

# 3-Way Control Ball Valve with a modulating Actuator

Flanges dimensions: DN65 – DN150: EN1092-1

## Typical applications

**For engines, turbines, gearboxes and heat exchangers:**

- Charge air cooling
- Secondary cooling systems
- Fuel and lube oil preheating
- Co-generation
- Engine jacket water

**For refineries, chemical plants and oil reproduction:**

- Waste heat boilers
- Product coolers
- Product heaters
- Product condensers

### Key benefits

- Ease of integration - valve size matches pipe size, resulting in reduced installation time and installation costs
- Flexible design - ports can be configured to suit installation
- Low pressure drop compared to other valve types
- Small physical size
- Hand wheel allows manual adjustment of valve
- (optional on pneumatic valve)
- Simplified set up and maintenance



## Overview

The 3-way control valves consist of a heavy-duty ball valve and either a quarter turn electric or pneumatic actuator. The valves provide a high degree of accuracy and repeatability for accurate temperature control and are equally accurate in mixing or diverting service over a wide flow range. The heavy-duty rotor design provides tight temperature control without high maintenance requirements. The system is available in three standard control configurations: electric; pneumatic; and electro-pneumatic, offering flexibility for most requirements.

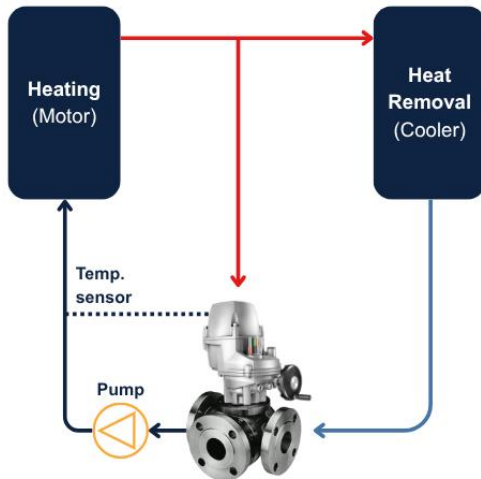
Some actuator options are designed and reinforced for vibration service and are qualified to Lloyd's Marine Requirements for shipboard service. Certain valve and actuator combinations can be directly mounted to reciprocating machinery such as diesel engines, without vibration isolation. Standard valves are suitable for a variety of fluids such as water, water/glycol, sea water, lubricating and hydraulic oils. Optional body materials are available for services involving synthetic or fire-resistant oils, deionized water and ammonia or freon in oil.

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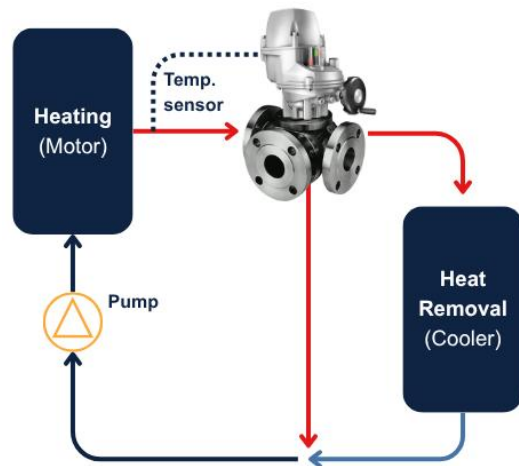
## Applications

### Mixing Applications



Lubricating oil temperature control is normally configured in a mixing application controlling the return temperature to the heat load. The temperature is normally measured as close as possible to the pump return.

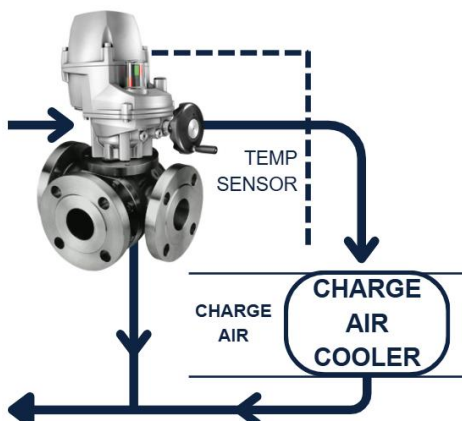
### Diverting Applications



Jacket water cooling in diverting applications regulates the outlet coolant water temperature from a diesel or gas engine. The valve either sends water to a cooler or bypass loop, accurately maintaining the temperature.

