

# INDUSTRIAL ELECTRIC ACTUATOR

## Technical Note 432

The new VICI AG industrial electric actuator is dedicated to industrial applications for manufacturers of in-process analytical instruments for heavy industry. Designed to be a lean, robust, economical replacement for the VICI two position standard electric actuator, the industrial electric actuator retains only the most critical hardware and firmware features of its predecessor.

The actuators are for use with the following VICI two position injectors and switching valves:

- All Cheminert valves
- Valco W and UW type GC valves
- Valco W type HPLC valves

Customized valves that fit these categories but have pressure specifications that differ from the catalog are excluded.

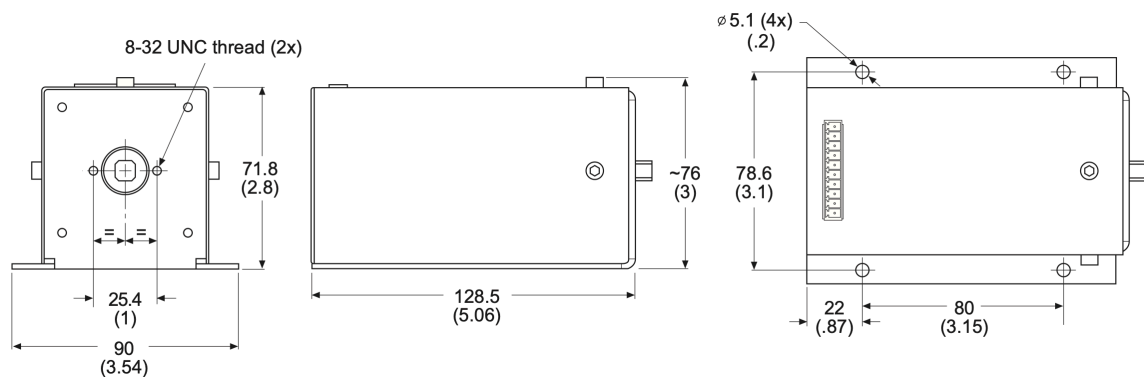
### GETTING STARTED

#### Precautions

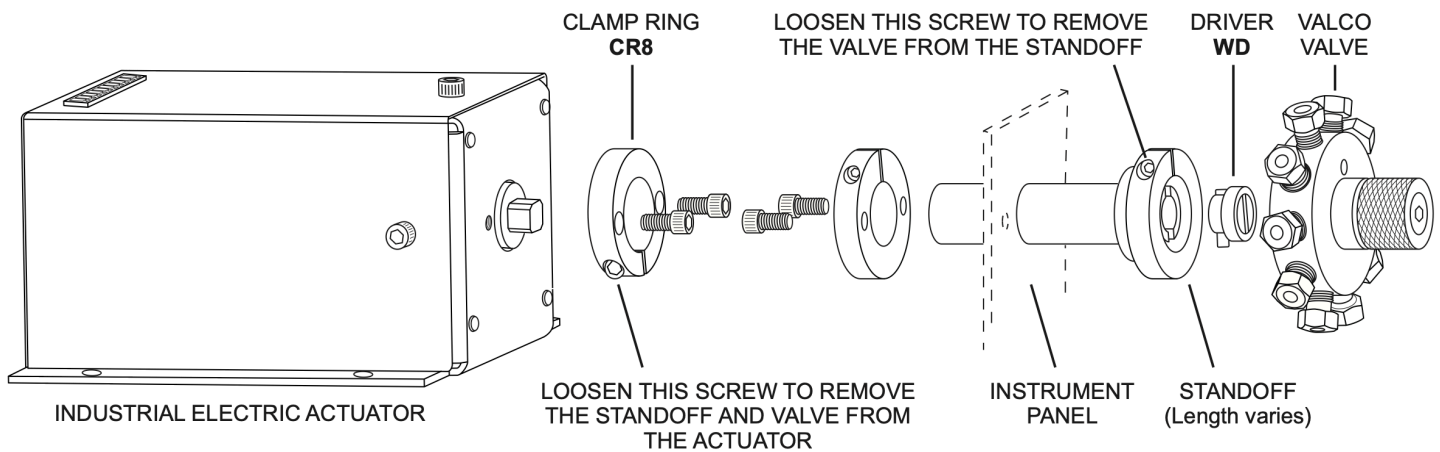
1. Do not remove the cover, or insert any tools through any openings in the cover.
2. Prevent accidental shorting of the contacts by tools, hands, bad contacts, or unsuitable equipment.
3. Do not apply any voltage exceeding the values specified for each interface pin.
4. Do not expose to the actuator humidity, corrosive vapors, or temperatures above 50°C.
5. Use only mounting hardware recommended and supplied by VICI.
6. Use of the actuator for any purpose that is not expressly described in this document may cause damage to the actuator and all connected devices.

