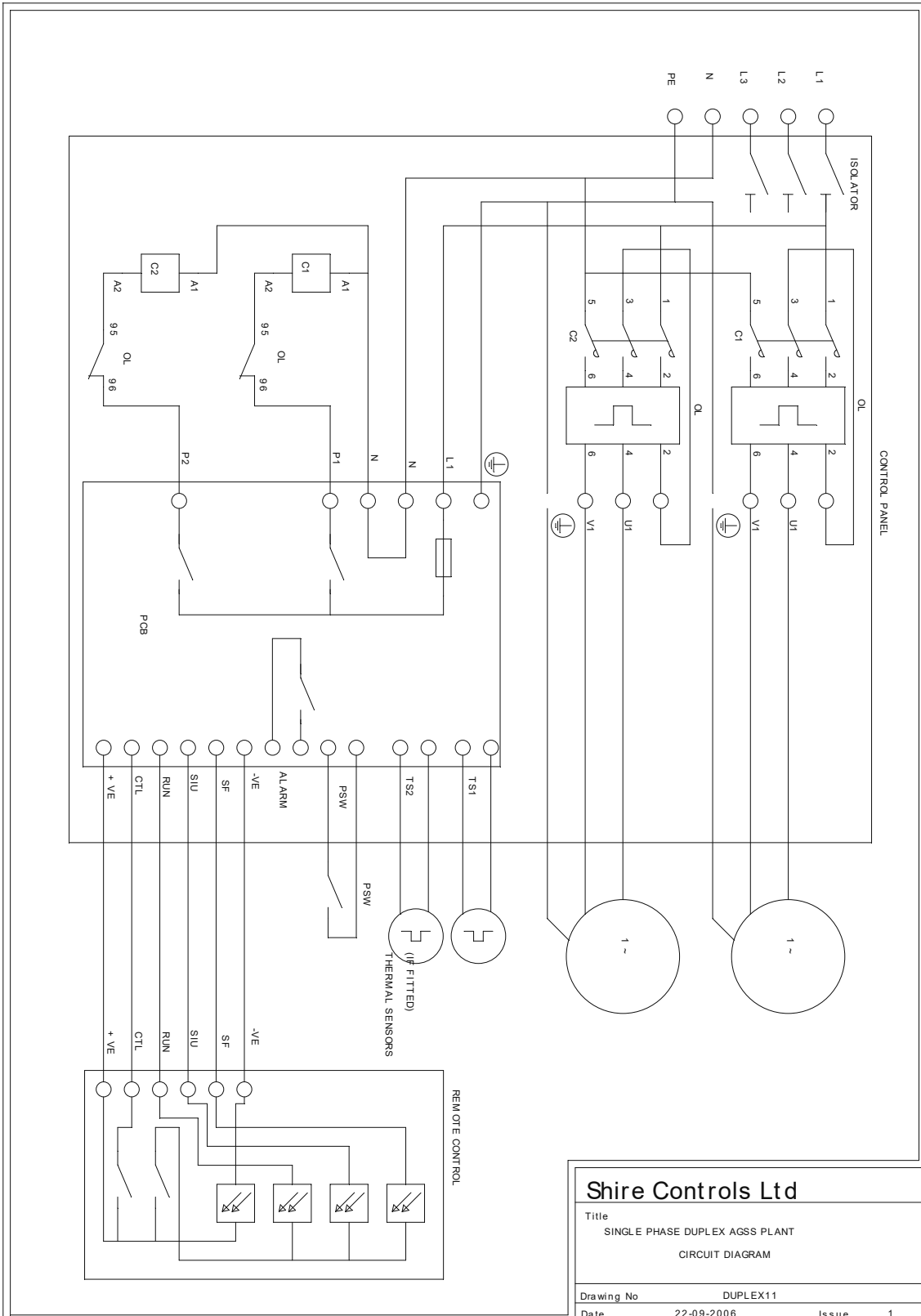
Title
THREE PHASE DUPLEX AGSS PLANT
CIRCUIT DIAGRAM

