

PRESSURE REDUCING VALVE  
FOR STEAM

# REH20

(DN15 – DN40)

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INSTALLATION, OPERATION  
and MAINTENANCE MANUAL



## **SAFETY**

**The MIYAWAKI – pressure reducing valve REH20 is a direct acting cast steel pressure regulator for use in steam lines. The valve is available in the pressure class PN40.**

**In order to get maximum benefit from this product, be sure to read this manual before installing it.**

The following warnings and cautions are shown at appropriate places in this manual.



Failure to observe this type of precaution may lead to serious injury or death.



Failure to follow this type of precaution can lead to injury or damage to equipment and property.

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# 1 SPECIFICATIONS AND MARKINGS



## WARNING

Be sure not to use this product at higher pressures than the specified maximum allowable pressure (PMA) or at temperatures higher than the specified maximum allowable temperature (TMA).

Main technical specification of the product:

(Check each item to avoid misuse of the product.)

### PN40

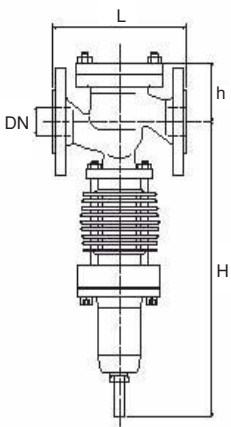
- Maximum allowable pressure (PMA): 4,0 MPa, 40 bar, 580 psig (@50°C, 122°F)
- Maximum allowable temperature (TMA): 400°C, 752°F (@ 2,3 MPa, 23 bar, 334 psig)
- Maximum operating (inlet) pressure (PMO): 2,8 MPa, 28 bar, 406 psig (@250°C, 482°F)
- Maximum operating temperature (TMO): 400°C, 752°F (@ 2,3 MPa, 23 bar, 334 psig)
- Adjustable Secondary (Outlet) Pressure: 0,05 to 1,6 MPa / 0,5 to 16,0 bar / 7.25 to 232 psig  
(For lower or higher secondary pressure setting than indicated contact our office or local representative)
- Maximum Pressure Reducing Ratio: 25 : 1
- Minimum Differential Pressure: 0,05 MPa / 0,5 bar / 7.25 psi
- Connection & Size: Flanged DIN-EN 1092-1 and ASME B16.5 – DN15 – DN200 (½” – 8”)  
(For socket weld, butt-weld or screwed connections contact our office or local representative)
- Flow direction: Shown by an arrow.
- Body material: Cast steel 1.0619

**Check the Pressure-Temperature Rating of the product.**

**Don't use it beyond the pressure and temperature limits of the table !!**

| PN  | Body material | Temperature °C |      |      |      |     |     |     |     |     |     |     |
|-----|---------------|----------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|
|     |               | -10 ...+50     | 100  | 150  | 200  | 250 | 300 | 350 | 400 | 450 | 500 | 530 |
|     |               | Pressure MPa   |      |      |      |     |     |     |     |     |     |     |
| 16  | 0.7040        | 1,6            | 1,6  | 1,6  | 1,5  | 1,4 | 1,3 | 1,1 |     |     |     |     |
| 25  | 0.7040        | 2,5            | 2,5  | 2,4  | 2,3  | 2,2 | 2,0 | 1,8 |     |     |     |     |
| 40  | 1.0619        | 4,0            | 3,7  | 3,5  | 3,1  | 2,8 | 2,6 | 2,4 | 2,3 |     |     |     |
|     | 1.4408        | 4,0            | 3,7  | 3,4  | 3,1  | 2,9 | 2,8 | 2,7 | 2,6 |     |     |     |
| 63  | 1.0619        | 6,3            | 5,9  | 5,5  | 4,9  | 4,5 | 4,1 | 3,8 | 3,6 |     |     |     |
|     | 1.7357        | 6,3            | 6,3  | 6,3  | 6,3  | 6,2 | 5,7 | 5,3 | 5,0 | 4,8 | 3,8 | 2,2 |
| 100 | 1.0619        | 10,0           | 9,3  | 8,7  | 7,8  | 7,1 | 6,4 | 6,0 | 5,8 |     |     |     |
|     | 1.7357        | 10,0           | 10,0 | 10,0 | 10,0 | 9,8 | 9,1 | 8,4 | 8,0 | 7,6 | 6,1 | 3,5 |

