

IWAKI
HI-TECHNO
PUMPS

IX-C



A new generation of advanced metering



pump technology!

Highly precise control offers a solution for every chemical dosing application. Iwaki's IX Series are digitally controlled direct-drive diaphragm pumps. Years of experience in high-end motor technology result in extremely accurate and energy efficient metering pumps with high resolution. The IX Series meet today's demand for automated chemical delivery in industries from water treatment to chemical process.

750:1

Turn down ratio

1000 mPa·s

Max. viscosity

±1%

High accuracy

UP TO 70%

Energy savings

1 MPa

Degassing ability



IX-C150S6FJ-TB-E

IX-C150S6R-TB-E



IX-C060S6FJ-TB-E

IX-C060S6R-TB-E

C150

Capacity: 0.2 - 150 L/h

C060

Capacity: 0.08 - 60 L/h

SUS head

Precise chemical dosing operation and energy savings

Advanced mechanism assists eco-friendliness



A wide turn down ratio

A control motor adjusts the discharge and suction speeds to meet a wide turndown ratio of 750:1.

C150 Capacity
0.2 - 150L/h

C060 Capacity
0.08 - 60L/h



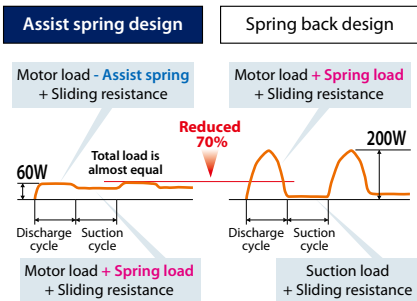
IX-C150TCR-TB-E



IX-C060TCR-TB-E

Energy savings and Eco-friendly

With the use of helical gears and spring assistance, power consumption is reduced by 70% compared to the standard spring back design.



Precise chemical dosing operation

The valve design maintains precise dosing at any flow rate whilst the motor regulates discharge and suction speeds to achieve high accuracy (+/-1%) all with a cost effective design from a mechanically driven diaphragm pump.

Efficient pump head design is incorporated with high compression

Fast priming without air locks is achieved with a high compression ratio due to a fixed (maximum) stroke length.

Maximum suction lift:

2m

With an open discharge line and dry valve condition.

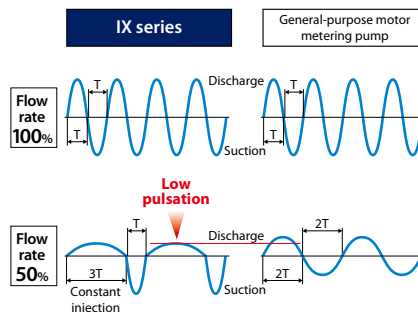
Degassing ability:

C060: 1.0 MPa, C150: 0.4 MPa

With a standard tubing layout.

Constant injection with low impact

Flow control via discharge speed adjustment (with a fixed suction speed) assures constant injection at any flow rate. This system also reduces impact (inertia force) and load to the discharge line.



Viscous liquid transfer

Standard IX series is capable of pumping liquid viscosities of up to 1000mP·a. Contact us for higher viscosity applications.

Compliant to world standards

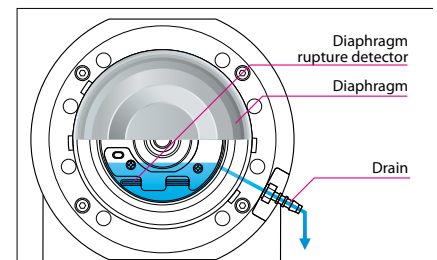
One of the IX features is multi-voltage operation (100-240VAC) compatible worldwide. Compliant to UL, CE standards.

IP65

Drive and control units are sealed separately to an IP65 enclosure.

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.



Easy operation on a Variety of applications

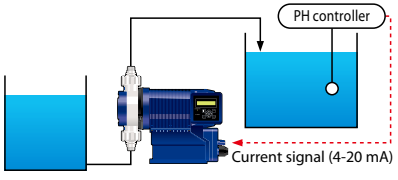


Automatic control

The IX can run in analogue, pulse, batch or interval batch modes.