Drawing No DUPLEX9

Date 22-09-2006

Issue 1



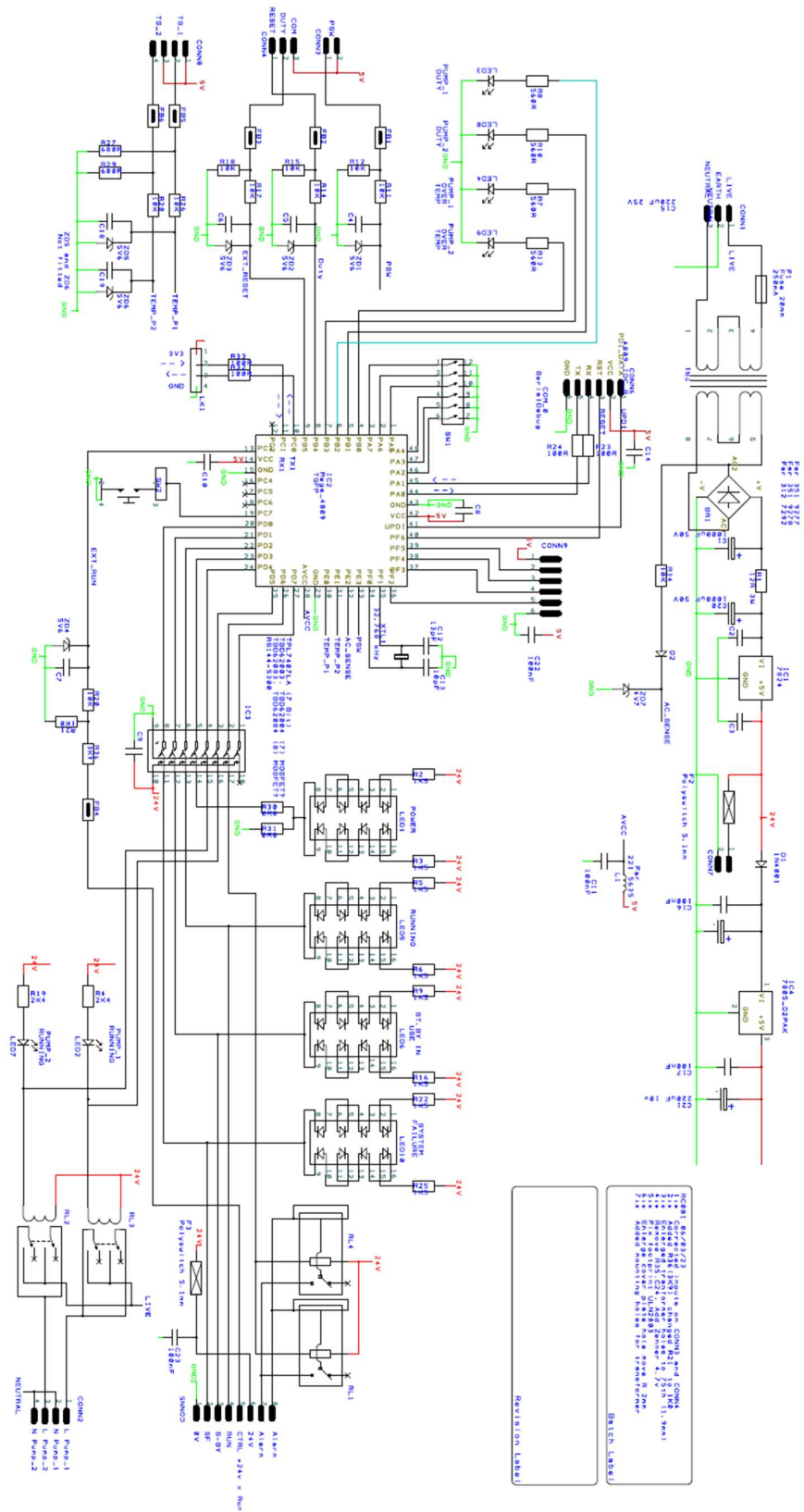


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Title
SINGLE PHASE DUPLEX AGSS PLANT
CIRCUIT DIAGRAM