#### Dimensions

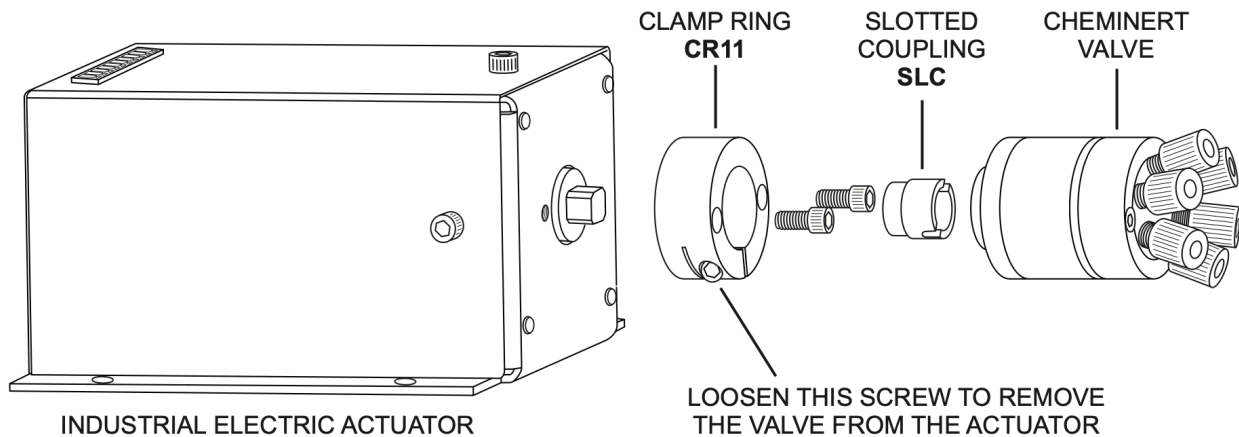
**Figure 1: Actuator dimensions, in millimeters (inches)**



**Figure 2: Valco GC valve mounted on an industrial electric actuator with a standoff assembly**



**Figure 3: Cheminert low pressure valve mounted on an industrial electric actuator with closemount hardware**



## Mounting

The actuator should be oriented so that any potential leakage of liquid from the valve or fittings flows away from rather than into the actuator. The front mounting holes and the square output shaft of the actuator allow VICI valves to be mounted with standard VICI mounting hardware.

The illustrations above show the two most common installations. Closemount and standoff mounting hardware for all valves mentioned in this technical note is available from VICI.

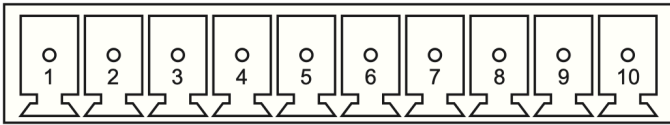
## Connectors and Interfaces

The actuator is equipped with a 10-pin pluggable terminal block header with 5.08 mm pitch. Use Phoenix Contact MC 1,5/10-ST-3,5 or similar to connect to it.

Input power (22-26 VDC, min. 2 A) is supplied through the first two pins of the header.

PIN #	NAME	FUNCTION
1	VIN	Power supply
2	GND	Power supply
3		Reserved
4	INA	Digital input
5	INB	Digital input
6	COM	Common
7	OUTA	Digital output
8	OUTB	Digital output
9	TXD	Serial port
10	RXD	Serial port

**Figure 4: Terminal block pin identification**



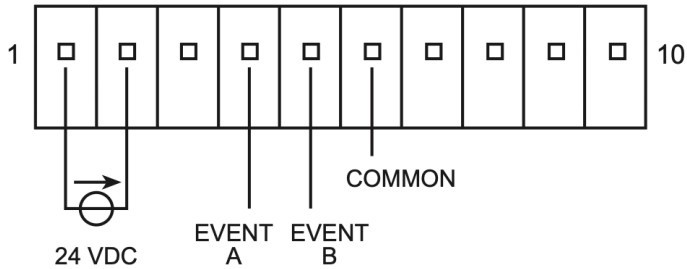
### Inputs

The actuator features two galvanically isolated, polarity-insensitive inputs. The inputs are suited for signal levels from 5V to 24V.

### Direct control

The actuator can be controlled by TTL/CMOS logic or 24V event signals. To assert an input pin, apply a voltage of 5V to 24V between the input pin and Common, as illustrated below.