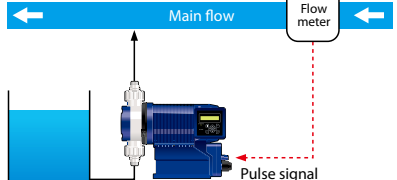
Analogue operation

The pump operates in response to an input, (4-20mA) from a controller.



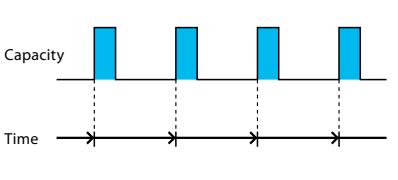
Pulse operation

When combined with a flow meter or contact head water meter, the IX pump gives a paced dose rate in proportion to the main flow rate.



Interval batch operation

Timed operation is possible with simple pump programming via the keypad and is initiated with a pulse signal.



Cavitation prevention

When pumping viscous liquids, suction stroke speed can be varied to avoid developing cavitation.

(Programmable suction speed: 75%, 50% or 25% of the normal speed)

Degassing

Keypad operation or the contact signal (AUX) runs the pump at maximum spm in any mode for degassing.

Calibration

The pump is calibrated prior to shipment, however we recommend recalibration when installed in your system due to pipe layout and liquid properties.

Operation history

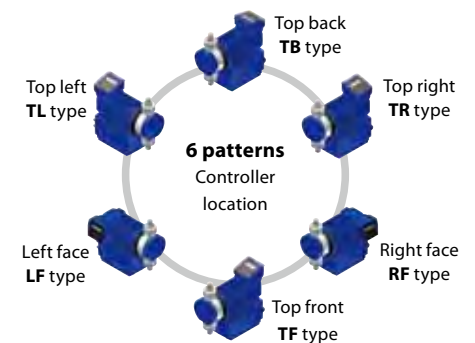
Controller memory logs the total power connection time, operating time, number of strokes and number of power-up events.

Maintenance mode

This operation makes it possible to move the diaphragm forward with partial pump stroke operation facilitating diaphragm replacement.

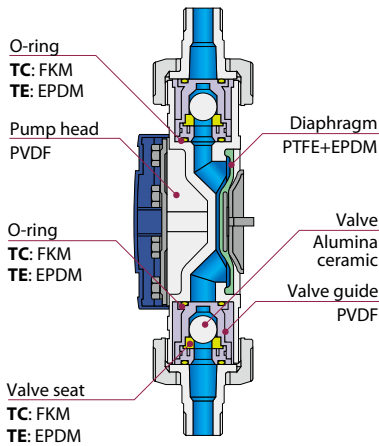
User friendly design

The controller position can be selected from 6 mounting positions for operator convenience. Also, a character LCD with LED backlight and optimized keypad positions assist easy operation.



