# ELECTRO-PNEUMATIC TRANSDUCING REGULATORS

## ETR Series

**Electro-Pneumatic Transducing Regulators**

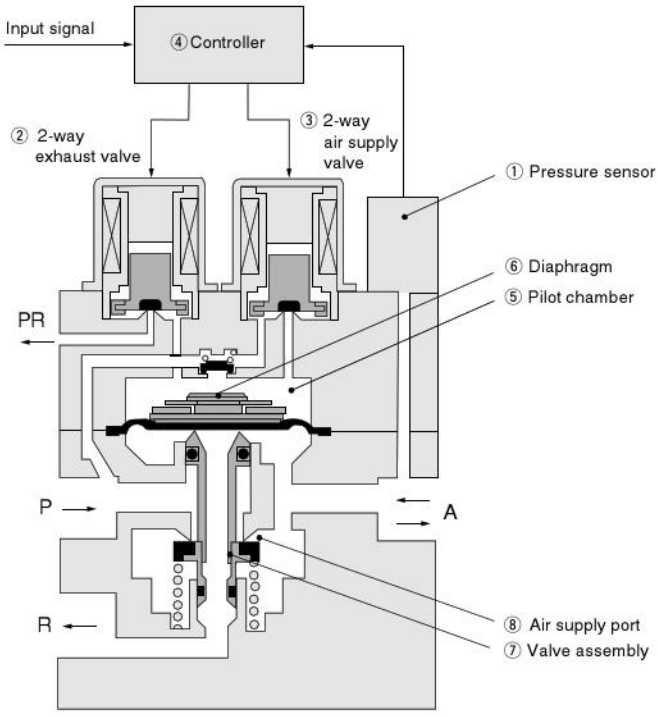
### A fusion of air and electronics

- Flexibly control pressure.
- A sequencer (PC) allows remote control operation.
- Feedback control ensures superior flow rate characteristics.

### Body construction uses P.W.M. control poppet

- Simple construction. Not requiring special air quality.
- Non-bleed type means no air leak problems.
- Any mounting direction is acceptable. It can withstand strong shocks and vibrations.

## Operation Principle of Electro-Pneumatic Transducing Regulators

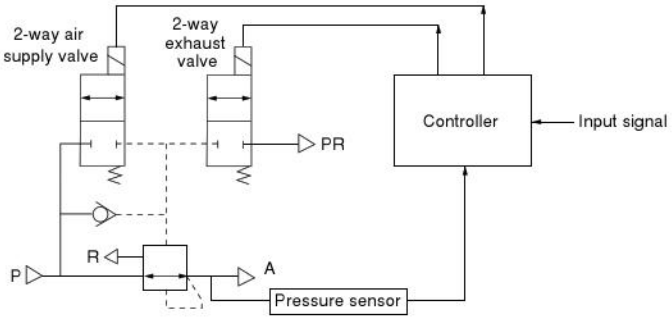



This diagram shows the ETR200.

### ■Increasing output air pressure A

When the controller ④ input signal increases, the 2-way valve ③ is activated and pressure on the pilot chamber ⑤ rises. Then, forcing downward the diaphragm ⑥ causes the valve assembly ⑦ to move downward, opening the air supply port ⑧, and causing the supply pressure P to flow in and output air pressure A to rise. Pressure A is detected using the pressure sensor ①, and the feedback returns to the controller.

The 2-way valves ②, ③ respond to the difference between output air pressure A and set pressure by an input signal, and switch supply air on and off to perform pressure adjustment, to obtain an output air pressure A that is proportional to the input signal.




Block diagram

**●What is an electro-pneumatic transducing regulator?**

A multi-purpose pressure control device that operates in response to voltage or current input signals from the outside to continuously step and accurately control high relief regulator's (pilot type) pilot section in electro-pneumatic transducers, for high-precision air pressure control.

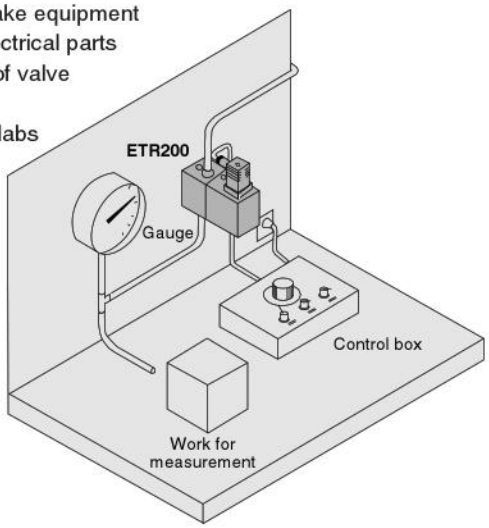
# Application Examples of Electro-Pneumatic Transducing Regulators

## The Koganei Electro-Pneumatic Transducing Regulator is suitable for such applications as:

| | |
|---|---|
| **Level 1** | Setting up test benches simply. |
| **Level 2** | Multiple stepping of air cylinder thrust. |
| **Level 3** | Controlling valves. |
| **Level 4** | Controlling various types of flow dispensers. |
| **Level 5** | Controlling tension force in winder equipment. |

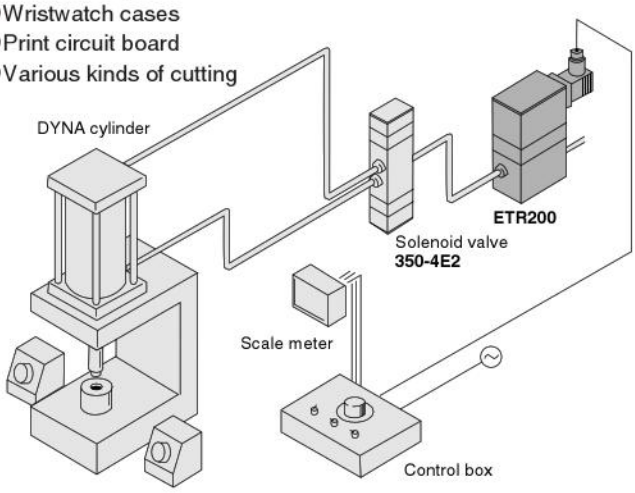
## Level 1

- Automotive brake equipment
- Automotive electrical parts
- Various kinds of valve operations
- Research test labs