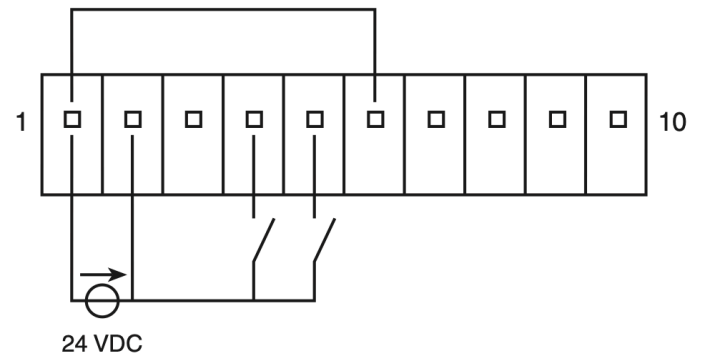
**Figure 5: Direct control**



### Contact closure

Route the 24V power supply to the digital I/O interface, as shown below, to establish contact-closure control.

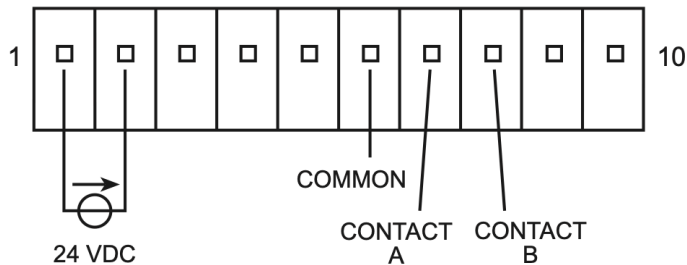
**Figure 6: Contact closure**



### Outputs

The actuator features two galvanically isolated contact-closure outputs which share the Common pin with the inputs. The actuator can send a signal by shorting either of the two output pins to Common. Both pins are insulated from Common when they are inactive.

**Figure 7: Outputs**

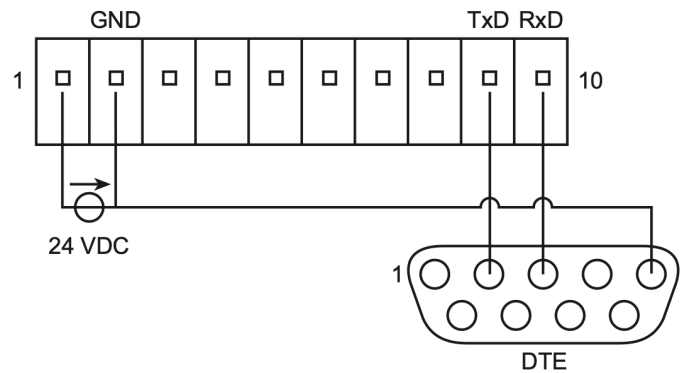


## Serial Interface

The industrial electric actuator features a serial port on the RXD and TXD pins. If you would like to control your actuator by RS-232 or USB (through a USB to RS-232 converter), please consult the factory about customized actuator software. Use the information below to construct a cable.

The serial port allows access to all functionality of the actuator, including commands that may damage firmware, software, actuator, valve, and mounting hardware.

Figure 8: Serial interface



**Caution: Make sure that no connected RS-232 device sends any character sequences other than those provided in the software documentation provided by VICI. Do not attempt to access the firmware API directly.**

## ACTUATOR CONTROL

### Prerequisites

The information in this section applies to VICI industrial electric actuators with standard functionality. Customised actuators may have different modes of control or initialization. If you've got a customized actuator, please refer to the specifications of the development project for more information on the control.

### Initialization

Initialization is the procedure by which the actuator "learns" the proper stroke (actuation angle) of the installed valve and its hardware. Any time a valve is removed and reinstalled, the actuator must be initialized by following these steps:

1. Switch off the power supply or separate it from the actuator.
2. Assert both inputs (pins 4 and 5).
3. Switch on the power supply or connect the it to the actuator.
4. Leave both inputs asserted for at least 2 seconds
5. Deassert both inputs.

When the initialization sequence is in progress, the actuator will move at a fraction of its normal speed while it seeks the valve stops. Once the proper travel is determined, the actuator will return to normal speed. A hammering noise produced when the valve driver pin hits the valve stops is not a cause for concern—it does not occur during normal operation.