The temperature is normally measured at the outlet from the heat source.

### Charge Air Applications



The intercooler is used to cool high temperature turbo charger air.

In this application the valve regulates the flow of cooling water through an intercooler, increasing efficiency, enhancing performance and helping to meet today's environmental requirements.

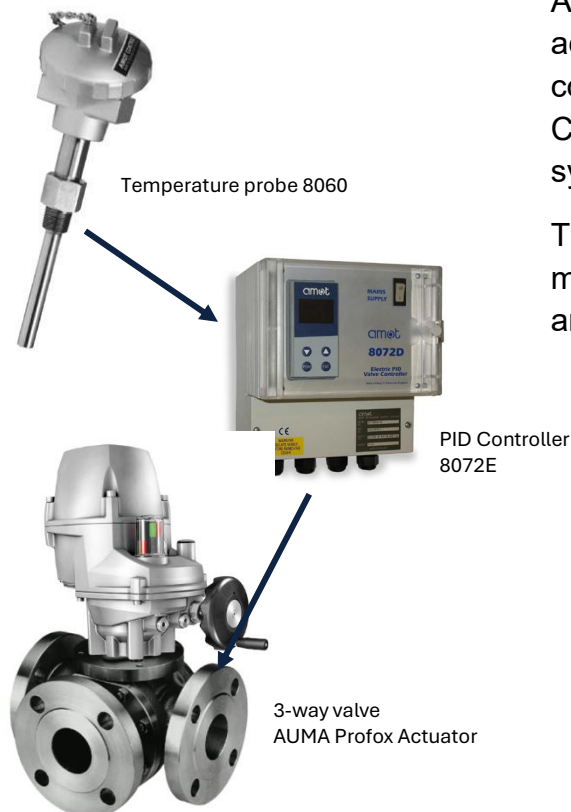
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## System Types (Electric)



For the electrically operated valves, a number of actuator options are available, which use an electric motor that rotates in either direction in response to the control signals received. The motor drives a gearbox connected to the rotor shaft and turns the valve rotor clockwise or counter-clockwise, normally 0 - 90 degrees. At the end of travel, limit switches are incorporated to isolate the electrical supply to the motor when the valve rotor has reached either end of the rotation. A feedback hall sensor is available on some actuators, providing position indication to the control system.



A typical electric valve system incorporates an electrically actuated three-way control valve with an electronic controller and temperature probe. AMOT's 8071D PID Controller can be either panel or wall mounted. The system is completed with a temperature sensor type 8060.

The electric valve system is simple to install with standard multicore cable and provides more accurate measurement and control than typical pneumatically operated systems.

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## Valve Body: Assembly features