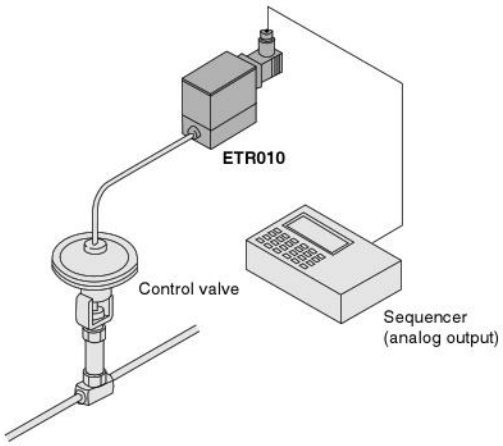

## Level 2

- Automotive parts
- Wristwatch cases
- Print circuit board
- Various kinds of cutting



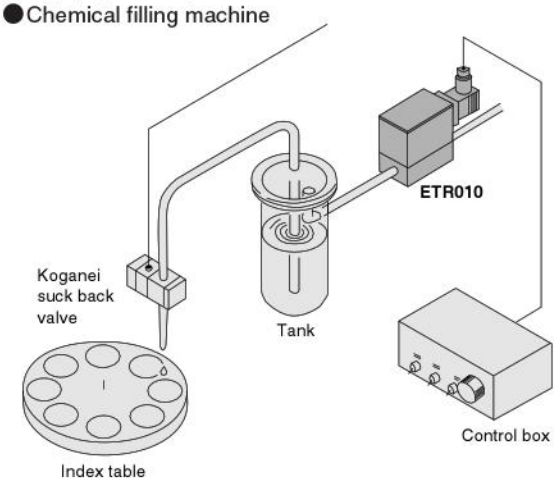

## Level 3

- Bakeries and snack food processing plants
- Pharmaceutical plants



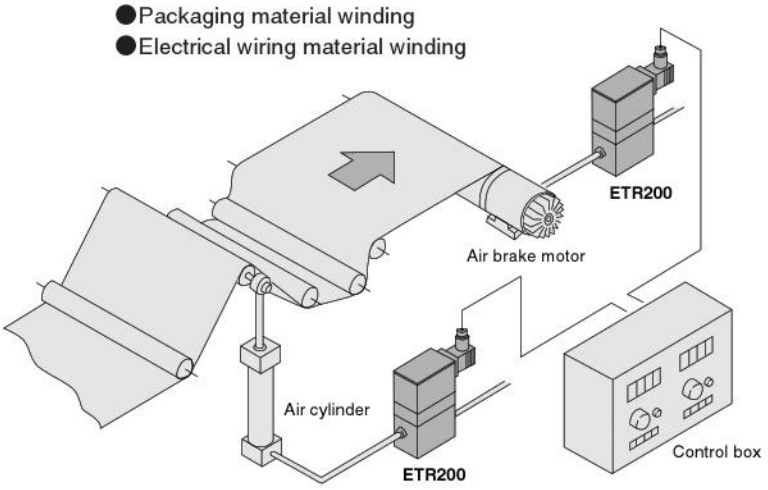

## Level 4

- Compact disk manufacturing
- Applying solder paste
- Chemical filling machine




## Level 5

- Video tapes and other magnetic tapes
- Coil wires
- Packaging material winding
- Electrical wiring material winding




Remark: For other examples and technical information materials regarding the applications listed above, consult us.

## Mounting and piping

1. Install in locations where wiring, piping, and maintenance work is easy to perform.
2. Do not leave the primary pressure applied when the electrical power has been switched OFF. (At this time, the secondary pressure could rise as high as the primary pressure.)
3. A bootstrap operation (of 1 to 2 seconds) occurs immediately after the power supply is switched ON, which could cause the secondary pressure to drop temporarily.
4. After switching ON the power supply, do not leave the primary pressure lower than the setting value.
5. Do not mount a valve on the ETR's primary side that will result in repeatedly switching the primary pressure ON and OFF.
6. Electric noise could result in operations instability. Always take adequate noise-reducing measures.
   ※ For wiring, use shielded wires.
   ※ Use surge protection for nearby solenoid valves and inductive loads.
7. Mount in locations that are as distant from motors and powered lines as possible. When mounting near inductive loads and powered lines, always implement load surge suppression, and use magnetic shielding for insulation. In particular, consult us if planning to use in environments subject to much external electric noise.
8. The electro-pneumatic transducing regulator is adjusted to the specifications before being shipped out from Koganei. Avoid removing or disassembling any of its parts because such action could result in breakdowns.
9. For other handling issues, see the User's Manual included with the product.

## General precautions

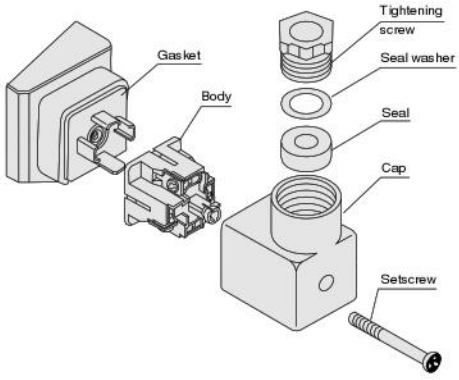
1. Always thoroughly blow off (use compressed air) the piping before plumbing. Entering chips, sealing tape, rust, etc., generated during piping work could result in air leaks or other defective operation.
2. As the interior of the electro-pneumatic transducing regulator uses precision parts, the compressed air should be cleaned air devoid of solid substances, moisture, etc.
   Intrusion of contaminated air into the device could have an adverse effect on operations characteristics and durability.
   For the use of any other media than air, consult us.
3. While the system can be used without lubrication, if lubricating the actuators, etc. is required, use Turbine Oil Class 1 (ISO VG32) or equivalent. Avoid using spindle oil or machine oil.
4. The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below. Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.
5. If using in locations subject to dripping water or oil, etc., or to large amounts of dust, use something to cover and protect the unit.

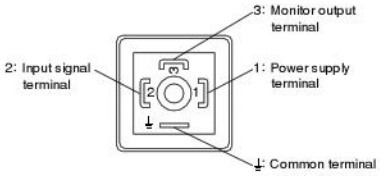
## Wiring method

**1.** Removing the connector

(1) Loosen and remove the connector set-screw, and lift off the connector from the regulator.

(2) Loosen the tightening screw, remove the seal washer and seal, and push the body out from the cap.