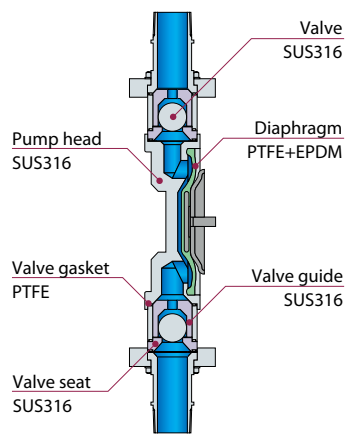
Construction and materials

IX-C150TC, IX-C150TE



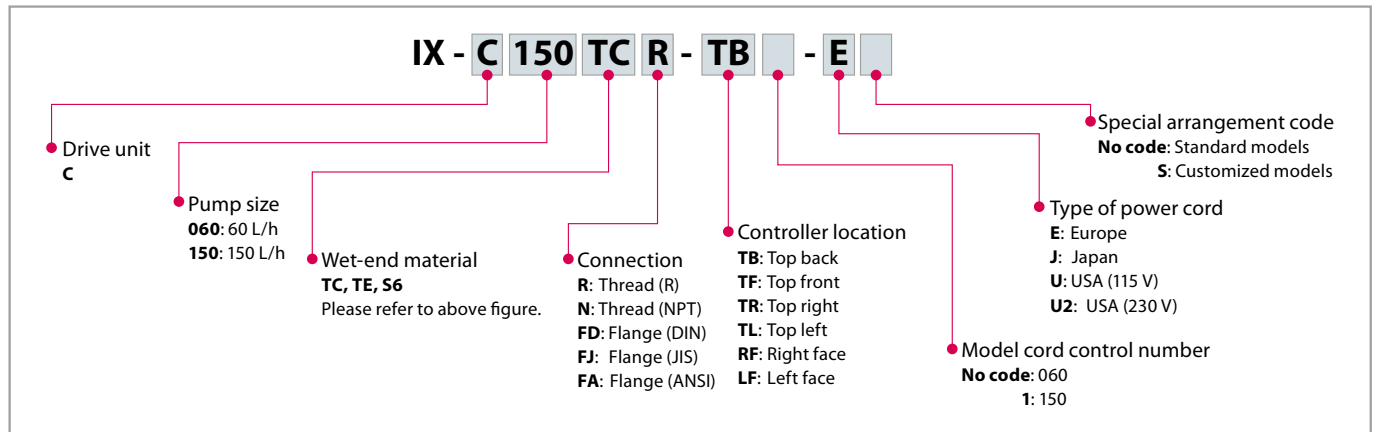
IX-C150TCR-TB-E

IX-C150S6



IX-C150S6R-TB-E

Pump identification



Specifications of pump









| Model | Capacity L/h | Maximum pressure MPa | Maximum viscosity mPa·s | Liquid temperature range °C ^{Note 2} | Connection | | Power consumption W | Current draw A | Mass kg |
|-----------------------------|-----------------|-------------------------|----------------------------|--------------------------------------------------|------------|------------------------------------------------------------|------------------------|-------------------|------------|
| | | | | | Thread | Flange | | | |
| IX-C060(TC/TE) | 0.08 - 60 | 1.0 | 1000 | 0 - 50 | R: R1/2 | FJ: JIS10K 15A FD: DIN PN10 DN15 FA: ANSI 150Lb 1/2" | 62 | 0.8 | 9 |
| IX-C060S6 ^{Note 1} | | | | 0 - 80 | N: 1/2NPT | | | | 11 |
| | | | | | | | | | 12 |
| IX-C150(TC/TE) | 0.2 - 150 | 0.4 | 1000 | 0 - 50 | R: R3/4 | FJ: JIS10K 20A FD: DIN PN10 DN20 FA: ANSI 150Lb 3/4" | 62 | 0.8 | 9 |
| IX-C150S6 ^{Note 1} | | | | 0 - 80 | N: 3/4NPT | | | | 11 |
| | | | | | | | | | 13 |

- The max. discharge capacity is obtained in operation with clear water at ambient temperature and the max. discharge pressure. It gets higher as the pressure gets lower.
- Operating temperature range: 0-50 °C (Indoor use only)
- Operating humidity range: 0-90%RH (Non condensing in the controller)
- Contact us for other plumbing connections
- For the IX-C150S6, a target flow rate may not be met when it is set to 1.0 L/h or below. For the IX-C060S6, a target flow rate may not be met when it is set to 0.4 L/h or below.

Note 1: For the IX-C150S6, accuracy is not guaranteed at flows below 1.0 L/h. For the IX-C060S6, accuracy is not guaranteed at flows below 0.4 L/h.

Note 2: No viscosity change, Non freezing, No slurry.