**Lightweight & compact design**

**Configurable ports** = flexibility on installation

**Low pressure drop** = savings on either valve or pump size

**High accuracy** = better temp. control

| Valve Specification Overview  |                                                        |             |
|-------------------------------|--------------------------------------------------------|-------------|
| Flow to                       | 2-500 m³/h                                             |             |
| Sizes                         | DN15 – DN150                                           |             |
| Body Materials                |                                                        |             |
|                               | Steel                                                  |             |
|                               | Stainless Steel                                        |             |
|                               | Stainless Steel w/nano polymer                         |             |
| Temp. Range                   | Min: -40°C                                             | Max: +150°C |
| Max Internal Valve Pressure   | 25 bar                                                 |             |
| Seal Material                 | RPTFE                                                  |             |
| Seal Compatibility            |                                                        |             |
|                               | Water                                                  |             |
|                               | Ethylene/Propylene Glycol                              |             |
|                               | Oils - Synthetic Based                                 |             |
|                               | Oils - Petroleum Based                                 |             |
| Applicable Standards          |                                                        |             |
| Design Standard               | DIN3357                                                |             |
| Face to Face Dimension        | Factory standard                                       |             |
| Test Standard                 | END12266                                               |             |
| END Flange Dimensions         | EN1092-1                                               |             |
| Property Specification        |                                                        |             |
| Nominal Pressure Class        | PN16 / PN25                                            |             |
| Air Seal Test                 | 6 bar                                                  |             |
| Hydraulic Seal Test           | 25 bar                                                 |             |
| Pressure Equipment Compliance | Pressure Accessory - Sound Engineering Practices (SEP) |             |

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**Comment:** In its design as a temperature control valve, the valve is defined as a Pressure Accessory under the terms of the EU Pressure Equipment Directive (PED) and the GB Pressure Equipment (Safety) Regulation (PE(S)R). When used within the temperature and pressure limitations given in this table, the valve range is designed for use in applications using non-hazardous liquids defined as Group 2 in the Directive/Regulation (such as water, water/glycol and lubricating oil). In these applications, the valves fall into the Sound Engineering Practice (SEP) category. Contact Ing Westad AS to discuss solutions if the application and/or specifications are outside of the above limitations, or if it is to use hazardous liquids (Group 1) or contain non-hazardous Group 2) or hazardous (Group 1) gases.

## Valve Body: Materials

| No. | Part Name          | Material       |
|-----|--------------------|----------------|
| 1   | Body               | ASTM A351 CF8M |
| 2   | Bonnet             | ASTM A351 CF8M |
| 3   | Bonnet Bolt        | ASTM A193 B8M  |
| 4   | Bonnet Nut         | ASTM A194 8M   |
| 5   | Seat               | PRTFE          |
| 6   | Ball               | ASTM A182 F316 |
| 7   | Anti-Static Spring | SS316          |
| 8   | Stem               | ASTM A182 F316 |
| 9   | Gasket             | PTFE           |
| 10  | Packing            | PTFE           |
| 11  | Gland              | ASTM A351 CF8M |

