IWAKI HI-TECHNO PUMPS

IX-B

Solutions for chemical handling applications
High output, high precision, high controllability
High efficiency brushless motor driven diaphragm type metering pumps

Hi-Techno Pump IX-B

Iwaki Hi-Techno Pump IX-B series is a brushless DC motor driven diaphragm type metering pump. The flow control range covers a wide range from 7.5 mL / h to 45 L / h, and various automatic control is also possible. Utility has also been enhanced, including support for highly flexible installation methods and various connection methods.
Unique Motor Design

The IX-B pumps use brushless DC (BLDC) motors to control the pump stroke speed. Many similar metering pumps use a stepper-motor based design, however the efficiency of the BLDC motor provides a higher power output in a smaller package and allows the IX-B pumps to achieve 45L/H discharge flowrates.

Degassing valve unit Design (Patent Pending)

One of the most advantageous features of the IWAKI IX Series Metering Pumps is the excellent degassing ability due to their proprietary valve unit design. The IX-B pumps retain this feature creating an entire pump line that will not gas lock and has no priming issues!

Flexible Installation (Patent Pending)

The IX-B Pumps have been designed to be installed into various locations. The control unit is mounted on the pump unit by default and can easily be repositioned by customers on-site. The control unit can also be relocated and wall mounted without any extra parts required.

Improved Chemical Resistance

Liquid End materials of construction remains PVDF, a highly chemical resistance material, and a choice of elastomers (FKM or EPDM). New is a non-elastomer, solid PTFE diaphragm providing optimal resistance to chemical gas penetration and better all-around chemical resistance.

High Turndown Ratio and High Accuracy

The turndown ration of the IX-B series improves to 1000:1 via stroke rate control by the BLDC motor. The pumps are 1% repeatable across most of the control range. Minimum flow on the IX-B series is 0.0075L/H.

LED Status Bar

A large LED status bar provides simple visual indication of operating conditions at a glance. It is easily visible to see the pump status at a distance or in dark locations.

Flexible Connections

Tubing, Threaded, Flanged or Union (Made by George Fisher) connections are available as standard options providing easy installation for any application.

Safety design

Standard to all models is a diaphragm rupture detector, protecting users and the environment. Also, a detector for abnormal operation protects the pipework in case of an accidental high discharge pressure caused by clogging or improper operation. A drain hole also ensures safe operation even when the diaphragm is damaged.

Note: In some cases it may not be able to detect sudden rises in pressure occurring in shut off operation. If the piping or machinery in use has low pressure resistance, install a separate safety valve.
Construction and materials

Pump identification

Performance chart
Specifications

Pump

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity L/h</th>
<th>Max. pressure MPa</th>
<th>Power consumption W</th>
<th>Current A</th>
<th>Connection</th>
<th>Mass kg</th>
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<td>17</td>
<td>0.4</td>
<td>1/2NPT</td>
<td>3.5</td>
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<td></td>
<td></td>
<td>1.7</td>
<td>17</td>
<td>0.4</td>
<td>G3/4</td>
<td>3.5</td>
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<td></td>
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<td>17</td>
<td>0.4</td>
<td>Tube</td>
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<td>Tube</td>
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<td>1.0</td>
<td>17</td>
<td>0.4</td>
<td>Flange</td>
<td>3.7</td>
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<td>R1/2</td>
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<td>0.6</td>
<td>19</td>
<td>0.5</td>
<td>1/2NPT</td>
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<td>0.6</td>
<td>19</td>
<td>0.5</td>
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<td>19</td>
<td>0.5</td>
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<td>0.6</td>
<td>19</td>
<td>0.5</td>
<td>Flange</td>
<td>3.9</td>
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<td></td>
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<td>0.4</td>
<td>19</td>
<td>0.5</td>
<td>1/2NPT</td>
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<td>19</td>
<td>0.5</td>
<td>G3/4</td>
<td>3.7</td>
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<td></td>
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<td>0.4</td>
<td>19</td>
<td>0.5</td>
<td>Tube</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.4</td>
<td>19</td>
<td>0.5</td>
<td>Flange</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Note1: The maximum settings for pulse operation, batch operation, and interval batch operation are the flow rates per stroke corrected by calibration. Also, the change rate of the setting value per pulse is the flow rates per stroke corrected by calibration.

Note2: Pump operation or pump stop can be selected at contact input.

Note3: The above is the value at rated voltage, ambient temperature and clear water.