1·····Power supply+DC24V terminal
2·····Input signal terminal
Blank: DC 1～5〔V〕
-1: DC 0～5〔V〕
-2: DC 0～10〔V〕
-4: DC 4～20〔mA〕
3·····Monitor output terminal
(DC1～5〔V〕)
⏚ ·····Common terminal (GND)

**2.** Wiring

(1) To avoid erratic operation in the electro-pneumatic transducing regulator due to electric noise, divide the power supply, input signal, and monitor output lines each, and use a shielded 2-wire cable for each.

(2) The electro-pneumatic transducing regulator consumes a maximum of 5W of electrical power. For the power supply, therefore, use shielded wiring with a conductor area of 0.4mm$^2$～0.5 mm$^2$ [0.0006～0.0008in.$^2$] (equivalent to AWG24～22).

**Recommendation**

Peripheral pneumatic devices are available for use with the ETR series. See the following list for reference.

**ETR010**

| | | |
|---|---|---|
| Fitting | A, P port | **TS6-01**<br>**TS8-01**<br>**TL6-01**<br>**TL8-01** |
| Muffler | R port | **KM-1**<br>**KM-11** |
| Tube | | **U6-B (0)**<br>**U8-B (0)** |
| Filter | | **F150-01** |

**ETR200**

| | | |
|---|---|---|
| Fitting | A, P port | **TS8-02**<br>**TS10-02**<br>**TL8-02**<br>**TL10-02** |
| Muffler | PR port | **150-30A** |
| | R port | **KM-2**<br>**KM-23** |
| Tube | | **U8-B (0)**<br>**U10-B (0)** |
| Filter | | **F600-02** |

**ETR600**

| | | |
|---|---|---|
| Fitting | A, P port | **TS10-04**<br>**TS12-04**<br>**TL10-04**<br>**TL12-04** |
| Muffler | PR port | **150-30A** |
| | R port | **KM-4**<br>**KM-41** |
| Tube | | **U10-B (0)**<br>**U12-B (0)** |
| Filter | | **F600-04** |

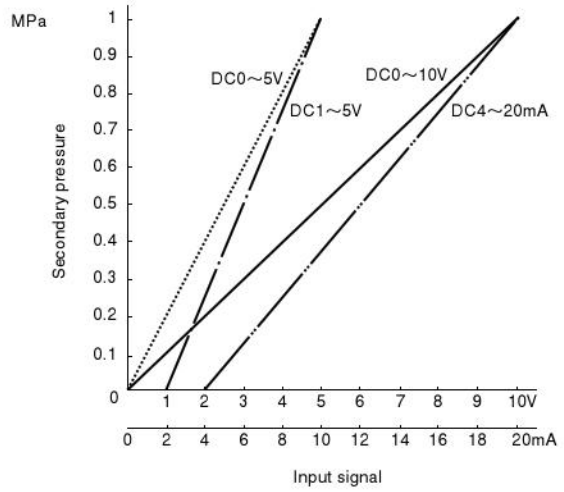
**ETR601**

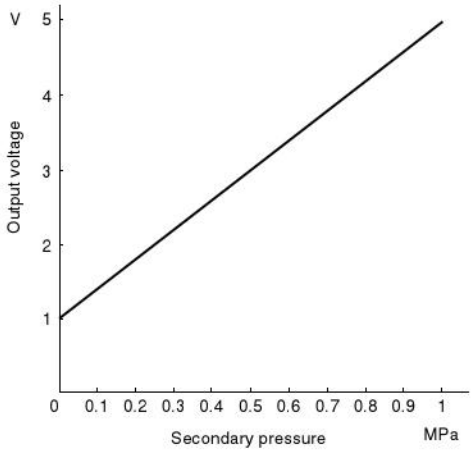
| | | |
|---|---|---|
| Fitting | A, P port | **TS10-04**<br>**TS12-04**<br>**TL10-04**<br>**TL12-04** |
| Muffler | PR port | **150-30A** |
| | R port | **KM-4**<br>**KM-41** |
| Tube | | **U10-B (0)**<br>**U12-B (0)** |
| Filter | | **F600-04** |

## Input Signal and Secondary Pressure Characteristics

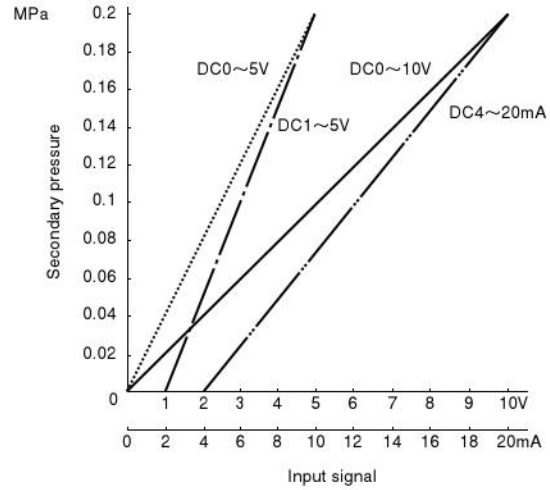
## Secondary Pressure and Output Voltage Characteristics

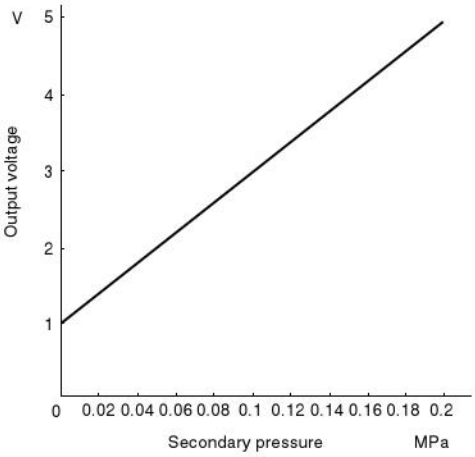
### ETR010, 200, 600




### ETR601




1MPa = 145psi.