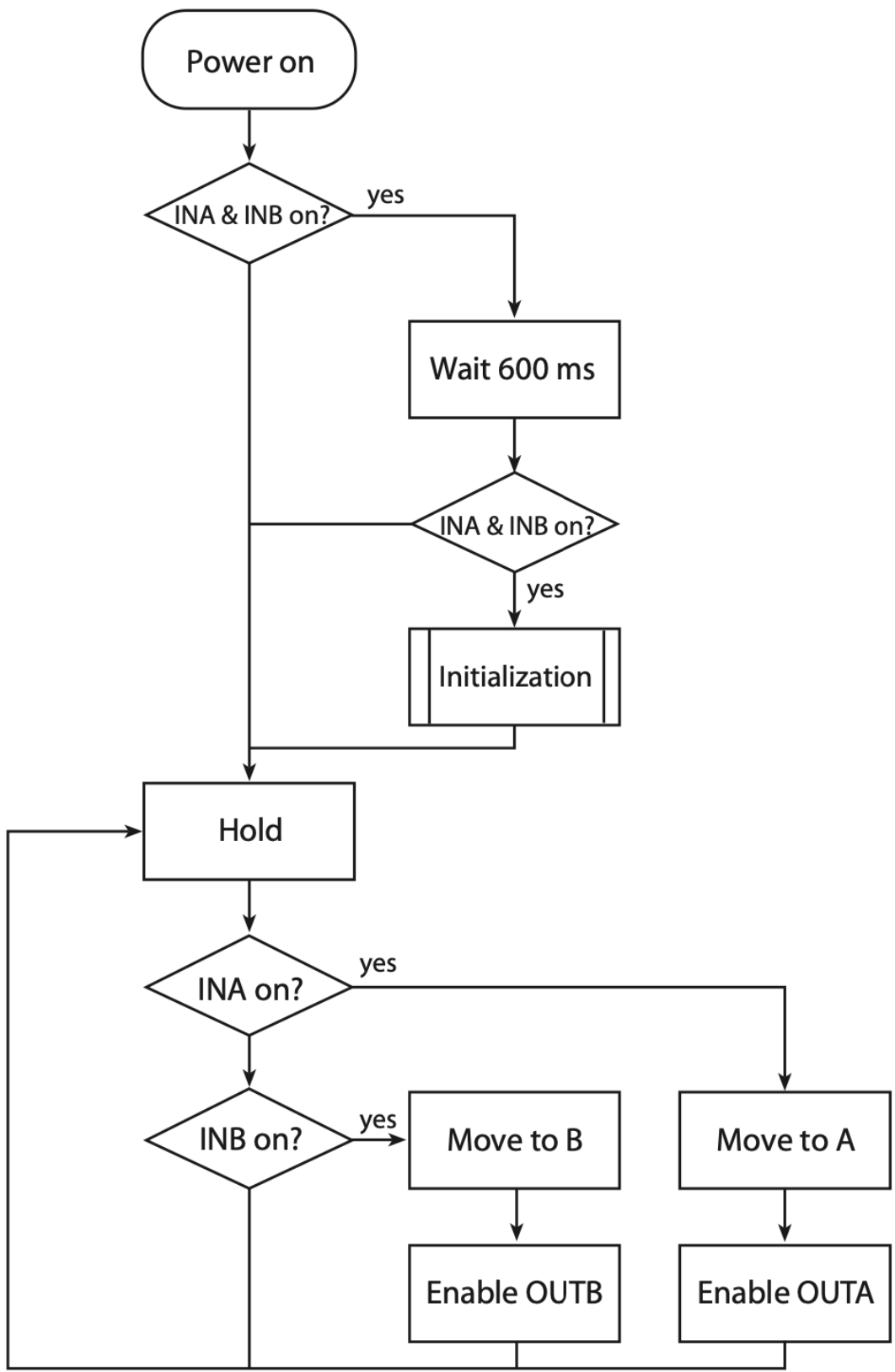
### Switching

Asserting input pin 4 causes the actuator to go to Position A; asserting input pin 5 sends it to Position B. A 50 ms pulse is sufficient to trigger the actuation. The actuator only "listens" for input signals when it's not moving.

### Position Readout

Pin 7 signals that the valve is in position A; pin 8 indicates that the valve is in Position B. The other pin is insulated. If there is a positioning error, both outputs are set to the "OFF" state (insulated from COMMON). The "OFF" state also occurs during the actual switching time and after initialization.

Figure 9: Simplified flow diagram of the standard actuator sequence



## SOFTWARE

The actuator software processes user inputs, controls motor movements, and broadcasts output signals. It may also be programmed with logic and automated tasks. Customized actuator software with logic tailored to the requirements of the application can be loaded onto the actuator through its serial port (Rx/D, Tx/D).

### Upgrading

All actuators arrived programmed and tested. A program upgrade on site is necessary only when program changes are required by the customer.

### Programming

When you request a program upgrade for your actuator, you will receive a link to the software download.

1. Download the software.
2. Start the programming suite, and follow the on-screen instructions.
3. Choose the COM port that is connected to the actuator you're updating.
4. Choose the software package.
5. Hit the upload button and wait for the software to confirm a successful update.

## SPECIFICATIONS

<b>POWER SUPPLY</b>	24 VDC $\pm$ 10%, 2.5 A minimum
<b>VALVES</b>	2-pos Cheminert, CW, UWE, UWT
<b>OPTOCOUPLE INPUTS</b>	3.3 to 24 V, bidirectional
<b>OPTOCOUPLE OUTPUTS ("RELAYS")</b>	max. 24V, 120 mA
<b>SERIAL INTERFACE</b>	RS-232, $\pm$ 3.3 to $\pm$ 15V
<b>OPERATING TEMPERATURE</b>	4° to 50°C