Specification of controller

| | | | |
|--------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Monitors | LCD | 16x2 backlight LCD | |
| | LED | Operation / Stop / Alarm | |
| Operation | Keypads |  START / STOP  MENU  ESC  Enter  Up  Down  Left  Light | |
| Operation mode | MAN (Manual) | C060: 0.08 mL/h - 60 L/h, C150: 200 mL/h - 150 L/h | |
| | EXT | Analogue control | 4 - 20, 0 - 20, 20 - 4, 20 - 0 mA |
| | | Pulse control | C060: 0.00625 mL/PLS - 120 mL/PLS, C150: 0.01560 mL/PLS - 300 mL/PLS |
| | | Batch control | C060: 6.25 mL/PLS - 120 L/PLS, C150: 15.6 mL/PLS - 300 L/PLS ^{Note 1} |
| | Interval batch control | Time 0-9 day, 0-23 H, 1-59 min Capacity C060: 6.25 mL - 120 L, C150: 15.6 mL - 300 L ^{Note 1} | |
| Control function | STOP | Operation stop at contact input | |
| | PRIME | MAX spm operation by pressing the Up and Down keys | |
| | Interlock | Operation stop at contact input | |
| | AUX | Operation with max. spm at contact input | |
| Input ^{Note 2} | STOP / Pre-STOP / AUX / Interlock | No-voltage contact or open collector | |
| | Profibus ^{Note 3} | Communication protocol: Profibus-DP International standard: Compliant to EN50170 (IEC61158) | |
| | Analogue | 0-20 mA DC (Internal resistance is 200 Ω.) | |
| | Pulse | No-voltage contact or open collector (MAX pulse frequency is 100 Hz.) | |
| Output | Alarm 1 ^{Note 4} | No-voltage contact (Mechanical relay) 250VAC 3A (Resistive load) Selectable: STOP, Pre-stop, Interlock, Leak Detection and Motor Overload. | |
| | Alarm 2 ^{Note 4} | No-voltage contact (PhotoMOS relay) 24VAC/DC 0.1A Selectable: STOP, Pre-STOP, Interlock, Leak Detection and Motor Overload. | |
| | Power supply | 12VDC 30mA or below | |
| Safety function | Diaphragm rupture detection | The pump will be stopped when the diaphragm is ruptured. | |
| | Overpressure detection | The pump will be stopped when the pump load has risen too high. | |
| Power voltage | | 100-240VAC 50/60Hz | |

Note 1: The IX discharges a programmed flow volume per pulse in batch control. Default setting is 6.25 mL(C060) or 15.6 mL(C150).

Note the volume per pulse varies during programming. The setting can also change after calibration and should be verified.

Note 2: Purchase an optional external control signal cable for analogue signal input, pulse signal input and an interlock signal input.

Purchase an optional STOP signal cable for STOP signal input, PreSTOP input and AUX signal input.

Note 3: Contact us for use of the IX with Profibus control.

Note 4: Purchase an optional output signal cable for signal output.

• An earth leakage breaker with a rated current of 5A / current sensitivity of 30mA is recommended.

Optional accessories



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



DIN 4-pin connector cable
STOP signal and AUX signal cable (5m)
(STOP signal input)
Selection No. IX0019



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



Profibus converter
Profibus communication

Points to be observed in pump installation and piping

Hi-Techno pump IX series are reciprocating pumps. Reciprocating pumps generate pulsation in the suction and discharge piping. Special consideration, (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 $P_{id} < 0.1$ MPa
 • P_{id} : Inertial resistance on discharge side

Inertial resistance means the pulsated 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 " $P_{id} < 0.1$ MPa is given above as an approximate standard. If P_{id} becomes 0.1MPa or higher, vibration on the pipe is generated. So measures should be taken to cope with the influence of vibration on the pump, too.

- 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 > Inertial resistance 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 is too long even with the differential pressure value at 0.03 MPa.

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


• Prevention of suction failure

$NPSH_a > NPSH_r$
 $NPSH_a = P_a - P_v \pm P_{hs} - P_{is} * MPa$
 *Or P_{fs} : whichever is the larger. (NPSH : Net positive suction head)

If $NPSH_a$ is not sufficient, the pump may be damaged by the flow-break or cavitation generated under such conditions.