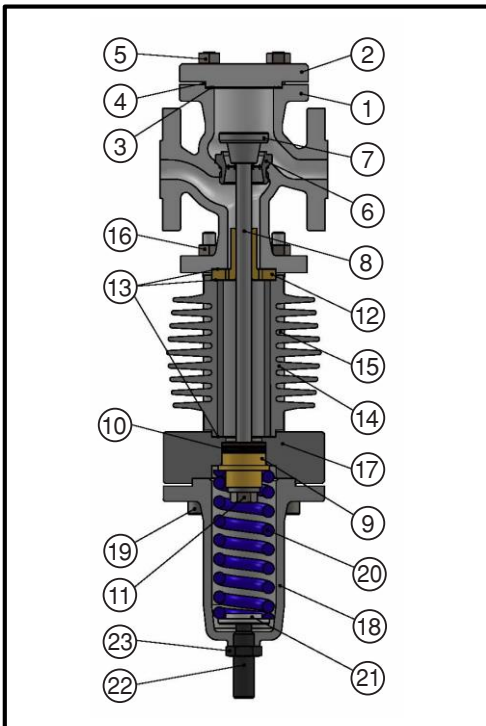
## 2 DIMENSIONS



**Dimensions & Weights**

| Size<br>DN | Dimensions (mm) |          |     |     | Kvs<br>value | Weight (kg) |        |        |
|------------|-----------------|----------|-----|-----|--------------|-------------|--------|--------|
|            | L               |          | H   | h   |              | 0.7040      | 1.0619 | 1.4408 |
|            | PN16-40         | PN63-100 |     |     |              |             |        |        |
| 15         | 130             | 210      | 410 | 82  | 1,8          | 11,4        | 12,0   | 12,0   |
| 20         | 150             | 230      |     | 66  | 3,2          | 11,4        | 12,0   | 12,0   |
| 25         | 160             | 230      |     | 66  | 5,0          | 12,5        | 13,0   | 13,0   |
| 32         | 180             | 260      |     | 81  | 7,9          | 14,5        | 16,0   | 16,0   |
| 40         | 200             | 260      |     | 83  | 13,0         | 16,0        | 18,0   | 18,0   |
| 50         | 230             | 300      | 586 | 100 | 20,0         | 35,0        | 37,5   | 37,5   |
| 65         | 290             | 340      | 615 | 113 | 34,0         | 39,5        | 43,0   | 43,0   |
| 80         | 310             | 380      | 733 | 140 | 51,0         | 52,5        | 58,0   | 58,0   |
| 100        | 350             | 430      | 762 | 154 | 80,0         | 68,0        | 77,0   | 77,0   |
| 125        | 400             |          | 715 | 210 | 130,0        | 150,0       | 155,0  | 155,0  |
| 150        | 480             |          | 720 | 235 | 180,0        | 180,0       | 190,0  | 190,0  |
| 200        | 600             |          | 950 | 285 | 320,0        | 330,0       | 385,0  | 385,0  |

## 3 CONSTRUCTION DETAILS



| Parts-No. | Description    | Parts-No. | Description       |
|-----------|----------------|-----------|-------------------|
| 1         | Body           | 14        | Cooling cylinder  |
| 2         | Valve cover    | 15        | Bolt              |
| 3         | Gasket         | 16        | Hexagon nut       |
| 4         | Stud bolt      | 17        | Control housing   |
| 5         | Hexagon nut    | 18        | Bonnet            |
| 6         | Valve seat     | 19        | Socket head screw |
| 7         | Cone           | 20        | Pressure spring   |
| 8         | Cone rod       | 21        | Spring plate      |
| 9         | Control piston | 22        | Adjusting screw   |
| 10        | O-Ring         | 23        | Hexagon nut       |
| 11        | Locking screw  |           |                   |
| 12        | Guide sleeve   |           |                   |
| 13        | Gasket         |           |                   |

## 4 INSTALLATION



### WARNING

Pay very careful attention when working in hazardous environments. There is a risk of explosion and the possibility of dangerous gases leaking. Always check whether the pipeline contains flammable, high pressure or high temperature materials before starting to work.

- Make sure that isolation valves are installed on both the upstream and downstream lines.



### CAUTION

Before installing the product, open both isolation valves and the bypass valve, if one exists, to blow out any debris or dirt inside the pipeline. After blowing out the line, before starting to work, close the isolation valves and allow time for the temperature to drop to a safe working temperature.

- When installing the product, be sure to leave clearance for maintaining it.