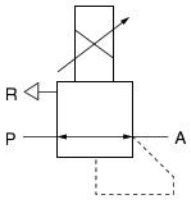
# ETR010

## Specifications

| Item | | | Basic model | ETR010 | ETR010-1 | ETR010-2 | ETR010-4 |
|---|---|---|---|---|---|---|---|
| Media | | | | Air | | | |
| Port size | | | Rc | 1/8 | | | |
| Pressure setting range | | | MPa [psi.] | 0.005～0.7 [0.7～102] | | | |
| Primary pressure range | | | MPa [psi.] | Set pressure or more, and 0.9 [131] or less | | | |
| Proof pressure | | | MPa [psi.] | 1.32 [191] | | | |
| Input signal | Voltage control method | Voltage | DC[V] | 1～5 | 0～5 | 0～10 | — |
| | | Input impedance | kΩ | 20 | 20 | 42 | — |
| | Current control method | Current | DC [mA] | — | | | 4～20 |
| | | Input impedance | Ω | — | | | 250 |
| Output signal | Output voltage | | DC [V] | 1～5 | | | |
| | Load impedance | | kΩ | 5 or more | | | |
| Power supply | | | DC [V] | 24 (7W)±10% | | | |
| Linearity※ | | | | ±1.0% F.S. | | | |
| Hysteresis※ | | | | ±0.5% F.S. | | | |
| Step response Note | | | s | 1 or less | | | |
| Operating temperature range (atmosphere and media) | | | °C [°F] | 5～50 [41～122] | | | |
| Vibration resistance | | | m/s² [ft./sec.²] | 98 [322] or less | | | |
| Wiring | | | | DIN connector (as standard) | | | |
| Mass | | | kg [lb.] | 0.44 [0.97] | | | |

※Values are calculated assuming a pressure full span (F.S.) of 0.7MPa [102psi.].
Note: Secondary pressure values assume at no load conditions.

## Symbol




## Order Codes

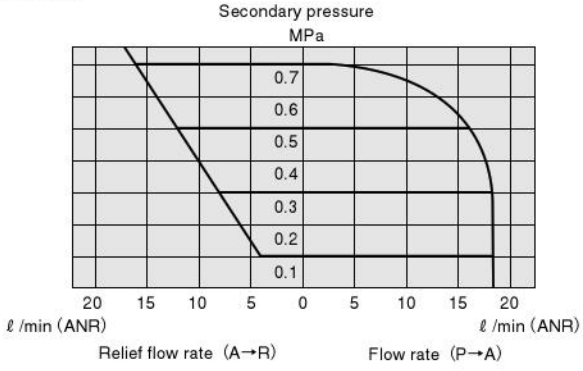
| Basic model | | Input signal |
|---|---|---|
| ETR010 | - | 1<br>2<br>4 |

Mounting base is standard equipment.

- ●Blank——DC1～5(V)
- 1——DC0～5(V)
- 2——DC0～10(V)
- 4——DC4～20(mA)

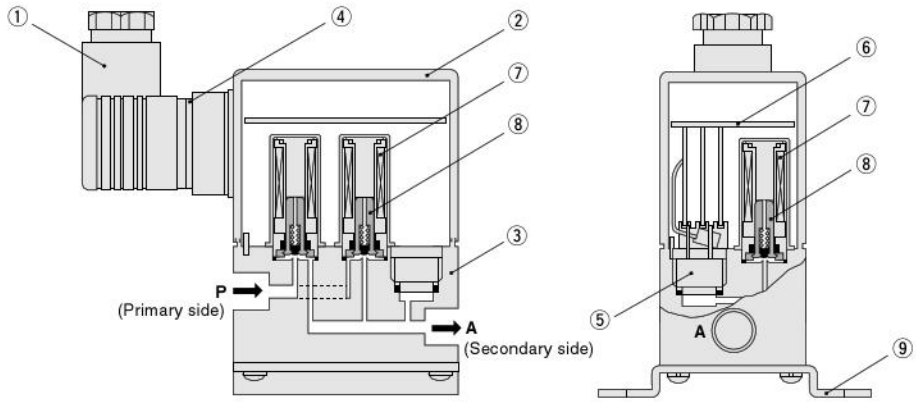
## Flow Rate Characteristics and Relief Characteristics

### ETR010




Remark: Primary pressure is 0.7MPa [102psi].
1MPa = 145psi. 1 ℓ/min = 0.0353ft³/min.

