

"Flexicon" 6E & UE Controller.

Installation, Commissioning & Operating Instructions.

!!!! IMPORTANT NOTE !!!!

Cable entry should only be effected via the gland plate at the bottom of the panel. Entry by any other method, invalidates the internal signal segregation, and may cause abnormal operation, and failure to comply with EEC directives.

General.

The heart of the controller is a printed circuit board(PCB), which carries all the circuitry for the power supply, filtering, distribution, output switching, and analogue processing, required by the sequencer.

The "Flexicon" control board(TP0114), features a Embedded microcontroller with on board multiplexed analogue to digital to converter, which decodes the transducer value, and the setpoint values of the high and low setpoint potentiometers, reads the status of the control inputs, and processes the system's output signals, based on the control software loaded into it. The excitation voltage for the system transducer, is also generated by the board.

The "Local/Sequence" pushbutton, mounted on the fascia operates the "Local/Sequence" output relays. These relays determine whether the compressors respond to the sequencer's control signals, or to their own internal controls.

The system also features a 7day time clock, used to programme the ON/OFF times of the whole system. This clock can be overridden by the external control input, or by operation of the change button on the clock fascia. The system is governed by this clock, whether in "Local" or "Sequence". However, if there is a problem, isolating the supply to the panel, will disable the clock, and allow the compressors to be run on their own.

Reference to the field terminals, means the Phoenix din rail mounted terminals at the bottom of the panel.

External Control.

Provision is made for an external control signal to be used to create a master ON/OFF for the system as a whole. A typical example would be control from a Building management system(BMS). If this signal is to be used as a coarse method of control, the time clock programmes should be used for detailed control of the system. If however the BMS is to be the complete control medium, the time clock programmes should be erased, leaving it in the ON mode. Connection of the external control signal is to be by clean contact(Open for system OFF, and Closed for system ON), this should be connected to field terminals No1(+24VDC) and 2(Input).

IMPORTANT! If this option is not used, a link should be fitted to these terminals.

Installation.

Machine Wiring. (Ingersoll - Rand Intellisys type)

There are two separate signals required to control an Intellisys machine remotely, an enable signal and a load signal. These are provided at the following terminals for each of the six possible machines.

IMPORTANT! Before these signals can be used by the machine, an Electronic option key must be inserted into the Intellisys controller, and the supply links for pressure switch control machines, should be removed this panel as directed below and isolated. Contact your distributor to ensure that the key has been fitted.

<u>Machine No</u>	<u>Field terminal No</u>	<u>Function</u>
1	4	LOAD
	5	"
	6	ENABLE
	7	"

To set machine No1 as I/R Intellisys Remove Link B from Field terminal 4 and isolate.

2	9	LOAD
	10	"
	11	ENABLE
	12	"

To set machine No2 as I/R Intellisys Remove Link B from Field terminal 9 and isolate.

3	14	LOAD
	15	"
	16	ENABLE
	17	"

To set machine No3 as I/R Intellisys Remove Link B from Field terminal 14 and isolate.

4	19	LOAD
	20	"
	21	ENABLE
	22	"

To set machine No4 as I/R Intellisys Remove Link B from Field terminal 19 and isolate.

5	24	LOAD
	25	"
	26	ENABLE
	27	"

To set machine No5 as I/R Intellisys Remove Link B from Field terminal 24 and isolate.

6	29	LOAD
	30	"
	31	ENABLE
	32	"

To set machine No6 as I/R Intellisys Remove Link B from Field terminal 29 and isolate.

The LOAD signal should be connected to the "REMOTE START" terminals, and the ENABLE signal should be connected to the "REMOTE STOP" terminals, at the machine's auxiliary terminal block. Refer to the machine manual for terminal Nos.

Machine Wiring.(3 wire pressure switch control).

Provision is made to control any machine using a 3 wire pressure switch, where the Normally closed contact of the pressure switch provides a signal to load the machine, and the normally open contact puts the machine into a timed shutdown mode. In these cases the common terminal of the pressure switch is usually a control supply feed. **Note!** pressure switch contacts are described with no pressure in the system.