### Installation Process

- ❖ Remove the dustproof seals covering both connections (if existing).
- ❖ Check the flow direction indicated on the side of the body.
- ❖ The pressure reducing valve should be installed in a **horizontal pipe line with the cooling cylinder (No. 14) turned downwards**, with suitable bypass and isolating valves.
- ❖ To prevent water hammer and vibrations caused by incoming condensate it is necessary to install a steam trap before the pressure reducing valve.
- ❖ If you expect the average flow velocity to rise above 30m/sec, it is recommended to increase the size of the pipe on the downstream side.
- ❖ In case the pressure reducing ratio exceeds 25 : 1 , the pressure reduction is to be made in two steps. In that case, a distance of at least 3 meters has to be kept between the two pressure reducing valves.
- ❖ The distance between the pressure reducing valve and a solenoid valve must be of at least 3 meters, if a solenoid valve with on/off function is installed upstream or downstream of the pressure reducing valve. Otherwise, the pressure reducing valve may not function in a stable way while the valve is opening or closing.
- ❖ If a control valve is installed downstream of the pressure reducing valve, the distance between the pressure reducing valve and the control valve must be of at least 2 meters. The disregard of this recommendation may cause an unstable function of the pressure reducing valve as well.
- ❖ To prevent an unusual rise of the secondary pressure a safety valve has to be installed to protect the steam consuming equipment.



- ❖ The pipe in which the pressure reducing valve is installed, must be fixed so that the weight and the vibration of the pipe do not directly influence the pressure reducing valve.
- ❖ Blow down the piping that leads to the PRV's inlet from any dirt and scale before the first start-up of the pressure reducing valve. This is particularly important in case of the start-up of the pressure reducing valve after a long time of shut-down.
- ❖ Before a long shut-down of the pressure reducing valve the condensate must be completely discharged from the pipe. Furthermore the stop valves before and behind the pressure reducing valve have to be closed.
- ❖ The distance between the pressure reducing valve and a downstream pressure gauge should be of at least 1 meter.
- ❖ The length of the straight section of the upstream piping and the length of the straight section of the downstream piping should be each at least 10 pipe diameters.
- ❖ The steam trap and the pressure reducing valve should both be protected with a strainer. The strainer should be installed in such a way that the screen will point sideways to avoid the accumulation of condensate in the area of the screen.
- ❖ If you insulate the pressure reducing valve, do not insulate the cooling cylinder !!! The insulation of the cooling cylinder prevents the built-up of condensate inside the cooling cylinder, which is protecting the O-Rings. If there will be no condensate inside the cooling cylinder, the O-Rings may be damaged !

## Adjustment

**The pressure reducing valve is usually preadjusted at the factory in accordance with the instructions of the customer. As the real steam consumption and operating pressure may differ a readjustment after installation under operating conditions is recommendable.**

- After the installation and before the adjustment of the pressure reducing valve close the stop valves before and behind the pressure reducing valve and open the bypass to remove all condensate and dirt from the pipe.
- Close the bypass valve.
- Open the stop valve downstream slightly. Then open the stop valve upstream slowly.
- Now, open the stop valve downstream completely and check the set pressure.
- To readjust the downstream pressure release the locking nut (No. 23). To increase the downstream pressure turn the adjusting screw (No. 22) clockwise until the required pressure is reached. To reduce the downstream pressure turn the adjusting screw counterclockwise until the required pressure will be reached. After setting the downstream pressure, tighten the locking nut again.
- In case of a shut-down of the equipment the stop valve downstream must be closed at first. The stop valve upstream is to be closed as a second step. When the equipment will start up again open the stop valve downstream at first and then open the stop valve upstream slowly.

## 5 MAINTENANCE



### CAUTION

- When replacing parts, make sure the replacement parts are supplied by Miyawaki.
- Assemble and disassemble the valve after the internal pressure becoming the same as the atmospheric pressure, and the surface temperature of the valve dropping enough to prevent burning and serious injuries.

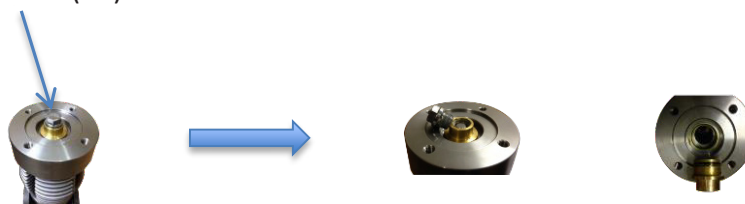
- 5.1. Remove the PRV from the pipe line
- 5.2. Fix the valve in a vice with the spring bonnet and adjust screw showing upwards.
- 5.3. Untighten the locking nut (23) and unscrew it. Then turn the adjusting screw (22) counterclockwise until the screw is moving easily (no pressure exerting to the spring).
- 5.4. Untighten the 4 socket head screws (19) and remove them. Now take off the bonnet (18) from the valve.
- 5.5. Remove the Spring plate (21) and the spring (20) from the valve.