- **NPSH_a**: Absolute NPSH (MPa)
- **NPSH_r**: Required NPSH (value particular to the pump) (MPa)
- **P_a**: Absolute pressure onto the tank liquid surface (MPa)
- **P_v**: Liquid vapour pressure (MPa)
- **P_{hs}**: Pressure caused by the height of the suction side (MPa) (Flooded suction : +, Negative suction : -)
- **P_{is}**: Inertial resistance on the suction side (MPa)
- **P_{fs}**: Piping resistance on the suction side (MPa)

See the table below for $NPSH_r$, inertia resistance(P_i) 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

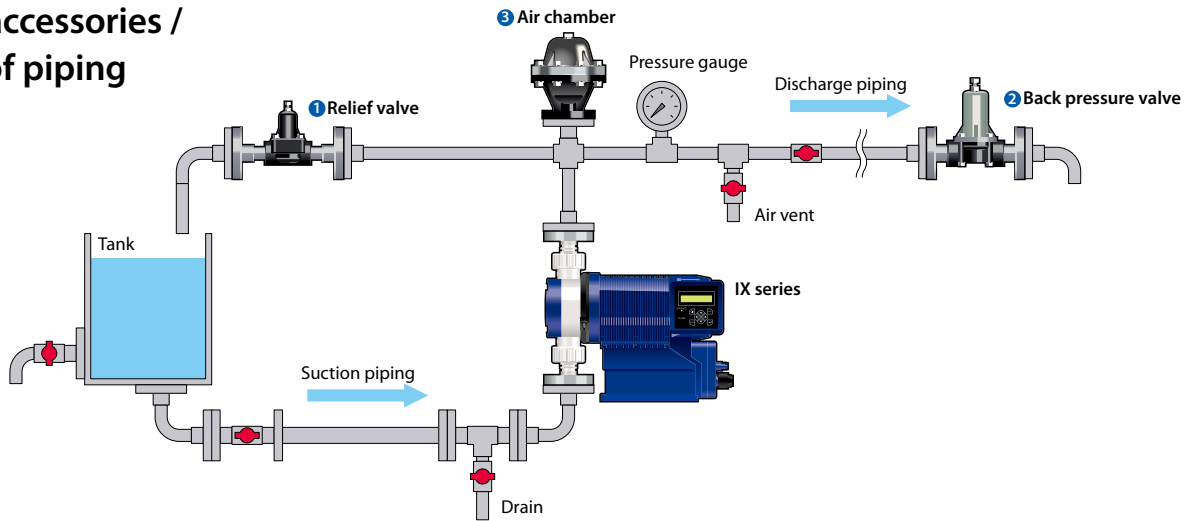
Install a relief valve to protect the pump and piping from overpressure.

Performance

| Model | Discharge line inertia resistance P_{id} | | Suction line inertia resistance P_{is} | | NPSH _r | Viscosity | Priming lift | Applicable chamber | |
|---------|--------------------------------------------|----------------------|------------------------------------------|----------------------|-------------------|------------|--------------|--------------------|-------|
| | Flow range | MPa/1m | Suction speed | MPa/1m | | | | Materials | |
| | | | | | | | | L/h | % |
| IX-C060 | to 60 | 4.4×10^{-3} | 100 | 4.4×10^{-3} | 0.08 MPaA | 1000 mPa·s | 2 m | 1.5 L | 2.0 L |
| | to 45 | 1.6×10^{-3} | 75 | 2.5×10^{-3} | | | | | |
| | to 30 | 4.9×10^{-4} | 50 | 1.1×10^{-3} | | | | | |
| | to 6 | 1.2×10^{-5} | 25 | 2.8×10^{-4} | | | | | |
| IX-C150 | to 150 | 6.3×10^{-3} | 100 | 6.3×10^{-3} | 0.08 MPaA | 1000 mPa·s | 2 m | 1.5 L | 2.0 L |
| | to 113 | 2.3×10^{-3} | 75 | 3.6×10^{-3} | | | | | |
| | to 75 | 7.0×10^{-4} | 50 | 1.6×10^{-3} | | | | | |
| | to 15 | 1.8×10^{-5} | 25 | 4.0×10^{-4} | | | | | |