Drawing No DUPLEX11

Date 22-09-2006 Issue 1



IC1: 74VHC04
IC2: 74VHC125
IC3: 74VHC125
IC4: 78L24
BR1: BRIDGE RECTIFIER
Q1: 2N2222
Q2: 2N2222
D1: 1N4007
D2: 1N4007
REL1: RELAY
REL2: RELAY
LED1: LED
LED2: LED
LED3: LED
LED4: LED
LED5: LED
LED6: LED
LED7: LED
LED8: LED
LED9: LED
LED10: LED
LED11: LED
LED12: LED
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LED99: LED
LED100: LED

IMPORTANT.

Ensure that an air flow is maintained through the pump via the balance valve when all terminal outlets are closed. Failure to allow an air flow will result in overheating of the pump with possible damage to the pump, motor and hoses and possible injury to personnel.

The following minimum flow rates should be observed.

| | |
|--------|----------|
| AGS120 | 130 l/m |
| AGS130 | 650 l/m |
| AGS141 | 1170 l/m |
| AGS152 | 1365 l/m |

Operation

Once the power supply is connected to the Control Panel and the Isolator Switch is turned ON, switching, on any Remote-Control Switch Unit will start the plant. Indication of System On, Duty Failed (standby in use) or System Failure will be given at any Remote-Control Unit which is switched on (in addition to the plant control panel itself).

The plant will continue to run until ALL remote-control units are switched off.

The Isolator switch (off) on the control panel will prevent the plant being started from a remote-control unit if it is switched off.

The Isolator switch (on) will not start the plant when switched on but will enable control from Remote Control Switches.

When the Control Panel Isolator is On and ANY Remote-Control Unit Switch is ON, the Duty Pump will start. The System Failure lamp will show momentarily as the pump produces a vacuum in the pipeline. This will change to System On as vacuum is produced.

If the duty pump fails to produce vacuum e.g. if the overload or the thermal protection has tripped, the duty pump will stop and once vacuum has been lost for a preset period (see PCB Switch Functions) the stand-by pump will start. If the stand-by pump produces vacuum in the pipeline, the Standby In Use lamp will show, indicating that the AGSS system is functioning but needs attention. If the stand-by pump also fails to produce vacuum, the System Failed lamp will show.

To return to normal operation after rectifying the fault on the duty pump, operate the Reset button on the control panel. The stand-by pump will stop, and the duty pump will start.

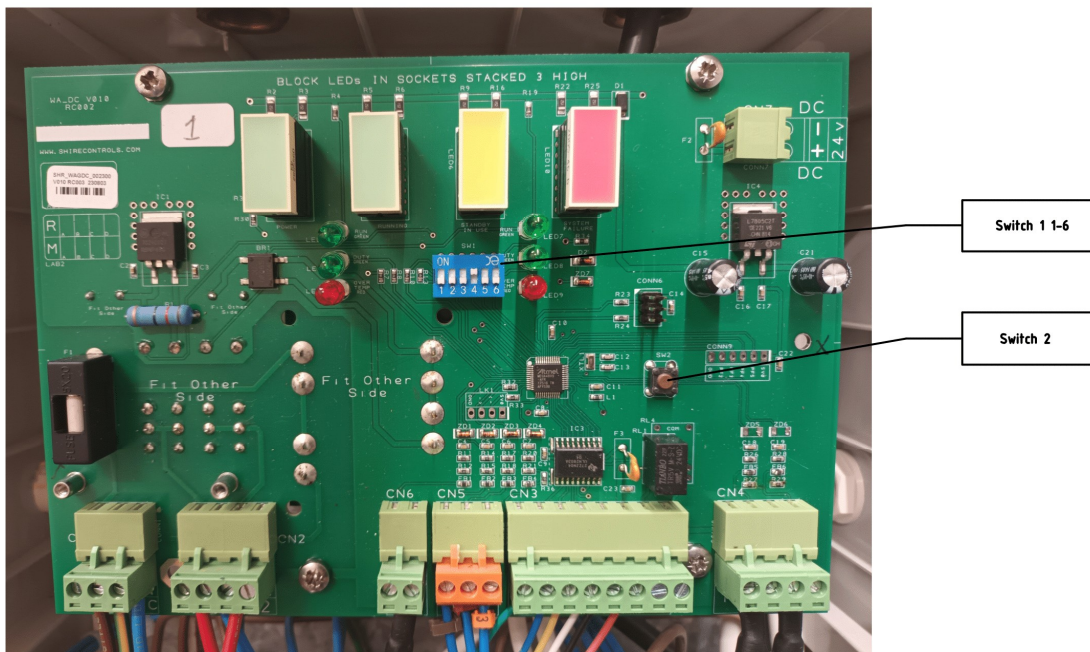
To change over duty pump, operate the Duty push button on the control panel. It is not possible to change duty onto a pump which has failed and caused the stand-by pump to operate until the system is Reset (see above).