- 5.6. Remove the valve from the vice and fix it again so that the flanges are showing upwards. Untighten the hexagon nuts (5 - wrench size 17 mm) and remove the valve cover (2) from the body. Remove also the cover gasket (3) and replace it by a new one.

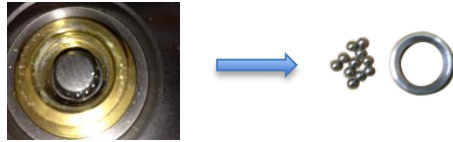


- 5.7. Now again turn the valve to the former position when the cooling cylinder is showing upwards. Untighten the locking screw with an impact driver (size 19 mm). After loosening the locking screw (11) screw it out.



5.8. **Caution !!**

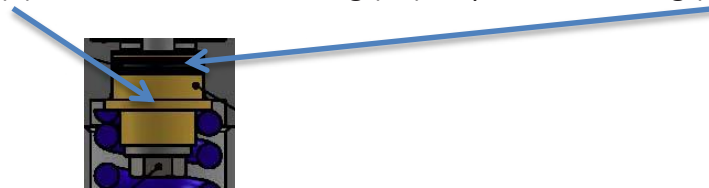
For DN15-DN40 (1/2" - 1 1/2") there is placed a small metal ring below the locking screw. Take it out. Under the metal ring there are located small balls (12 pcs.). They are keeping the cone rod (8) in its position. Remove these small balls carefully by turning the valve 180°. Pay attention that the balls will not be lost.



5.9. Now remove the cone rod (8) from the valve body.



5.10. Remove the control piston (9) from the control housing (17). Replace the O-Ring (10) by a new one.



5.11. *Replacement of the gaskets between the cooling cylinder and body and between the cooling cylinder and control housing*

Untighten the hexagon nuts (16 - wrench size 15 mm) and unscrew them. Take off the valve body from the cooling cylinder (14) and remove the cooling cylinder from the control housing (17). Take off the guide sleeve (12) from the cooling cylinder. Check and clean the openings in the guide sleeve. Replace the gaskets (13 – 3 pcs.) by new ones.

5.12. Now reassemble the valve in the opposite way.



## 6 TROUBLESHOOTING

| Problem                                                            | Cause                                                                                                         | Solution                                                                           |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| The downstream pressure doesn't meet the set value. It is too low. | Pressure was set incorrectly.                                                                                 | Turn the adjusting screw to correct the setting of the secondary pressure.         |
|                                                                    | The upstream stop valve is closed .                                                                           | Open the valve.                                                                    |
|                                                                    | The downstream stop valve is closed .                                                                         | Open the valve.                                                                    |
|                                                                    | The pressure gauge does not work properly.                                                                    | Replace the pressure gauge.                                                        |
|                                                                    | The steam amount upstream is too small.                                                                       | Check the steam amount by using a bypass valve.                                    |
|                                                                    | Insufficient capacity of the pressure reducing valve. The size of the valve is too small.                     | Check the real steam amount and the capacity of the valve.                         |
|                                                                    | The screen of a strainer installed on the inlet side of the pressure reducing valve is plugged.               | Clean the screen.                                                                  |
|                                                                    | The O-Ring No.10 is leaking.                                                                                  | Replace by a new one.                                                              |
|                                                                    | The gasket of the valve cover (3) is leaking.                                                                 | Replace by a new one.                                                              |
| The downstream pressure exceeds the set pressure.                  | Pressure was not set correctly.                                                                               | Turn the adjust screw to correct.                                                  |
|                                                                    | Inlet and outlet were installed the wrong way round.                                                          | Install correctly according to the flow direction.                                 |
|                                                                    | The downstream stop valve is closed.                                                                          | Open the stop valve.                                                               |
|                                                                    | The surface of the seat and/or valve is damaged. The valve cannot close and regulate the downstream pressure. | Check the valve and seat and judge which parts must be replaced.                   |
|                                                                    | The openings in the guide sleeve (12) are plugged. Steam cannot enter the cooling cylinder.                   | Disassemble the valve and clean the guide sleeve.                                  |
|                                                                    | The gaskets No. 13 are leaking.                                                                               | Replace by new ones.                                                               |
| The secondary pressure is fluctuating.                             | The inlet pressure is fluctuating.                                                                            | Check the operating conditions on the inlet side.                                  |
|                                                                    | The steam consumption is fluctuating strongly.                                                                | Check the downstream operating conditions.                                         |
|                                                                    | The steam consumption is exceeding the capacity of the valve from time to time.                               | Check the operating conditions and select another size of the valve, if necessary. |