- P_i : Inertia resistance per meter (based on clean water, suction line I.D. should be equal to the pump suction connection as a minimum.) Calculate inertia resistance per meter using the following formula.
 $P_i = P_{id} \text{ (or } P_{is}) \times \text{Specific gravity} \times \text{Pipe length (m)} \times (\text{Pump I.D.} \div \text{Pipe I.D.})^2 \text{ (MPa)}$
- Suction speed is set to 100% as the default setting. Reduce speed when handling viscous or gaseous liquids to prevent the possibility of cavitation. Note the suction speed is used to control maximum discharge capacity.
 e.g.) If suction speed is set to 75%, maximum discharge capacity is correspondingly reduced to 75% (45 L/h for IX-C060).
- Discharge capacity may be reduced from rated performance when pumping highly viscous liquids. Select a suitable pump size according to liquid viscosity. Calibration accuracy may be reduced with liquid viscosities of over 500 mPa·s. Review piping layout as necessary. Contact us if handling liquid viscosities of over 1000 mPa·s.
- Applicable chamber: Capacities are based on Iwaki standard chamber sizes. Contact us for chamber materials.
- High accuracy: $\pm 1\%$ (This accuracy may not be met at flows below 1.0 L/h for the IX-C150S6. For model IX-C060S6, accuracy may not be met at flows below 0.4 L/h)
- Liquid temperature range: 0-50 °C (TC/TE type), 0-80 °C (S6 type) No viscosity change, Non freezing, No slurry
 Accurate calibration may not be possible with liquid temperatures over 60°C and discharge pressures over 0.8MPa. For optimum accuracy, calibration must be performed below these parameters.

Optional accessories / example of piping



1 Relief valve Model RV

Reciprocating pumps keep running even in closed-discharge operation, resulting in piping breakage and motor failure by overpressure without a relief valve. Always install the relief valve to prevent overpressure in a discharge line.



| Model | Wet-end materials | | Max. capacity L/min (L/h) | Setting pressure MPa | Connection JIS10K Flange | Mass kg |
|------------|-------------------|------|------------------------------|-------------------------|-----------------------------|------------|
| RV-7TV-15 | PVDF | PTFE | 7.5 (450) | 0.3 - 0.8 | 15A | 5 |
| RV-7TE-15 | | | | | EPDM | |
| RV-7TV-25 | | | | | FKM | |
| RV-7TE-25 | | | | | EPDM | |
| RV-2S6-15 | SUS316 SCS14 | PTFE | 2.0 (120) | 0.3 - 0.8 | 15A | 3.5 |
| RV-2S6B-15 | | | | 0.8 - 1.5 | 15A (JIS16K) | |
| RV-7S6-25 | | | | 0.3 - 0.8 | 25A | |
| RV-7S6B-25 | | | | 0.8 - 1.5 | 25A (JIS16K) | |
| RV-3P-15 | PVC | PTFE | 3.0 (180) | 0.3 - 1.0 | 15A | 0.6 |
| RV-3P-20 | | | | | 20A | |
| RV-3P-25 | | | | | 25A | |

2 Back pressure valve Model BV

Install a back pressure valve when discharge-line pressure is less than 0.03 MPa or less than suction-line pressure. Pump check valves may otherwise not operate correctly and overfeeding may result. Differential pressure between discharge and suction lines must be 0.03 MPa or more and also greater than the inertia resistance (Pid or Pis, whichever greater). Differential pressure (0.03 MPa or more) > Inertia resistance (Pid or Pis, whichever is greater)



| Model | Wet-end materials | | Capacity L/min (L/h) | Setting pressure MPa | Connection JIS10K Flange | Mass kg |
|-----------|-------------------|------|-------------------------|-------------------------|-----------------------------|------------|
| BV-7TV-15 | PVDF | PTFE | 0.2 - 7.0 (12 - 420) | 0.05 - 0.8 | 15A | 5 |
| BV-7TE-15 | | | | | EPDM | |
| BV-7TV-25 | | | | | FKM | |
| BV-7TE-25 | | | | | EPDM | |
| BV-2S6-15 | SUS316 SCS14 | PTFE | 0.02 - 2.0 (1.2 - 120) | 0.05 - 0.8 | 15A | 3.5 |
| BV-7S6-25 | | | 0.2 - 7.5 (12 - 450) | | 25A | |
| BV-3NV-15 | PVC | FKM | 0.03 - 3.0 (1.8 - 180) | 0.1 - 0.3 | 15A | 0.6 |
| BV-3NV-20 | | | | | 20A | |
| BV-3NV-25 | | | | | 25A | |
| BV-3NE-15 | | EPDM | | | 15A | 0.6 |
| BV-3NE-20 | | | | | 20A | |
| BV-3NE-25 | | | | | 25A | |

Contact us for use at smaller flow rates than the above.