To protect the pump mechanism the system incorporates a 2-core cable with a M8 crimp ring end.

An alarm output in the form of volt-free contact is closed under normal operating conditions, rated at 50 V dc, 50mA. This contact will open if the power fails or the duty pump trips.

PCB Switch Functions

Two switches are now incorporated within the PCB design. Switch 1 (a 6-way DIL switch) and Switch 2 (a momentary action push button switch) enable additional operational functions, as follows:



Switch

DIL 1 and 2 allow the manual disabling of either pump 1 or pump 2 due to mechanical failure or precaution. Where a pump has been disabled in this way, the control panel will run the opposite run as if the disabled pump has failed to pull a vacuum for the predetermined period.



INSTRUCTIONS FOR USE
Shire Controls Ltd. Duplex AGSS

The Duty will remain designated to the disabled pump and the Pump Run will set to the opposite pump. System status will then run between Standby In Use and System fault (depending on vacuum produced). This acts as a visual warning that the system only has one pump available.

Also, Thermal Trip warning light will flash to show that a pump has been manually disabled.

NOTE: Do not inhibit both pumps simultaneously. In this instance the plant should be isolated.

| Switch | On | Off |
|--------|----------------|---------------|
| SW1.1 | Pump 1 Disable | Pump 1 Enable |
| SW1.2 | Pump 2 Disable | Pump 2 Enable |

DIL 3 & 4 are used to enable 1 of 3 preset times (or disabled) for the designated Duty Pump to automatically change to the opposite pump. For the 15-, 30- & 60-hours settings, the Duty Pump will swap over after the designated period only after the pump has been manually switched off and then switched back, on at a later time.

NOTE: It was determined that the swap over should not happen whilst a pump is running effectively and that the actual swap should only happen when the pumps are NOT in operation.

| SW1.3 | SW1.4 | Auto Duty Function |
|-------|-------|----------------------------------|
| Off | Off | Disabled |
| Off | On | Duty swap after 15 hours running |
| On | Off | Duty swap after 30 hours running |
| On | On | Duty swap after 60 hours running |

DIL 5 & 6 are used to set the time delay allowed for loss of vacuum. The table below shows the delay options available (3 seconds typically use for in-house testing).

If a Duty pump fails to draw vacuum for the period determined by these switch settings, then the Duty pump will stop and the Standby pump will switch on (as described above).

| SW1.5 | SW1.6 | Pressure faults hold off |
|-------|-------|--------------------------|
| Off | Off | 3 Seconds |
| Off | On | 10 Seconds |
| On | Off | 20 Seconds |
| On | On | 30 Seconds |

Switch 2

This switch is a momentary action (push to break, release to make) switch. This switch provides a straightforward way of demonstrating the changeover function of the pump without having to dis-connect.

Pushing the button simulates a loss of vacuum (whilst held in). If the button is held in for longer than the pre-determined time (set by Switch 1 DIL 5 & 6 above) then the Duty pump will change to standby pump.