## **7 WARRANTY**

### **7.1 Warranty period**

The warranty period shall last 18 months from the date of product delivery, but not more than 12 months after the date of installation.

### **7.2 Details of the warranty**

If the product stops working correctly within the warranty period, we will repair or replace the product free of charge if the cause of the trouble is not one of the following items:

- The precautions described in this manual were not observed.
- User's errors or mistakes such as an inappropriate installation or incorrect handling, or an excessively large impact caused by dropping
- Problems caused by devices or equipment other than ours, or a disallowed use environment
- When a repair or modification has been performed by anyone else than us or people who are authorized to make such repairs
- Intrusion of salt or other substances that promote significant rust or corrosion or problems from fluids that contain the same substances
- Extremely worn packing, gaskets, or other parts
- Attachment or accumulation of foreign objects in the pipe, such as dust and scale
- Problems from fires, natural disasters, or other force majeure which is not our responsibility

### **7.3 Warranty limitation**

The remedy available under the warranty shall not exceed the sales price of the products delivered, for any cause whatsoever.

## ★ Guidance for reading special product name

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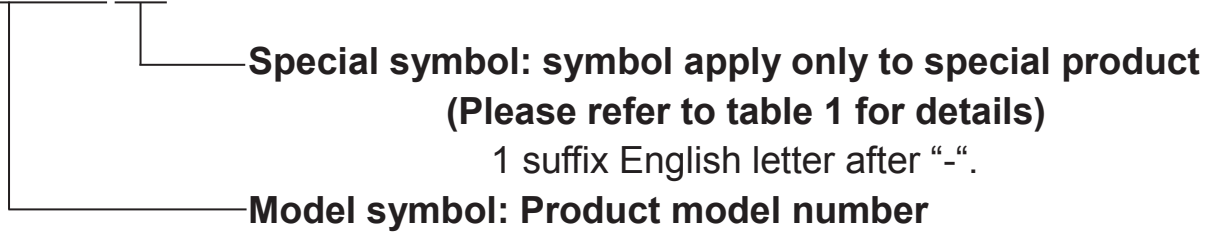


Table 1 Symbol description

| Suffix | Special contents                                                                    |
|--------|-------------------------------------------------------------------------------------|
| A      | Approved high-pressure gas trap                                                     |
| C      | Blow valve attached & countermeasure against scale                                  |
| K      | Change of gasket                                                                    |
| L      | Special face to face dimension                                                      |
| M      | Change of parts material                                                            |
| P      | Change of operating pressure                                                        |
| R      | Change of screen mesh or countermeasure against scale                               |
| T      | Parts are standards, and the specification (operating temp, press. etc.) is changed |
| V      | Change of air vent                                                                  |
| X      | Other than mentioned above or complex of special contents above                     |

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- For any questions about the product that you purchased or about the details in this user's manual, please contact the following.
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  - Some special specifications of the product you have, may found to be different from the ones in the user's manual. If you have any question, please contact MIYAWAKI, our local authorized agent, or the place where you purchased.
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**INTERNATIONAL SALES DEPT.**

2-1-30, Tagawakita, Yodogawa-ku, Osaka, 532-0021, Japan

Tel: +81-6-6302-5549

www.miyawaki.net e-mail: export@miyawaki-inc.co.jp

EU Importer and Authorized representative:



**MIYAWAKI GmbH**

Birnbaumsmühle 65, 15234 Frankfurt (Oder), Germany

Tel: +49-335-4007-0097

www.miyawaki.net e-mail: info@miyawaki.de

China Importer and Authorized representative:



**MIYAWAKI WEST Co.,ltd**

Room 1705, No.1, Building, No.311, Yanxin Road, Huishan Economic Development Zone,  
Wuxi, Jiangsu, China

Tel: +86-510-8359-5125

www.miyawaki-inc.com.cn e-mail: mywkwest@miyawaki-inc.com.cn

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