3 Air chamber Model A

The air chamber reduces flow pulsation to prevent piping vibration and overfeeding. An air chamber designed for slurry transfer is also available. Contact us for detail.



SUS type

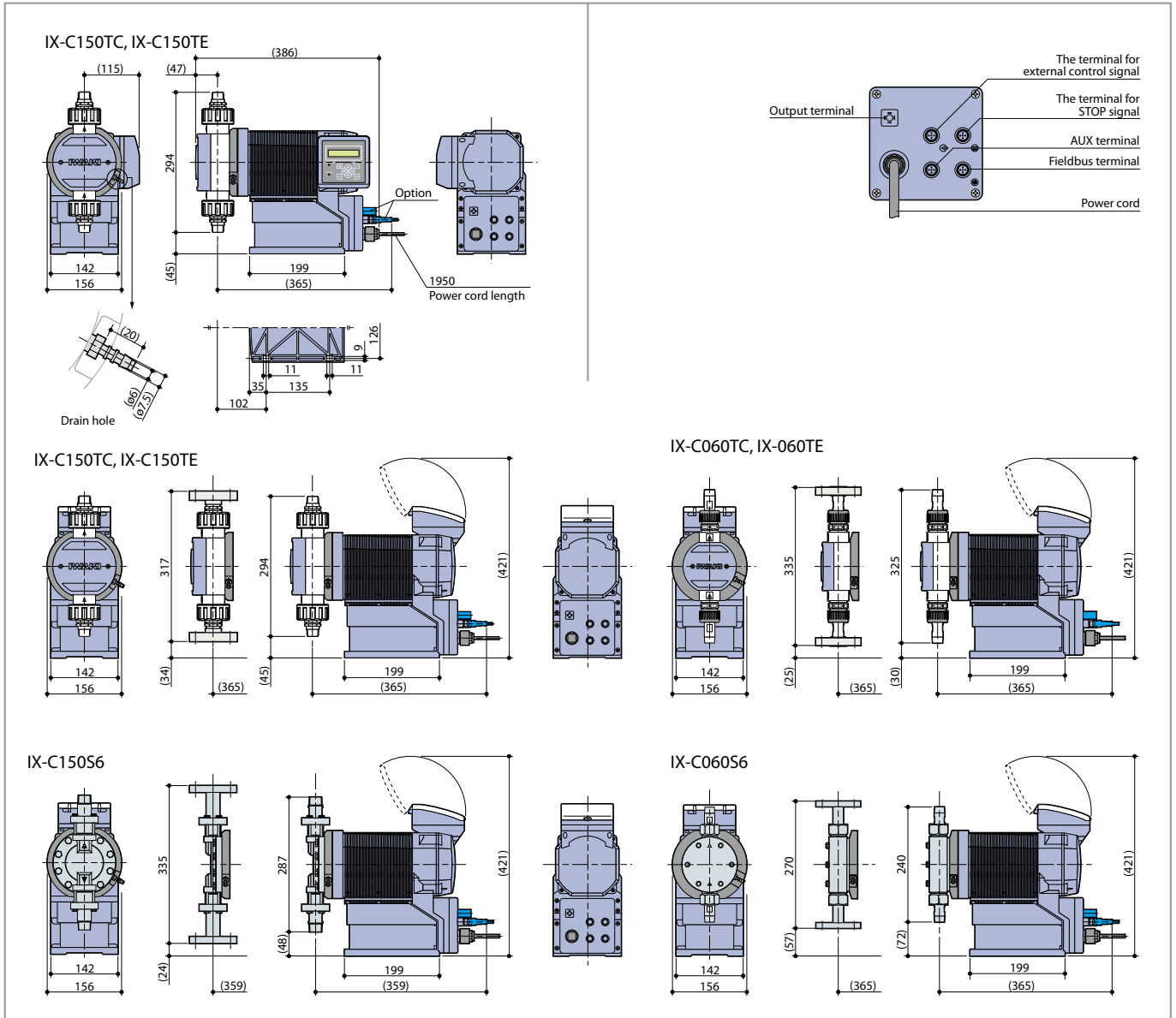


PVC type

| Model | Wet-end materials | Capacity L | Max. pressure MPa | Connection JIS10K Flange | Mass kg |
|----------|-------------------|---------------|----------------------|-----------------------------|------------|
| A-1S6-15 | SUS316 | 1.5 | 0.9 | 15A | 5 |
| A-1S6-20 | | | | 20A | |
| A-1S6-25 | | | | 25A | |
| A-2VV | PVC | 2 | 0.5 | 15 - 25A shared | 2.5 |
| A-2VE | | | | | |

FKM O rings (A-2VV) and EPDM O rings (A-2VE) are not wet end materials.

Dimensions in mm



IWAKI CO., LTD. 6-6 Kanda-Sudacho 2-chome Chiyoda-ku Tokyo 101-8558 Japan
 TEL : (81)3 3254 2935 FAX : 3 3252 8892

()Country codes

IWAKI has global network. Please find your distributor location at

www.iwakupumps.jp

European office : **IWAKI Europe GmbH**
 Germany : **IWAKI Europe GmbH**
 Holland : **IWAKI Europe GmbH** (Netherlands Branch)
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 France : **IWAKI France S.A.**
 Norway : **IWAKI Norge AS**
 Sweden : **IWAKI Sverige AB**
 U.K. : **IWAKI Pumps (UK) Ltd.**

TEL: (49)2154 9254 0 FAX: 2154 9254 48
 TEL: (49)2154 9254 50 FAX: 2154 9254 55
 TEL: (31)74 2420011 FAX: (49)2154 925448
 TEL: (39)0444 371115 FAX: 0444 335350
 TEL: (34)93 37 70 198 FAX: 93 47 40 991
 TEL: (32)13 67 02 00 FAX: 13 67 20 30