## Inner Construction



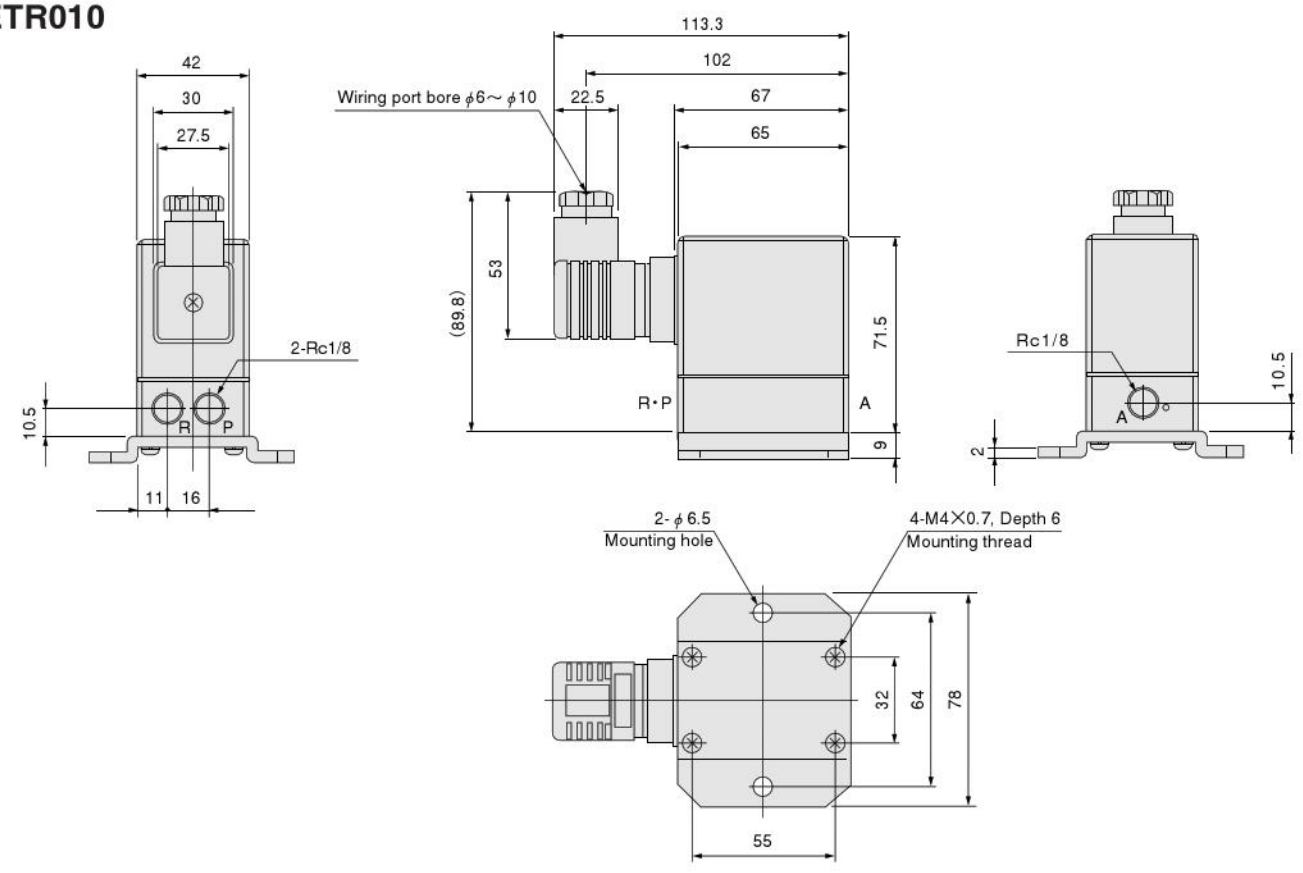

## Major Parts and Materials

| No. | Parts | Materials |
|---|---|---|
| ① | DIN connector | Plastic |
| ② | Cover | Plastic |
| ③ | Body | Aluminum alloy (anodized) |
| ④ | Gasket | Synthetic rubber (chloroprene) |

| No. | Parts | Materials |
|---|---|---|
| ⑤ | Pressure sensor | Plastic (diffusion-type semiconductor) |
| ⑥ | Circuit board assembly | Glass epoxy |
| ⑦ | Coil assembly | — |
| ⑧ | Plunger | Magnetic stainless |
| ⑨ | Mounting base | Mild steel (zinc plated) |

## Dimensions (mm)

### ETR010



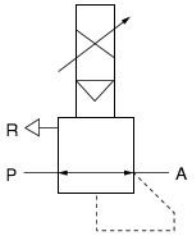
# ETR200

## Specifications

| Item | | | Basic model | ETR200 | ETR200-1 | ETR200-2 | ETR200-4 |
|---|---|---|---|---|---|---|---|
| Media | | | | Air | | | |
| Port size | | | Rc | 1/4 | | | |
| Pressure setting range | | | MPa [psi.] | 0.01～0.7 [1.5～131] | | | |
| Primary pressure range | | | MPa [psi.] | Set pressure ＋0.1 [15] or more, and 0.9 [131] or less | | | |
| Proof pressure | | | MPa [psi.] | 1.32 [191] | | | |
| Input signal | Voltage control method | Voltage | DC[V] | 1～5 | 0～5 | 0～10 | — |
| | | Input impedance | kΩ | 20 | 20 | 42 | — |
| | Current control method | Current | DC [mA] | — | | | 4～20 |
| | | Input impedance | Ω | — | | | 250 |
| Output signal | Output voltage | | DC [V] | 1～5 | | | |
| | Load impedance | | kΩ | 5 or more | | | |
| Power supply | | | DC [V] | 24 (7W)±10% | | | |
| Linearity※ | | | | ±1.0% F.S. | | | |
| Hysteresis※ | | | | ±0.5% F.S. | | | |
| Step response Note | | | s | 2 or less | | | |
| Operating temperature range (atmosphere and media) | | | °C [°F] | 5～50 [41～122] | | | |
| Vibration resistance | | | $m/s^2$ [$ft./sec^2$] | 98 [322] or less | | | |
| Wiring | | | | DIN connector (as standard) | | | |
| Mass | | | kg [lb.] | 0.74 [1.63] | | | |

※Values are calculated assuming a pressure full span (F.S.) of 0.7MPa [102psi.].
Note: Secondary pressure values assume at no load conditions.

## Symbol




## Order Codes

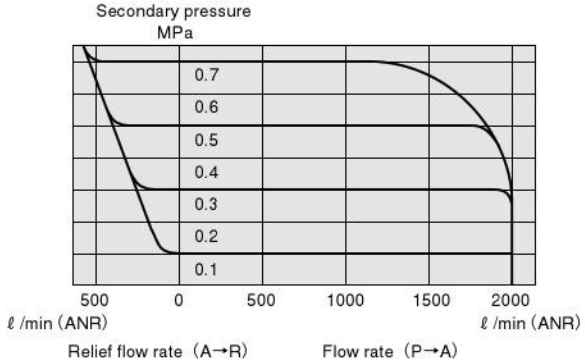
| Basic model | | Input signal |
|---|---|---|
| ETR200 | - | 1<br>2<br>4 |

Mounting base is standard equipment.

- ●Blank — DC1～5(V)
- 1 — DC0～5(V)
- 2 — DC0～10(V)
- 4 — DC4～20(mA)

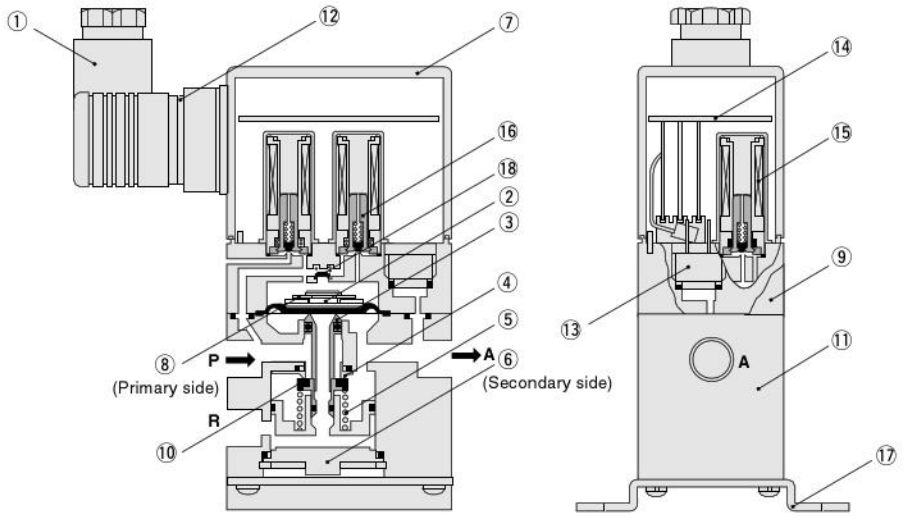
## Flow Rate Characteristics and Relief Characteristics

### ETR200




Remark: Primary pressure is 0.83MPa [120psi.].
1MPa = 145psi. 1 ℓ/min = 0.0353$ft^3$/min.