Controller

- **MAN (Manual)**
  - Use the UP (↑) and DOWN (↓) keys to set a flow rate.

- **EXT**
  - Analog fixed operation: 4-20, 0-20, 20-0 mA (Proportional to the discharge rate)
  - Analog variable operation: Programmable 2-point setting (input signal DC 0–20 mA, proportional to the discharge rate)
  - Pulse control: 0.00625mL/PLS – 15.000000mL/PLS (IX-B007), 0.00250mL/PLS – 60.000000mL/PLS (IX-B030), 0.00075mL/PLS – 90.000000mL/PLS (IX-B045)
  - Batch control: 0.625mL/PLS – 15.000000mL/PLS (IX-B007), 1.250mL/PLS – 30.000000mL/PLS (IX-B015), 2.500mL/PLS – 60.000000mL/PLS (IX-B030), 3.750mL/PLS – 90.000000mL/PLS (IX-B045)
  - Interval batch control: 2.500mL/PLS – 60.000000mL/PLS (IX-B030), 3.750mL/PLS – 90.000000mL/PLS (IX-B045)

- **Monitors**
  - LCD: 16 digits × 2 lines, backlit character LCD
  - LED: White: When the pump is stopped etc., Green: During pump operation etc., Orange: When entering Pre-Stop etc., Red: When alarm such as abnormal pressure detection etc.

- **Operation**
  - Keypads: (Q)Start/Stop, MENU, ESC, (↑)Up, (↓)Down, (←)Left and (→)Right keys

- **Input**
  - STOP/Pre-Stop: Non-voltage contact or open collector
  - AUX: Non-voltage contact or open collector
  - Interlock: Non-voltage contact or open collector
  - Analogue: 0 - 20 mA (Internal resistance is 200 Ω)
  - Pulse: Non-voltage contact or open collector Max pulse frequency is 100 Hz. (Pulse ON: 5 msec or more)

- **Output**
  - Alarm1 (OUT1): Non-voltage contact (mechanical relay), AC 250 V, 3 A (resistive load)
  - Alarm2 (OUT2): Non-voltage contact (photo MOS relay), AC/DC 24 V, 0.1 A (resistive load)
  - External power supply: DC12V 30 mA or less
  - Current: DC 0–20 mA, Two-point setting (allowable load resistance: 300 Ω)

Note: Use below the maximum allowable pressure of a connected tube.

- Liquid temperature range: 0 - 50 °C (No viscosity change, Non freezing, No slurry)
- Allowable voltage fluctuation: within ± 10% of the rated voltage
- Operating ambient temperature: 0 - 50 °C
- The pressure at which the abnormal pressure detection function operates is 1.3 to 2 times the maximum discharge pressure
- Operating humidity range: 30 - 90%RH (Non condensing in the controller)

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Points to be observed in pump installation and piping

IX Series Hi-Techno pumps are positive-displacement, reciprocating pumps. Reciprocating pumps generate pulsation in the suction and discharge piping. Special considerations, (different from the ordinary centrifugal pumps), should be given to this point when planning the pump installation and piping.

- **Prevention of pipe vibration**

  Discharge side inertial resistance $P_{id} < 0.1 \, \text{MPa}$
  - $P_{id}$: Inertial resistance on discharge side

  Inertial resistance means the pulsed impact force generated by the flow just upon entering discharge stroke. It is a phenomenon particular to a reciprocating pump which is generated as a result of the sudden application of acceleration to the liquid in the discharge piping. The condition $P_{id} < 0.1 \, \text{MPa}$ is given above as an approximate standard. If $P_{id}$ becomes 0.1 MPa or higher, vibration on the pipe is generated. So measures should be taken to cope with the influence of vibration on the pump, too.

  \[
  \text{Inertial resistance} = \frac{P_{id} \times \text{Specific gravity} \times \text{Pipe length} (\text{m}) \times (\text{Pump I.D.} \div \text{Pipe I.D.})}{1000}
  \]

  Measures
  1. Install pulsation prevention device (air chamber).
  2. Enlarge the diameter and shorten the length of the discharge piping.

- **Prevention of overfeeding**

  Pump differential pressure $> \text{Inertial resistance } P_i$
  - $P_i$: The larger one of the suction side or the discharge side

  Overfeeding means excessive flow of the liquid due to abnormal functioning of the check valve caused by pulsation of the liquid in the piping. Check carefully in case the differential pressure is low and in case the piping pulsation of the liquid in the piping. Check carefully in case the differential pressure is low and in case the piping is too long even with the differential pressure value at 0.03 MPa.