 TEL: (45)48 24 2345 FAX: 48 24 2346
 TEL: (358)9 2745810 FAX: 9 2742715
 TEL: (33)1 69 63 33 70 FAX: 1 64 49 92 73
 TEL: (47)23 38 49 00 FAX: 23 38 49 01
 TEL: (46)8 511 72900 FAX: 8 511 72922
 TEL: (44)1743 231363 FAX: 1743 366507

U.S.A. : **IWAKI America Inc.**
 Argentina : **IWAKI America Inc.** (Argentina Branch)
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 Thailand : **IWAKI (Thailand) Co., Ltd.**
 Vietnam : **IWAKI Pumps Vietnam Co., Ltd.**

TEL: (1)508 429 1440 FAX: 508 429 1386
 TEL: (54)11 4745 4116
 TEL: (65)6316 2028 FAX: 6316 3221
 TEL: (62)21 6906606 FAX: 21 6906612
 TEL: (60)3 7803 8807 FAX: 3 7803 4800
 TEL: (61)2 9899 2411 FAX: 2 9899 2421
 TEL: (852)2607 1168 FAX: 2607 1000
 TEL: (86)20 84350603 FAX: 20 84359181
 TEL: (86)21 6272 7502 FAX: 21 6272 6929
 TEL: (82)2 2630 4800 FAX: 2 2630 4801
 TEL: (886)2 8227 6900 FAX: 2 8227 6818
 TEL: (66)2 322 2471 FAX: 2 322 2477
 TEL: (84)613 933456 FAX: 613 933399

Caution for safety use:
 Before use of pump, read instruction manual carefully to use the product correctly.

Legal attention related to export.

Our products and/or parts of products fall in the category of goods contained in control list of international regime for export control. Please be reminded that export license could be required when products are exported due to export control regulations of countries.

Actual pumps may differ from the photos. Specifications and dimensions are subject to change without prior notice. For further details please contact us.