## Inner Construction



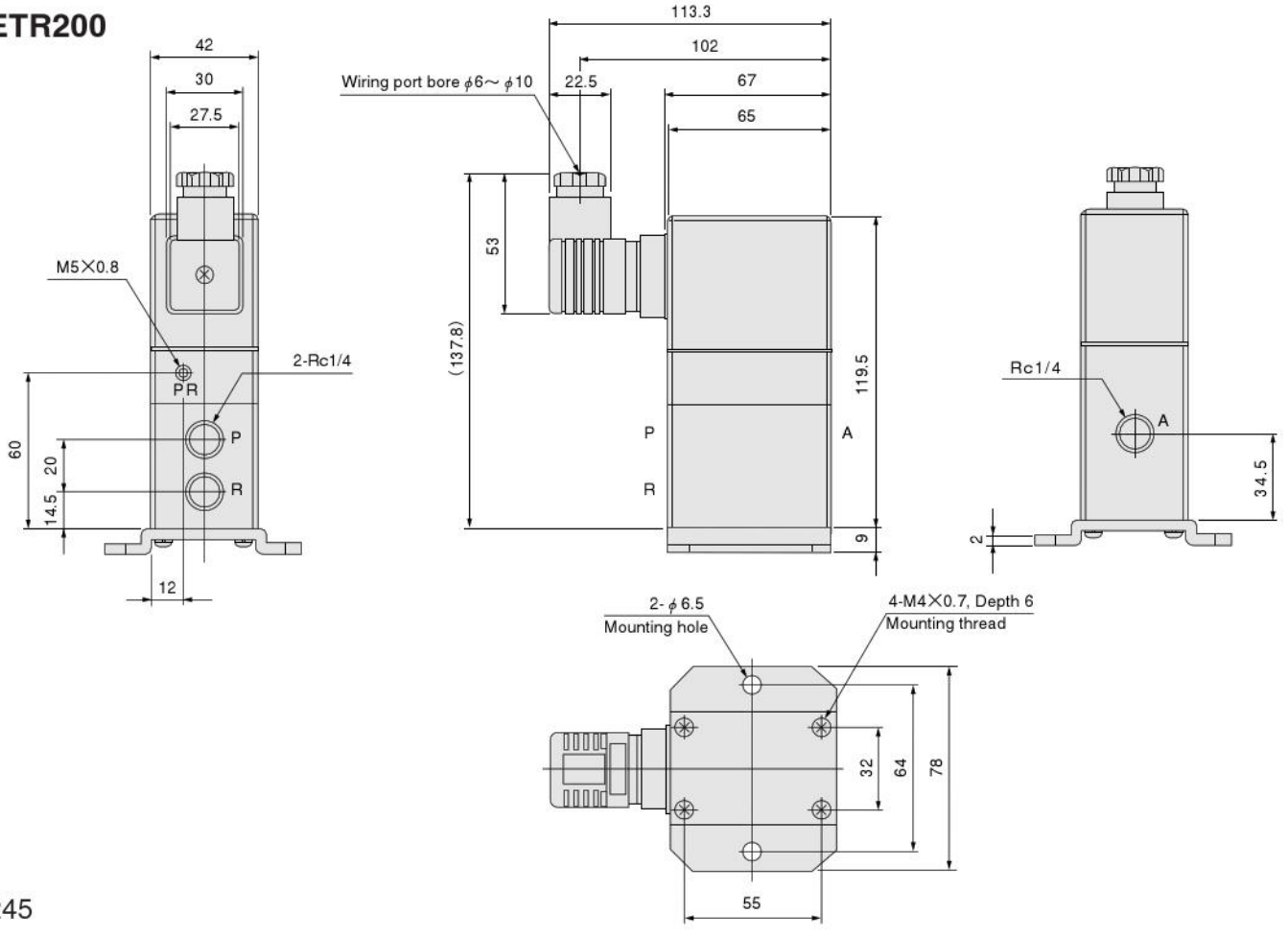

## Major Parts and Materials

| No. | Parts | Materials |
|---|---|---|
| ① | DIN connector | Plastic |
| ② | Diaphragm | Aluminum (NBR baked) |
| ③ | Valve pin | Brass |
| ④ | Valve seat | Brass |
| ⑤ | Spring | Piano wire |
| ⑥ | Exhaust cover | Aluminum alloy (anodized) |
| ⑦ | Cover | Plastic |
| ⑧ | Balancer | Brass |
| ⑨ | Adapter | Aluminum alloy (anodized) |

| No. | Parts | Materials |
|---|---|---|
| ⑩ | Valve | Brass (NBR baked) |
| ⑪ | Body | Aluminum alloy (anodized) |
| ⑫ | Gasket | Synthetic rubber (chloroprene) |
| ⑬ | Pressure sensor | Plastic (diffusion-type semiconductor) |
| ⑭ | Circuit board assembly | Glass epoxy |
| ⑮ | Coil assembly | — |
| ⑯ | Plunger | Magnetic stainless |
| ⑰ | Mounting base | Mild steel (zinc plated) |
| ⑱ | Check valve | Synthetic rubber (NBR) |

## Dimensions (mm)

### ETR200



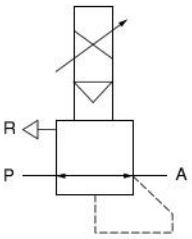
# ETR600

## Specifications

| Item | | | Basic model | ETR600 | ETR600-1 | ETR600-2 | ETR600-4 |
|---|---|---|---|---|---|---|---|
| Media | | | | Air | | | |
| Port size | | | Rc | 1/2 | | | |
| Pressure setting range | | | MPa [psi.] | 0.01～0.7 [1.5～102] | | | |
| Primary pressure range | | | MPa [psi.] | Set pressure ＋0.1 [15] or more, and 0.9 [131] or less | | | |
| Proof pressure | | | MPa [psi.] | 1.32 [191] | | | |
| Input signal | Voltage control method | Voltage | DC [V] | 1～5 | 0～5 | 0～10 | — |
| | | Input impedance | kΩ | 20 | 20 | 42 | — |
| | Current control method | Current | DC [mA] | — | | | 4～20 |
| | | Input impedance | Ω | — | | | 250 |
| Output signal | Output voltage | | DC [V] | 1～5 | | | |
| | Load impedance | | kΩ | 5 or more | | | |
| Power supply | | | DC [V] | 24 (7W)±10% | | | |
| Linearity※ | | | | ±1.0% F.S. | | | |
| Hysteresis※ | | | | ±0.5% F.S. | | | |
| Step response Note | | | s | 2 or less | | | |
| Operating temperature range (atmosphere and media) | | | °C [°F] | 5～50 [41～122] | | | |
| Vibration resistance | | | m/s² [ft./sec.²] | 98 [322] or less | | | |
| Wiring | | | | DIN connector (as standard) | | | |
| Mass | | | kg [lb.] | 1.2 [2.65] | | | |

※Values are calculated assuming a pressure full span (F.S.) of 0.7MPa [102psi.].
Note: Secondary pressure values assume at no load conditions.