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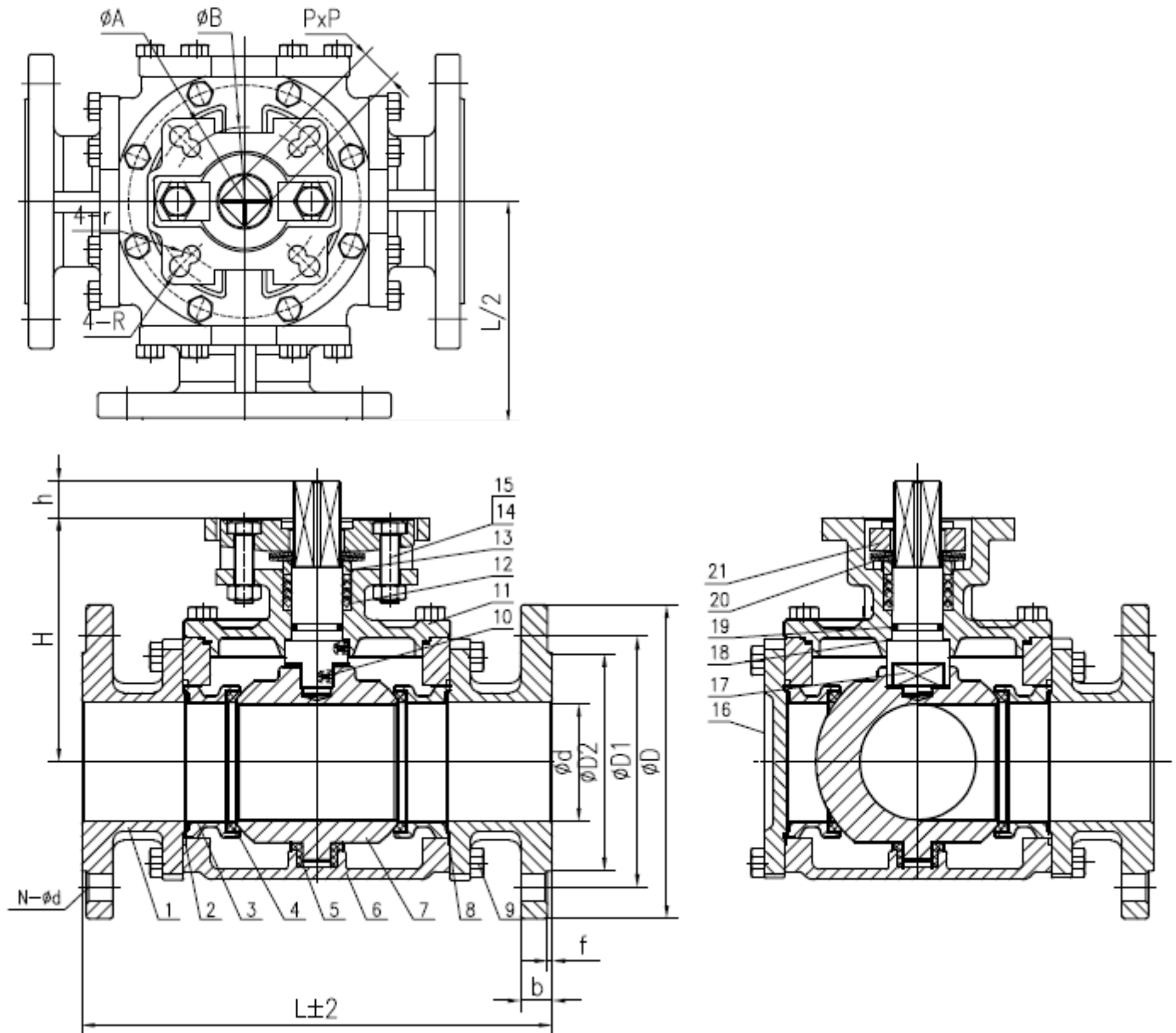
## Valve Body: Flowrate

| Flow Rate |        |     | Recommended flow rate in m <sup>3</sup> /h |       |     |
|-----------|--------|-----|--------------------------------------------|-------|-----|
| Size      | Inches | Kv  | Min                                        | Ideal | Max |
| DN15      | ½"     | 13  | 2                                          | 6     | 7   |
| DN20      | ¾"     | 22  | 3                                          | 10    | 12  |
| DN25      | 1"     | 37  | 4                                          | 16    | 20  |
| DN32      | 1¼"    | 58  | 8                                          | 26    | 32  |
| DN40      | 1½"    | 75  | 10                                         | 33    | 41  |
| DN50      | 2"     | 100 | 14                                         | 44    | 55  |
| DN65      | 2½"    | 128 | 15                                         | 56    | 70  |
| DN80      | 3"     | 146 | 20                                         | 64    | 80  |
| DN100     | 4"     | 456 | 50                                         | 200   | 250 |
| DN125     | 5"     | 730 | 80                                         | 320   | 400 |
| DN150     | 6"     | 913 | 100                                        | 400   | 500 |