Maintenance

The filter on the balance valve must be cleaned or replaced periodically. The frequency of these inspections will depend on operating environment & should be determined by experience.

Every 6 months.

- Isolate the plant & remove the motor fuses to prevent the pumps starting.
- Switch the power back on.
- Go to each remote-control unit or other point at which the plant conditions are displayed in turn.
- Turn the plant on & check that the System Failed lamp comes on (remember to allow enough time for the duty pump to trip when checking the first remote control).
- Turn off the plant & repeat for all other control positions.
- Next isolate the pump and replace the motor fuses for Pump 1 only.
- Switch on the power.
- Start the plant and wait for it to trip.
- Go to each remote-control unit in turn. Switch on & check that Duty Failed lamp is on. Reset the plant.
- Isolate and replace the fuses for pump 2.

Every 2 Years

- Isolate the plant & remove the motor fuses to prevent the pumps starting.
- Dis-assemble and clean the Non-Return Valves
- Dis-assemble and clean the Balance Valve.
- Clean or replace the Balance Valve filter.
- Replace Thermal Trip Leads.



Spares Parts list.

| Description | Part Number | Supplier |
|---|--|----------------------------------|
| AGSS Frame (152) | SH851 | Shire Controls Ltd |
| AGSS Frame (12, 130 & 140) | SH852 | Shire Controls Ltd |
| Balance valve | SH215 | Shire Controls Ltd |
| Balance Valve Filter | SH912 | Shire Controls Ltd |
| Drain Flask, Ring & Cap | SH377 / SH378 / SH379 | Shire Controls Ltd |
| Pressure Switch | SH398 Vacuum 1/4BSP | Shire Controls Ltd |
| Press Switch Seal | SH401 | Shire Controls Ltd |
| Cre-A-Flex Hose | | |
| 1.5Inch | SH375 | Shire Controls Ltd |
| 2 inches | SH381 | Shire Controls Ltd |
| | | |
| Control Panel Box | GW42010 or SH885 | Gewiss or Shire Controls Ltd |
| Control PCB WAGDC V010_RC004 | agssduplexpcbcomplete | Shire Controls Ltd |
| Contactor | 3RT10 17-1AP01 or SH357 | Siemens or Shire Controls Ltd |
| Overload (See Pump Tables) | 3RU1116-1**0 & SH** | Siemens or Shire Controls Ltd |
| Alternatives: - | | |
| Contactor | 5.5Kw | IMO, Lovato |
| Overload | To Match Contactor | IMO, Lovato |
| Fuse (See Pump Tables) | C10M* or SH** | Bussman or Shire Controls Ltd |
| Fuse Holder | CHM3D (3 Ph) or CHM1D (1 Ph) SH577 (3 Ph) or SH576 (1 Ph) | Bussman or Shire Controls Ltd |
| Pushbutton | MP0031 or SH628 | Bulgin or Shire Controls Ltd |
| Fuse F1 250mA ceramic | S501 250mA | Bussman |
| Fuse F2 & F3 2A | S500 2A | Bussman |
| | | |
| Duplex Pressure Switch Lead Assembly | agssdpswlead | Shire Controls Ltd |



INSTRUCTIONS FOR USE
Shire Controls Ltd. Duplex AGSS

| | | |
|--|-------------|--------------------|
| Duplex Thermal Trip Lead Assembly (Pair) | agssdttlead | Shire Controls Ltd |
| Remote control (Flush) | wag2240f | Shire Controls Ltd |
| Remote control (Surface) | wag2240s | Shire Controls Ltd |
| | | |
| AGSS Relay Interface | Wagrid | Shire Controls Ltd |