## Symbol




## Order Codes

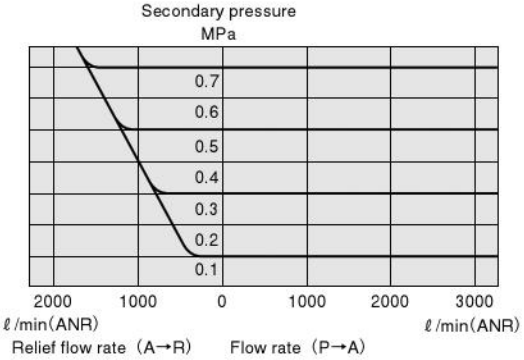
| Basic model | | Input signal |
|---|---|---|
| ETR600 | - | 1<br>2<br>4 |

Mounting base is standard equipment.

- ●Blank — DC1～5(V)
- 1 — DC0～5(V)
- 2 — DC0～10(V)
- 4 — DC4～20(mA)

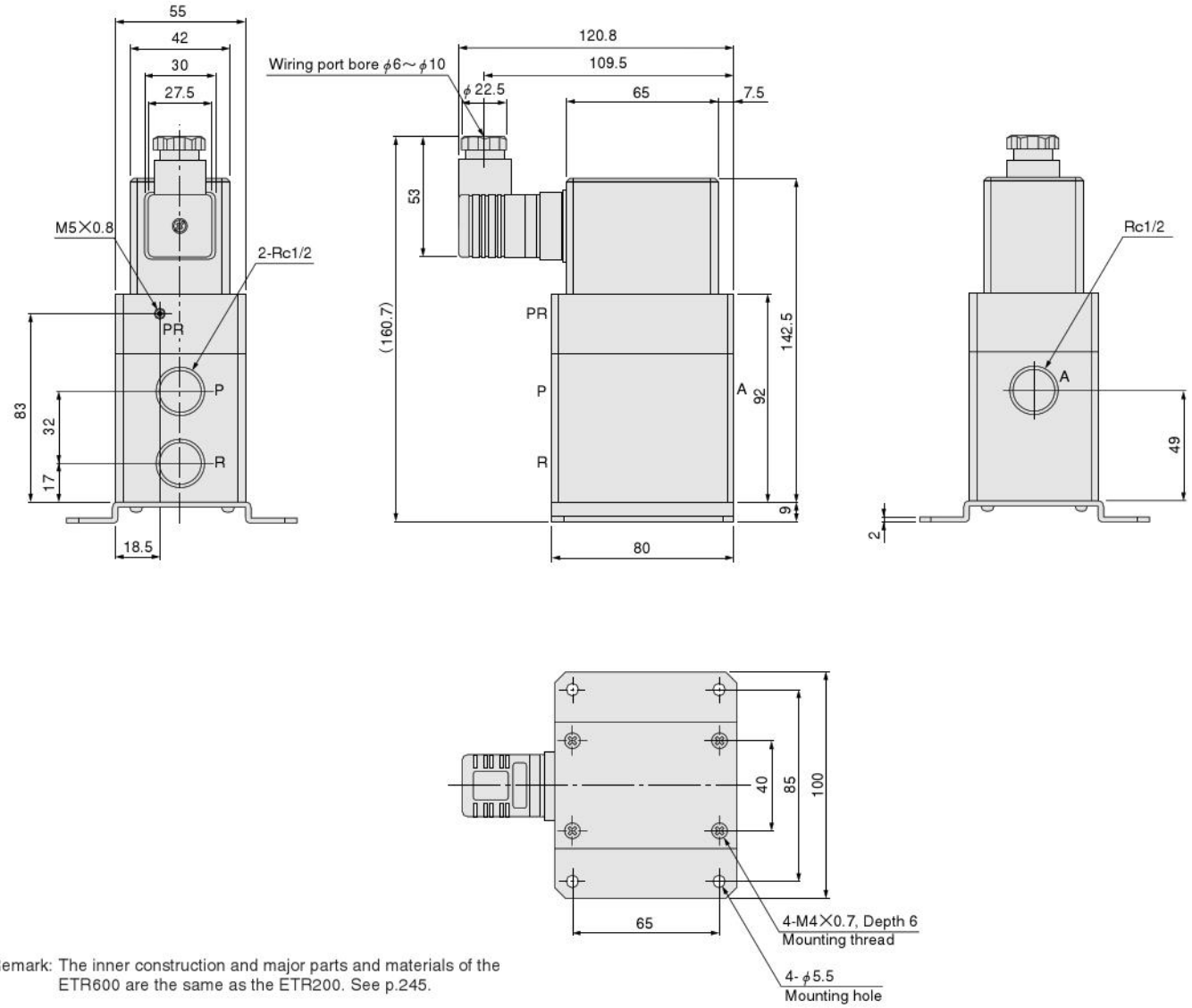
## Flow Rate Characteristics and Relief Characteristics

### ETR600




Remark:Primary pressure is 0.83MPa [120psi.].
1MPa = 145psi. 1ℓ/min = 0.0353ft³/min.

## ETR600




Remark: The inner construction and major parts and materials of the ETR600 are the same as the ETR200. See p.245.