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## Valve Body: Dimensions



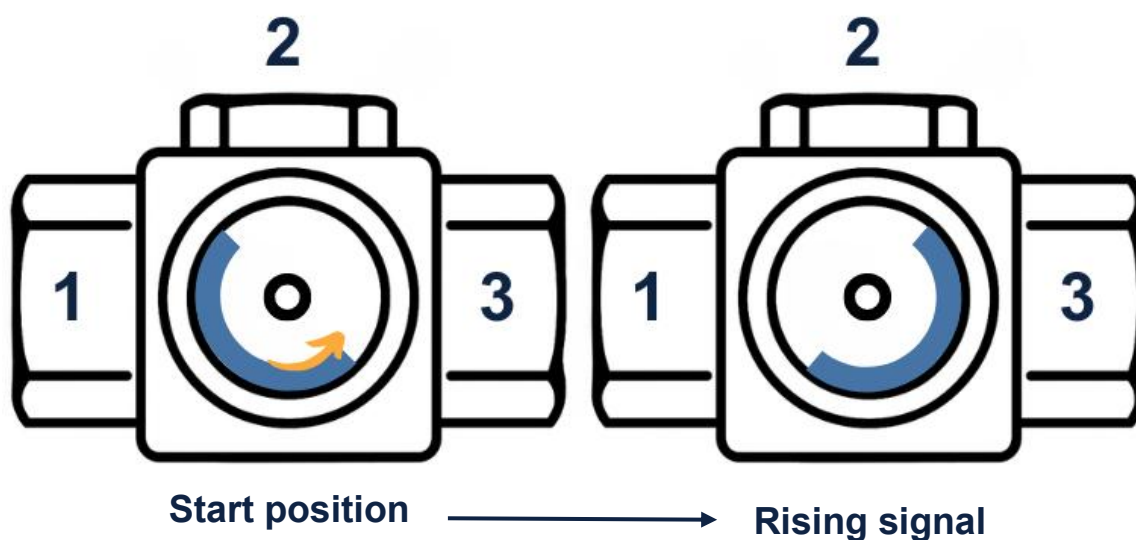
| Size  | L   | D   | D1  | D2  | b  | f | N-ø d | H   | h2 | r  | R3 |
|-------|-----|-----|-----|-----|----|---|-------|-----|----|----|----|
| DN65  | 277 | 185 | 145 | 122 | 18 | 3 | 8-ø18 | 124 | 17 | 9  | 11 |
| DN80  | 302 | 200 | 160 | 138 | 20 | 3 | 8-ø18 | 155 | 23 | 12 | 14 |
| DN100 | 348 | 220 | 180 | 158 | 20 | 3 | 8-ø18 | 178 | 23 | 12 | 14 |
| DN125 | 420 | 250 | 210 | 188 | 22 | 3 | 8-ø18 | 203 | 23 | 18 | 22 |
| DN150 | 510 | 285 | 240 | 212 | 22 | 3 | 8-ø22 | 260 | 37 | 18 | 22 |

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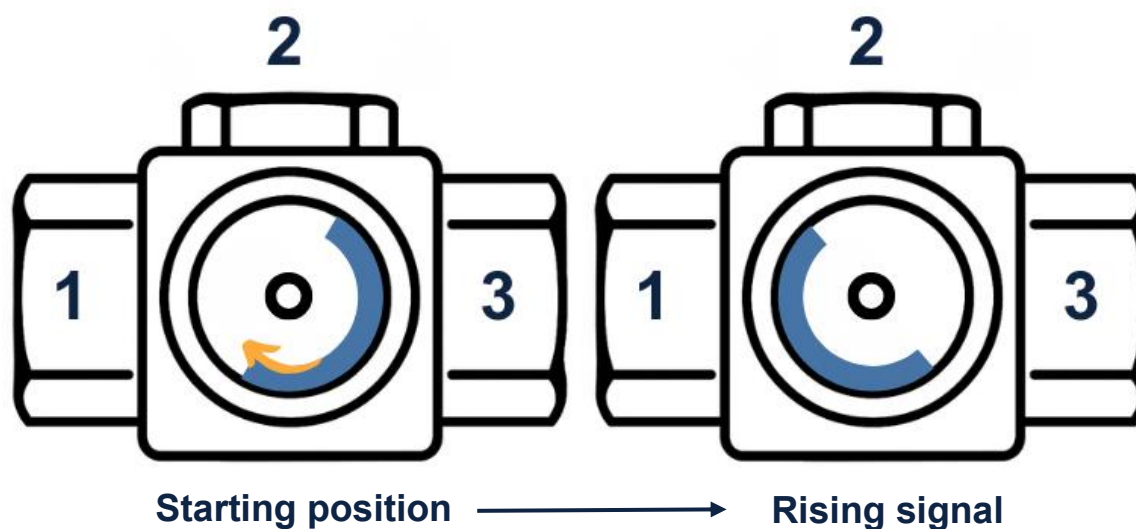
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## Modes of Operation

