

TESCOM™ Electropneumatic Controller/Motors

What is the ER5000 Series?

- An electropneumatic device
- A PID controller
- A low pressure, low flow, pressure reducing regulator
- Pilot pressure controller to another regulator

What is an electropneumatic device?

The user inputs an electronic signal, the device gives a pneumatic output.

What are PIDs?

P=proportional, I=integral, D=derivative PID is one of the oldest controls algorithm, which is commonly used in various industries.

What do I need in order to run an ER5000?

- 24 VDC power supply
- A setpoint signal
- A feedback signal
- Pneumatic supply (up to 120 psig / 8.2 bar)

Can I operate an ER5000 Series without a computer?

Yes. The computer MAY be used to send the setpoint signal (digital), but there are other options (analog signal or a profile already onboard the ER).

Can I tune the ER5000 Series without a computer?

No.

What is “tuning”?

Tuning is the selection of the proper values for your P, I, and D gains so that the system gives you the optimal performance characteristics that include speed, stability, and agility.

Do I have to tune the ER5000 Series periodically?

No. Once the ER5000 Series is tuned for a system in the setup phase, there is no need to re-tune the system, unless the system’s conditions and characteristics change so severely that the existing P, I, D values do not deliver the performance goals anymore.

How does ER5000 Series communicate with a computer?

USB or RS485 communication.

What is an A/D and its resolution in the ER5000 Series?

An analog to digital converter and the resolution is 16 bits.

Can I use a digital transducer for feedback to the ER?

No, unless it is converted to an analog signal using a D/A.

What kind of analog signals can I send to the ER5000 Series?

- 4-20 mA or 1-5 VDC (selectable jumpers) for both setpoint and/or feedback (ER5000XI-X)
- 0-10 VDC for both setpoint and feedback (ER5000XV-X)

What kind of overall accuracy can I expect from a system with ER5000 Series?

0.1% of the range of the transducer if the transducer has a 0.1% accuracy or better. Otherwise as accurate as the transducer.

What does an ER5000 Series do for my system?

- Controls pressure to the given setpoint
- Improves accuracy and repeatability
- The ER automatically compensates for the changes in the system (flow, temperature, inlet pressure, etc.)
- Provides closed-loop control
- Automation
- Easy downloadable profiles eliminate PC or PLC for cycling applications
- Data acquisition

Where can I get the ER5000 Operations Manual?

You can download the manual for free from the Emerson website: Emerson.com/ER5000.

What about the software?

The ER5000 comes with:

1. The ERTune Program for communication with PC, PID Tuning, Diagnostics and Data Acquisition
2. Software examples provided for LabVIEW, Visual Basic, C and C#
3. DLL provided for process control software development
4. Written description of the software protocol and un-compiled source code

Where can I get the ERTune Software?

You can download the software for free from the Emerson website: Emerson.com/ER5000.

What does 1 “bit” in the system amount to in regards to pressure?

1 bit is equal to 0.03% of the sensor’s range (the sensor that is used for feedback). You can never do better than 1 bit.

Do I lose my PID parameters on the ER when power is lost (or ER is unplugged)?

No.

Do I lose communication with the PC in case of a power loss?

Yes.

Do I lose communication with the PC, if I am sending an analog setpoint to the ER?

No.

What happens to pressure when power is lost?

As both solenoid valves inside the ER5000 are normally closed, the valves will close and the pressure will be trapped if the ER is mounted into a dead headed system, e.g. dome of a regulator. The pressure will be lost if the ER is in a flowing condition.

What should I do if I want the ER5000 to exhaust its internal pressure upon loss of power?

Install a normally open solenoid valve into the ER’s gauge port (TESCOM P/N 85178).

ER5000 FAQ

What do the Control Limits offer in the ER5000?

The Control Limits feature in the ERTune software allows the user to set minimum and maximum limits on five operational parameters of the system. If one or more of the parameters fall below or exceed the limit, the ER5000's internal solenoid valves will go into a user selected condition. The solenoid valve condition choices are: Inlet Closed/Exhaust Open, Inlet Closed/Exhaust Closed, Inlet Open/Exhaust Closed. The five operational parameters are: Analog Setpoint, Internal Sensor, External Sensor, Inner Error and Outer Error.