  Measures
  1. Install air chamber.
  2. Install back pressure valve.

**Performance**

<table>
<thead>
<tr>
<th>Model</th>
<th>Discharge line inertia resistance $P_{id}$</th>
<th>Suction line inertia resistance $P_i$</th>
<th>NPSHr</th>
<th>Transportable viscosity Standard valve</th>
<th>Viscous valve</th>
<th>Priming lift</th>
<th>Applicable chamber Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>IX-B007</td>
<td>~7.50 8.3x10^-2 100 8.3x10^-2</td>
<td>0.07 MPa</td>
<td>—</td>
<td>1000 mPa•s</td>
<td>1 m</td>
<td>0.5 L</td>
<td>1.0 L</td>
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<tr>
<td>IX-B015</td>
<td>~7.50 8.3x10^-2 100 8.3x10^-2</td>
<td>0.07 MPa</td>
<td>100 mPa•s 1000 mPa•s 1000 mPa•s</td>
<td>2 m</td>
<td>0.5 L</td>
<td>1.0 L</td>
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<td>~7.50 8.3x10^-2 100 8.3x10^-2</td>
<td>0.06 MPa</td>
<td>100 mPa•s 1000 mPa•s 1000 mPa•s</td>
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<td>0.5 L</td>
<td>1.0 L</td>
<td></td>
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<tr>
<td>IX-B045</td>
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<td>0.06 MPa</td>
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<td>0.5 L</td>
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<td>IX-B007Tube</td>
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<td>0.07 MPa</td>
<td>—</td>
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<td>0.5 L</td>
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<tr>
<td>IX-B030Tube</td>
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<td>0.06 MPa</td>
<td>100 mPa•s 1000 mPa•s 1000 mPa•s</td>
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<tr>
<td>IX-B045Tube</td>
<td>~7.50 8.3x10^-2 100 8.3x10^-2</td>
<td>0.06 MPa</td>
<td>500 mPa•s 1000 mPa•s 1000 mPa•s</td>
<td>2 m</td>
<td>0.5 L</td>
<td>1.0 L</td>
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</tr>
</tbody>
</table>

- **Prevention of suction failure**

  $\text{NPSHr} > \text{NPSHr}$
  - $\text{NPSHr} = \text{Pa} - \text{Pv} \pm \text{Phs} - \text{Pis} \times \text{MPa}$

  *Or Pfs : whichever is the larger. (NPSH : Net positive suction head)

  If NPSH is not sufficient, the pump may be damaged by the blow-break or cavitation generated under such conditions.
  - **NPSHr**: Absolute NPSH (MPa)
  - **NPSHr**: Required NPSH (value particular to the pump) (MPa)
  - **Pa**: Absolute pressure onto the tank liquid surface (MPa)
  - **Pv**: Liquid vapour pressure (MPa)
  - **Phs**: Pressure caused by the height of the suction side (MPa)
  - **Pis**: Inertial resistance on the suction side (MPa)
  - **Pfs**: Piping resistance on the suction side (MPa)

  See the table below for NPSHr, inertia resistance(Pi) and applicable chambers.

  - Compressed air dissolves in solutions in a chamber. Supply air into the chamber periodically, or its performance may reduce. It takes longer time for air to be compressed enough to deliver liquid as a flow rate gets lower.

  - **Pump/Piping protection**

  Install a relief valve to protect the pump and piping from overpressure.
### Dimensions (mm)

**Connection: R/N (R Thread/NPT Thread)**

**Connection: G (G Thread)**

**Connection: F (Flange)**

**Connection: T (Tube)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Connection</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<td>—</td>
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<td>—</td>
<td>270</td>
<td>296</td>
<td>97.5</td>
<td>289</td>
</tr>
</tbody>
</table>

### Optional accessories

1. **DIN 5-pin connector cable**  
   External control signal cable (5m)  
   (External control signal input)  
   Selection No. IX0018

2. **DIN 5-pin connector cable**  
   STOP signal and AUX signal cable (5m)  
   (STOP signal input)  
   Selection No. IX0019

3. **DIN 4-pin connector cable**  
   Output signal cable (5m)  
   (Signal output)  
   Selection No. IX0020

4. **Profinet converter**  
   Profinet communication
Caution for safety use:
Before use of pump, read instruction manual carefully to use the product correctly.

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