### Mode 13



### Mode 31



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## Valve model code designation

| Valve model code designation  | Code      | Code Description                                    |
|-------------------------------|-----------|-----------------------------------------------------|
| Valve Size                    | 15        | DN15 = 1/2"                                         |
|                               | 20        | DN20 = 3/4"                                         |
|                               | 25        | DN25 = 1"                                           |
|                               | 32        | DN32 = 1 1/4"                                       |
|                               | 40        | DN40 = 1 1/2"                                       |
|                               | 50        | DN50 = 2"                                           |
|                               | 80        | DN80 = 3"                                           |
|                               | 100       | DN100 = 4"                                          |
|                               | 125       | DN125 = 5"                                          |
|                               | 150       | DN150 = 6"                                          |
| Valve Model                   | W2        | 2-way control valve                                 |
|                               | W3        | 3-way control valve                                 |
| Valve Flow Type               | L         | Low flow                                            |
|                               | S         | Standard flow                                       |
|                               | H         | High flow                                           |
| Valve Body / Seal Material    | S         | 216 Steel                                           |
|                               | R         | 316 Stainless Steel                                 |
|                               | N         | 316 Stainless Steel treaded with Nano polymer       |
| Valve Flange Connection       | B         | PN10 RF (Raised flanges)                            |
|                               | C         | PN16 RF (Raised flanges)                            |
|                               | D         | PN25 RF (Raised flanges)                            |
|                               | U         | Female Parallel Threads (BSPP/G) EN ISO 228-1       |
| Ball-Rotor Type               | S         | Class I «no test»                                   |
|                               | H         | Class II (0,5 %) ANSI/FCI 70-2 and IEC 60534-4.     |
|                               | K         | Class IV (0,01 %) ANSI/FCI 70-2 and IEC 60534-4.    |
| Mode of Operation             | OC        | OPEN-CLOSE only 2-way                               |
|                               | 13        | Mode 13: Start position Port 1 closed@signal 4mA.   |
|                               | 31        | Mode 31: Start position Port 1 closed@signal 4mA.   |
|                               | CL        | Configuration L                                     |
|                               | CT        | Configuration T                                     |
|                               | MM        | 360 degrees rotation - multi mode                   |
| Valve Actuation Type          | E / F / G | AMOT Electric Actuator (E: EB, F: EA, G: EC)        |
|                               | A         | AUMA Electric Actuator                              |
|                               | H         | HKC Electric Actuator                               |
|                               | V         | Valpes EL actuator                                  |
|                               | P         | Pneumatic                                           |
| Actuator Power Supply         | 1         | 12 VDC                                              |
|                               | 2         | 24 VDC                                              |
|                               | A         | 110 VAC 1 phase                                     |
|                               | B         | 230 VAC 1 phase                                     |
|                               | C         | 400 VAC 3 phase                                     |
|                               | M         | Pneumatic with manual override                      |
| Actuator Control Signal Input | A         | Switched live supply or OPEN-CLOSE for 2-way        |
|                               | B         | 4-20mA: signal increases as temp rises              |
|                               | K         | 0-10V: signal increases as temp rises               |
|                               | P         | Pneu with pos 4-20mA signal increases as temp rises |
|                               | B         | BUS - Specify which kind                            |
| Actuator Feedback Signal      | A         | End pos signal, no feedback or pot meter            |
|                               | B         | 4-20mA                                              |
|                               | K         | 0-10V                                               |
|                               | P         | Pneu 4-20mA                                         |
|                               | T         | BUS - Specify which kind                            |