What happens if I lose my analog setpoint source?

If a Control Limits range has already been established, once the setpoint goes below its minimum, the ER will go into the control limits mode (the valves will be open or closed depending on your selection). If the Control Limit for analog setpoint is disabled, then losing the setpoint will be translated into asking for 0 setpoint. The ER will open the exhaust valve, and the pressure is lost.

What happens if the feedback signal is lost?

If a control limits range has already been established, once the feedback goes below its minimum, the ER will go into the control limits mode (the valves will be open or closed depending on your selection). If the Control Limit is disabled for the feedback, then losing the feedback will be translated into having 0 feedback. The ER will open the inlet valve to bring the feedback up to the setpoint value (if the setpoint is not zero) but the feedback will not change and the ER will stay fully open. A "No Feedback" warning will appear above the Plot Screen Display of the ERTune program.

What happens if the pneumatic signal is lost (0-120 psig / 0-8.2 bar into the ER)?

The pressure is eventually lost if either solenoid valve opens. Depending on the application, this can take a few seconds to many minutes.

What happens if communications with a PC is lost?

- If the PC was sending a constant setpoint to the unit, the unit will continue on with the last setpoint it received and try to hold the feedback at that level (no major change).
- If the PC was sending a varying setpoint to the ER, the ER will take the very last setpoint (before communication is lost) and hold that as the setpoint.
- If the PC had already downloaded the profile into the ER and started the profile, the profile will continue without interruptions if communication with the PC is lost.
- If an analog setpoint was being sent to the ER, the ER5000 Series will not be affected by the loss of communication with the PC.
- The ER5000 provides a "Setpoint to Zero on Power Up" option to utilize if the above options are not suitable for the application.

Can I adjust the PID parameters on the board using pots or jumpers?

No.

What are the things I can do with the boards to setup the system?

- For ER5000XI-1 models, selection between 4-20mA and 1-5VDC can be made for setpoint and feedback signals by changing jumper positions
- For ER5000FI-1 models, selection between 4-20mA or 1-5VDC for the extra inputs can be made, in addition to the setpoint and feedback signals, by changing jumper positions
- Select between ER5000 and ER3000 mode
- Use the LEDs for troubleshooting

How durable are the solenoid valves?

The manufacturer for the ER valves had cycled their valves over 100,000,000 times but then stopped because it had far exceeded any requirements.

What is the C_v of the solenoid valves?

0.01

What is the maximum flow and pressure that I can use the ER for?

As high of a flow and pressure that your mechanical regulator is capable of delivering. If the ER5000 Series is used as a standalone unit, it is a pressure reducing regulator with the following characteristics: $P_1(\text{max})=120$ psig / 8.2 bar, $P_2(\text{max})=100$ psig / 6.9 bar, $C_v=0.01$, media compatibility: dry clean air, N_2 , Argon.

Can I use the ER5000 for High Purity applications?

Yes, you will need to couple it with a high purity regulator/transducer.

Can I use it for hydraulic applications?

Yes, you will need to couple it with a hydraulic regulator/transducer.

Can I use the ER with a back pressure regulator?

Yes, you will need to couple it with a back pressure regulator and the transducer needs to be on the inlet side of the back pressure regulator.

Can I use the ER5000 Series in vacuum service?

- If the ER5000 Series is used as a standalone, connect the vacuum pump to its exhaust port, put the absolute range transducer on the outlet of the ER, and operate in the external feedback mode. The inlet may be open to atmosphere, or you may apply up to 120 psig / 8.2 bar, depending on availability of your supply and the flow needed in the system.
- If the ER5000 Series is used with a vacuum service regulator (Models 44-4600, 44-4700, 44-5000, FR, or DV) then the ER5000 Series will act as the pilot to the regulator.

What is Suspend Mode?

A feature with the ER5000FX-X that when the Suspend Input is active, the Inlet and Exhaust valves remain fully closed and the PID algorithm is suspended.

What are the Auxiliary Inputs and Digital Outputs?

The ER5000FX-X provides additional inputs and outputs that may be controlled and monitored through a profile or remotely when networked to the ER5000.