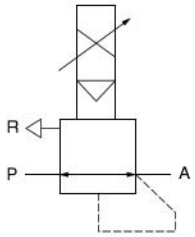
# ETR601

## Specifications

| Item | | | Basic model | ETR601 | ETR601-1 | ETR601-2 | ETR601-4 |
|---|---|---|---|---|---|---|---|
| Media | | | | Air | | | |
| Port size | | | Rc | 1/2 | | | |
| Pressure setting range | | | MPa [psi.] | 0.01～0.2 [1.5～29] | | | |
| Primary pressure range | | | MPa [psi.] | Set pressure ＋0.05 [7] or more, and 0.4 [58] or less | | | |
| Proof pressure | | | MPa [psi.] | 0.6 [87] | | | |
| Input signal | Voltage control method | Voltage | DC [V] | 1～5 | 0～5 | 0～10 | — |
| | | Input impedance | kΩ | 20 | 20 | 42 | — |
| | Current control method | Current | DC [mA] | — | | | 4～20 |
| | | Input impedance | Ω | — | | | 250 |
| Output signal | Output voltage | | DC [V] | 1～5 | | | |
| | Load impedance | | kΩ | 5 or more | | | |
| Power supply | | | DC [V] | 24 (7W)±10% | | | |
| Linearity※ | | | | ±1.0% F.S. | | | |
| Hysteresis※ | | | | ±0.5% F.S. | | | |
| Step response Note | | | s | 2 or less | | | |
| Operating temperature range (atmosphere and media) | | | °C [°F] | 5～50 [41～122] | | | |
| Vibration resistance | | | m/s² [ft./sec²] | 98 [322] or less | | | |
| Wiring | | | | DIN connector (as standard) | | | |
| Mass | | | kg [lb.] | 1.2 [2.65] | | | |

※Values are calculated assuming a pressure full span (F.S.)of 0.2MPa [29psi.].
Note: Secondary pressure values assume at no load conditions.

## Symbol




## Order Codes

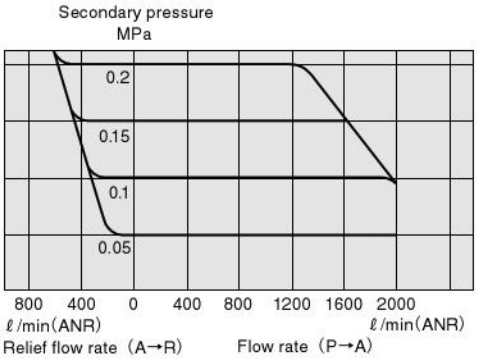
| Basic model | | Input signal |
|---|---|---|
| ETR601 | - | 1<br>2<br>4 |

Mounting base is standard equipment.

- ●Blank — DC1～5(V)
- 1 — DC0～5(V)
- 2 — DC0～10(V)
- 4 — DC4～20(mA)

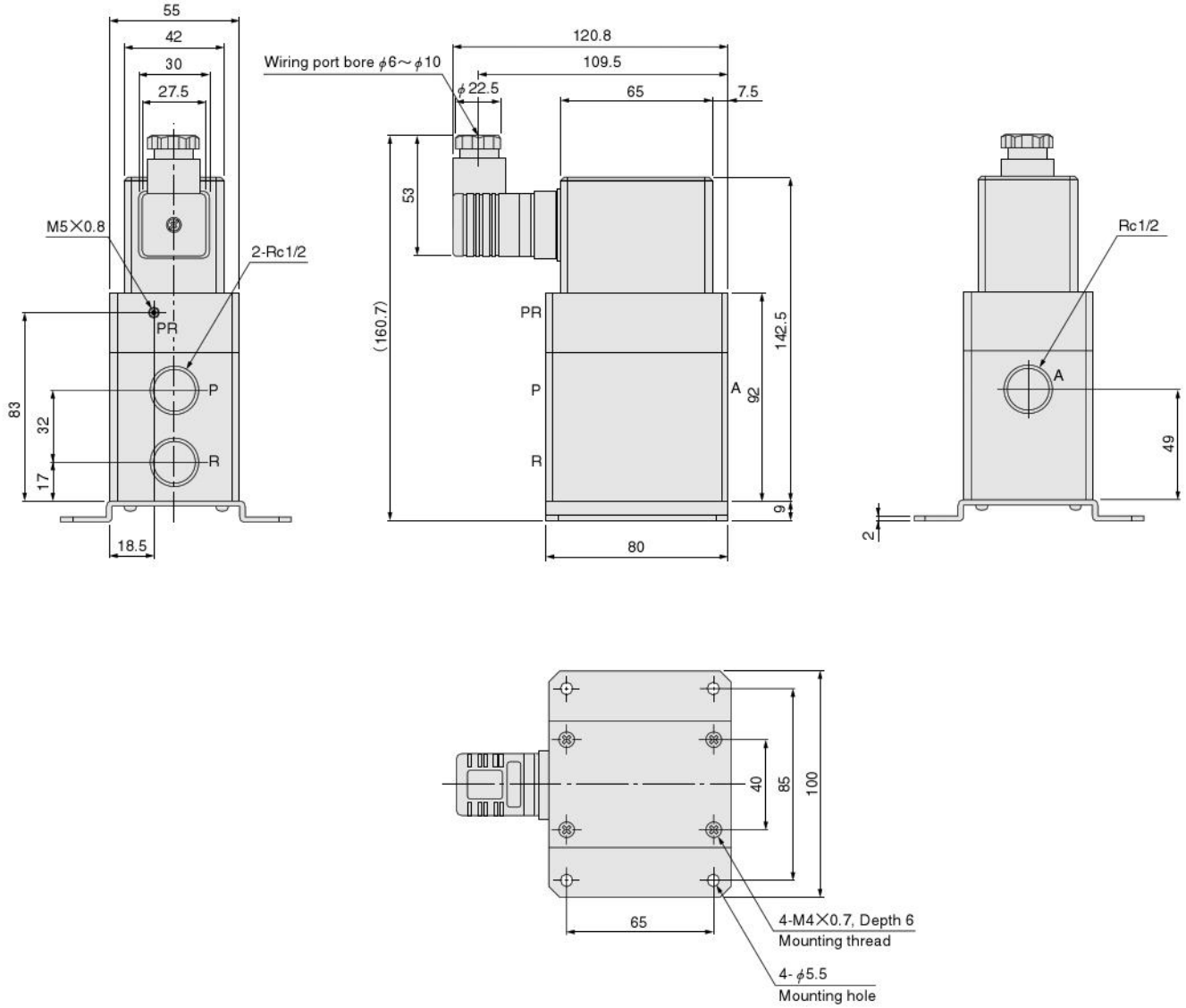
## Flow Rate Characteristics and Relief Characteristics

### ETR601




Remark:Primary pressure is 0.25MPa [36psi.].
1MPa = 145psi. 1ℓ/min = 0.0353ft³/min.

## ETR601




Remark: The inner construction and major parts and materials of the ETR601 are the same as the ETR200. See p.245.