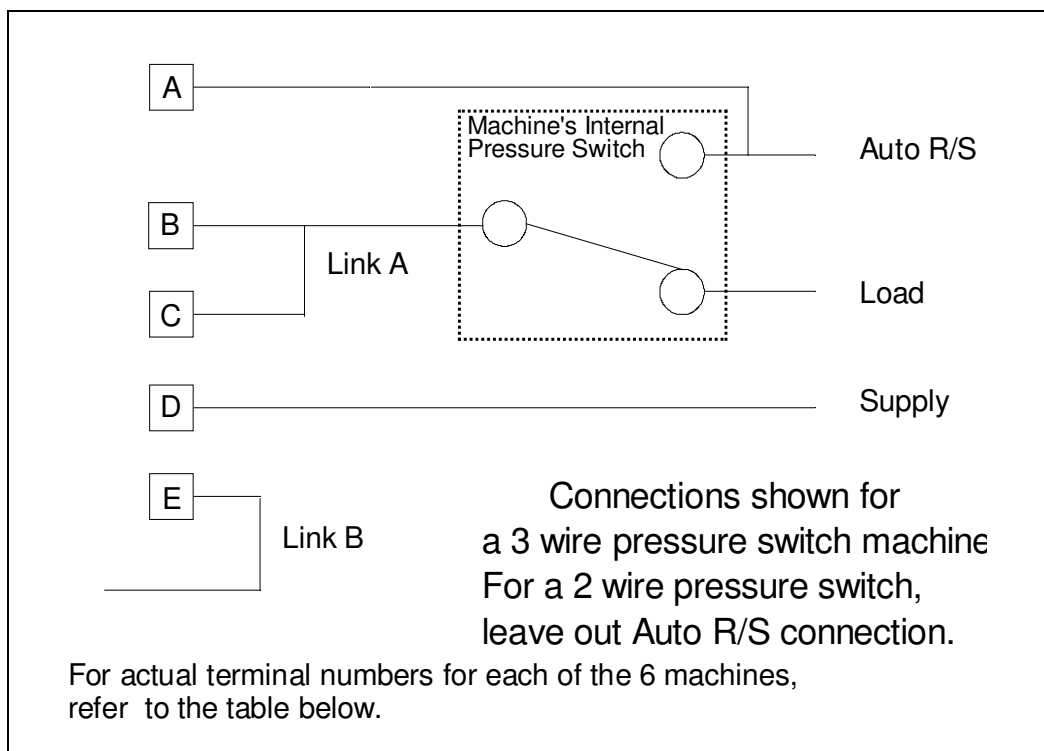
To use the controller in this mode, the control supply feed should be removed from the common of the machine's pressure switch and connected to the terminal marked SUPPLY (D) in the following diagram.

The common of the pressure switch should now be connected to the terminal marked COMMON (B) in the following diagrams, and linked to the enable terminals as shown (Link A in the diagram).

The terminal marked AUTO R/S (A) should now be connected to the pressure switch normally open contact **AS WELL AS** the existing connection.

A link should be fitted from the relative AUTO relay to the appropriate field terminal. This link (Link B in the diagram) is fitted as standard when it leaves the factory, but may have been removed if this location has previously been a different machine type.

Connection Diagram for 3 wire pressure switch controlled machines.



Machine	1	2	3	4	5	6
Term A	3	8	13	18	23	28

Term B	5	10	15	20	25	30
Term C	6	11	16	21	26	31
Term D	7	12	17	22	27	32
Term E	4	9	14	19	24	29

IMPORTANT! Under no circumstances should an Intellisys machine be connected to a channel wired for a pressure switch machine, as damage to the control system is likely. It is recommended that the type of machine installed to each channel, is clearly marked on the unit at the time of commissioning, with a warning to this effect. Should machine types change in the future, it is simply a question of reversing the above setups to suit.

Common Fault.

In the event of a failure in the controller, the normally energised common fault output will de-energise, providing a volt-free changeover contact on field terminals 35(Normally closed), 34(Common), and 33(Normally open). These states are with the output in the de-energised mode.

No of Machines selection. (Equal strategy only)

This controller can be set to control any number of equal sized machines, from 2 to 6. In order that the controller knows how many machines are to be used, the configuration links must be set. These links are to be fitted as follows:

- LINK A: Terminals 45 and 46 of the main board.
- LINK B: Terminals 43 and 44 of the main board.
- LINK C: Terminals 41 and 42 of the main board.

To set the number of machines, refer to the table below.

No of machines	Fit Link A?	Fit Link B?	Fit Link C?
2	No	Yes	No
3	Yes	Yes	No
4	No	No	Yes
5	Yes	No	Yes
6	No	Yes	Yes

NOTE! If all three links are fitted, the No of machines would be invalid, with the result that the controller will default to six machines. If no links are fitted, the number of machines would again be invalid, with the controller defaulting to two.

Commissioning and Diagnostics.