Control Panel Variations

| Single Phase Pump Control Panel Part Number | Pump Specification |
|--|---|
| agssduplex11_16panel1ph | 1 Phase Pump With 1.1-1.6 Running Current |
| agssduplex14_20panel1ph | 1 Phase Pump With 1.4-2.0 Running Current |
| agssduplex22_32panel1ph | 1 Phase Pump With 2.2-3.2 Running Current |
| agssduplex28_40panel1ph | UNI-JET 75 120 230vac 0.4Kw 3.1A |
| agssduplex35_50panel1ph | 1 Phase Pump With 3.5-5.0 Running Current |
| agssduplex45_63panel1ph | 1 Phase Pump With 4.5-6.3 Running Current |
| agssduplex55_80panel1ph | TECNO JET 130 230vac 0.75Kw 6A |
| agssduplex70_100panel1ph | FLUX JET 141 230vac 1.1Kw 7.6A |
| agssduplex90_120panel1ph | FLUX JET 141 230vac 1.5Kw 10.0A |
| | |
| Three Phase Pump Control Panel Part Number | Pump Specification |
| agssduplex11_16panel3ph | UNI-JET T2 75 120 415vac 50hz 0.4kw 1.4A |
| agssduplex14_20panel3ph | 3 Phase Pump With 1.4-2.0 Running Current |
| agssduplex28_40panel3ph | TECNO JET T2 130 415vac 50hz 1.1kw 3A |
| agssduplex22_32panel3ph | TECNO JET T2 130 415vac 50Hz 0.75kw 2.7A |
| agssduplex35_50panel3ph | FLUX JET 142 415vac 50hz 1.5kw 4a Pump |
| agssduplex45_63panel3ph | MEDIO JET 152 415vac 2.2Kw 5.2A |



Pump/ Overload & Motor Rated Fuse Variations

| Single Phase Pump Specification | Overload Variation | Fuses | Pump Mount (Foot) |
|--|--|---|--|
| UNI-JET 75 120 230vac 0.4Kw 3.1A | Overload Siemens 2.8-4.0amp SH359 | 10x38mm Motor rated 6A SH640 | A20/15 M6x15-57 SH256 |
| TECNO JET 130 230vac 0.75Kw 6A | Overload Siemens 5.5-8.0amp SH361 | 10x38mm Motor rated 10A SH354 | A20/15 M6x15-57 SH256 |
| FLUX JET 141 230vac 1.1Kw 7.6A | Overload Siemens 7.0-10.0amp SH523(J) | 10x38mm Motor rated 16A SH354 | A30/15 M8x20-57 SH261 |
| FLUX JET 141 230vac 1.5Kw 10.0A | Overload Siemens 9.0-12.0amp SH523(K) | 10x38mm Motor rated 32A SH356 | A30/15 M8x20-57 SH261 |
| Three Phase Pump Specification | | | |
| UNI-JET T2 75 120 415vac 50hz 0.4kw 1.4A | Overload Siemens 1.1-1.6amp SH875 | 10x38mm Motor rated 4A SH503 | A20/15 M6x15-57 SH256 |
| TECNO JET T2 130 415vac 50hz 1.1kw 3.0A | Overload Siemens 2.8-4.0amp SH359 | 10x38mm Motor rated 6A SH640 | A20/15 M6x15-57 SH256 |
| TECNO JET T2 130 415vac 50Hz 0.75kw 2.7A | Overload Siemens 2.2-3.2amp SH358 | 10x38mm Motor rated 6A SH640 | A20/15 M6x15-57 SH256 |
| FLUX JET 142 415vac 50Hz 1.5kw 4.0A | Overload Siemens 3.5-5.0amp SH360 | 10x38mm Motor rated 10A SH641 | A30/15 M8x20-57 SH261 |
| MEDIO JET 152 415vac 50Hz 2.2Kw 5.2A | Overload Siemens 4.5-6.3amp SH519 | 10x38mm Motor rated 10A SH641 | A30/15 M8x20-57 SH261 |
| Customers Own Pump | Running Current Stated Pump Inspection Plate | Specified Pump Running Current x1.8 | Use Pump Manufacturers Recommended Mount |

History

- 1.0 Issued For ISO13485
- 1.1 Updating of Parts Lists, Maintenance & PCB Schematic