1. Wiring / physical check.

Thoroughly check all system wiring, in particular where Intellisys machines are connected. Ensure that Intellisys machines have been fitted with the "Option key", to allow sequence control. **Important!** The "Option key" must only be fitted with the machine's power SUPPLY turned OFF, as the Intellisys controller reads the options at first time power up only. The option key may be damaged or erased by inserting with power to the machine.

2. Power up the Flexicon controller.

Once satisfied with the physical installation, turn on the power to the controller. The status at power up is "LOCAL" or stand alone mode, where the installation runs as it did without the controller.

3. Verifying Power Supplies.

The controller is to be fed from a 230VAC single phase supply, via an external fused spur (Customer's supply). The Live supply should be connected to field terminal L, the Neutral to field terminal N, and the earth to the dedicated earth terminal.

The controller pcb is fed by 20V ac from a transformer (pcb terminals 1&2), and is internally protected by a 1amp fuse.

The system uses an internal regulated control supply of 24VDC, which can be measured on terminals 47(+ve) & 48(-ve) of the control board, and provides an unregulated auxiliary supply of nominal 28VDC, which can be measured on terminals 29(+ve) & 30(-ve) of the board.

The transducer excitation voltage is 10VDC and can be measured at terminal 49(+ve) and 52(0V) on the board. The transducer output is 10mv/bar of pressure, hence with 7 bar in the system, a reading of approximately 70mv should be apparent on terminals 50(-ve) & 51(+ve). If this is not of the correct polarity, swap the white and green wires in these two terminals, and re-check. If it is not of the correct value, check the connection of the DIN plug on the transducer body.

4. Clock display blank at power up.

It is possible that the backup battery has discharged during storage. Leave the system with power on for a while, to allow the battery to charge.

By using the slide switch on the clock's front panel, (ON = System running, OFF = System shutdown, TIMED = System turns ON and OFF in accordance with the program entered into the clock.) it is possible to carry on with the commissioning procedure, whilst the battery is charging.

5. Setting up the Flexicon controller.

(i) Set the clock to the ON state, or slide the switch to ON. If you are operating the system from a local or remote switch, ensure that it is in its ON state. The analogue circuitry will now be enabled, allowing it to start reading the system pressure transducer.

The controller's default state is "LOCAL" mode, where the machines continue to run as they did without the controller, and it is toggled between this mode (No "SEQUENCE" lamp, No output 7 LED, and three auxiliary relays de-energised), and "SEQUENCE" mode ("SEQUENCE" lamp, output 7 LED, three aux relays energised) by repeated operations of the "LOCAL/SEQUENCE" button on the front panel.

The controller may appear to select machines, (as indicated by the 6 GREEN LEDs [OP1 - OP6]), but they do not come under the system's control, until it is placed in "SEQUENCE" mode.

(ii) Decide on the system operating pressure band. ie. 100 to 110psi. With the system running in "LOCAL" mode, you can now adjust the machine's internal pressure switches (or other control medium) to a margin above the required operating pressure band. ie. 112 - 115psi.

(iii) With the controller still in "LOCAL" mode, adjust the "HIGH" and "LOW" setpoint pots to the required pressure.

(iv) Press the "LOCAL/SEQUENCE" button, putting the system into "SEQUENCE" mode as indicated by the "SEQUENCE" lamp.

(v) Referring to the customer's normal pressure indicator, (Favourite or receiver mounted gauge) take note of the pressures at which the compressors LOAD and UNLOAD. With the pressure rising, the controller should unload a machine at your chosen high setpoint. If it does not, then as the pressure reaches your chosen value, turn the "HIGH" potentiometer gently anticlockwise until a machine offloads. Now, with the pressure falling, the controller should load a machine at your chosen low setpoint. If it does not, turn the "LOW" potentiometer gently clockwise, until a machine loads. Allow the system to find the correct machine combination, and then finely trim the "HIGH" and "LOW" pots to achieve the desired band. Clockwise to increase pressure, anticlockwise to decrease pressure.

IMPORTANT! When adjusting the pressure band, you should always adjust the "HIGH" setpoint first if you are raising the pressure, and the "LOW" setpoint first if you are lowering the pressure. This prevents you from closing down the differential, causing rapid cycling of the compressors. It is also important, when raising the pressure, to check that you have not exceeded the machine's internal setting, as this will then take priority, effectively locking it out of the system.

5. Setting up the Time clock program.

(i) First determine and document your ideal program for the automatic starting and stopping of the compressed air plant. If you cannot fix a definite schedule of times, pick the nearest to your requirements. The program can be overridden at any time by pressing the change button on the front, and will resume automatic control at the next program entry.

(ii) Enter in your program, following the detailed instructions in the leaflet supplied with the panel.

6. Technical support and commissioning.

(i) Assistance can be arranged either through your authorised distributor, selected OEM's or by calling 0161 439 1444, and asking for "Flexicon" Technical support.

(iii) Commissioning / training can be arranged for a nominal charge, enabling any queries or special requirements to be easily sorted out.

(iv) Your system should be registered with the manufacturer, via your authorised distributor, to enable the warranty to be verified. Please quote the serial/batch number of the controller, and your invoice details.

(v) Extended warranty and service contract packages are available, for ongoing peace of mind, once the initial twelve month period is exhausted.

Operating Instructions.

1: Turning the package ON and OFF.

The system is turned ON and OFF by the 7 day clock, according to the times programmed into it, or by the external control input (closed for ON).

2: Duty Cycle Rotation.

The rotation of the duty cycle is performed automatically, when either the time clock or the external control input, turns the system OFF, or every 24 hours if a link is fitted to terminals 39 & 40 of the board(FL6E) or 35 & 36 (FL6UE).

3: Overriding the Time Clock.

With the 7 day clock in the "TIMED" mode, it can be overridden, by pressing the "CHANGE" button on it's fascia. Repeated pressing of this button causes the system to be toggled "ON" and "OFF", as indicated on the display.

For the clock to operate, in conjunction with the external control input, the signal must be closed, allowing the system to go ON & OFF according to the program in the clock. If however the external control input is to have precedence, the slide switch on the time clock should be set to "ON", allowing the system to respond to the external signal.

4: Machine Control Method.

The machines are controlled by their LOAD/UNLOAD signals, and will shutdown in Auto-restart mode, until required, by the controller. The machine's existing control medium (Pressure Switch or Transducer), is set to operate slightly above the system pressure band, acting as both safety cut - out, and LOCAL control.

5: LOCAL / SEQUENCE States.

The system's default state is LOCAL, where the machines act independently. The controller takes over, when the LOCAL / SEQUENCE pushbutton is operated. Repeated presses of this button toggle the system from LOCAL to SEQUENCE. The SEQUENCE mode is indicated by a lamp on the panel fascia.

6: SEQUENCE operation.

In SEQUENCE mode, the plant air system is run in a pressure window, monitored by the system pressure transducer. The HIGHer and LOWEr stepoints of this window can be set using the HIGH and LOW potentiometers at the top of the panel. The range of adjustment is 0 - 15 bar, and so only small increments of movement should be made, clockwise for increase in pressure, anti-clockwise for a decrease.

Once running the controller will select the appropriate machines, to maintain the pressure in the operating window.

Additional Diagnostic Information.

PCB Indicator LEDs.

The 8 green LEDs indicate the operation of the 8 digital outputs from the board. Their uses are as follows:

- OP1 - Compressor No1 Load/Unload Signal
- OP2 - Compressor No2 Load/Unload Signal
- OP3 - Compressor No3 Load/Unload Signal
- OP4 - Compressor No4 Load/Unload Signal
- OP5 - Compressor No5 Load/Unload Signal
- OP6 - Compressor No6 Load/Unload Signal
- OP7 - Local/Sequence Output. Drives relays RL2,3&4 + Front panel Lamp.
- OP8 - Common Fault Output.

The 8 Red LEDs indicate the operation of the 8 digital inputs to the board. Their uses are as follows:

- IP1 - Master ON/OFF input. From Clock relay RL1 & BMS input Field terminals 1&2.
- IP2 - Local/Sequence pushbutton input. Front panel.
- IP3 - IP8 Not designated in this system.

Tracing the transducer through to the Microprocessor pins.

As previously, the Transducer's supply and input can be measured at the following terminals.

The transducer excitation voltage of 10VDC and can be measured at terminal 49(+ve) and 52(0V) on the board. The transducer output is 10mv/bar of pressure, hence with 7 bar in the system, a reading of approximately 70mv should be apparent on terminals 50(-ve) & 51(+ve). If this is not of the correct polarity, swap the white and green wires in these two terminals, and re-check. If it is not of the correct value, check the connection of the DIN plug on the transducer body.

The transducer signal is then amplified before arriving at the Microprocessor pin for reading by the on board Analogue to Digital converter. This signal is 0 - 4.5VDC, and can be read on the second pin up, on the right hand side of the processor. The Low & High setpoints from the potentiometers, can be read on the third and fourth pins respectively.