
Solenoid Driven Metering Pump

PZi series

PZi4 / PZi8

Instructions and Key Operation Manual for Special Functions

Before you start using this metering pump, read this manual together with the separate Operation Manual.

• For details on the liquid pumping unit and general handling, refer to the "PZ Series Operation Manual."

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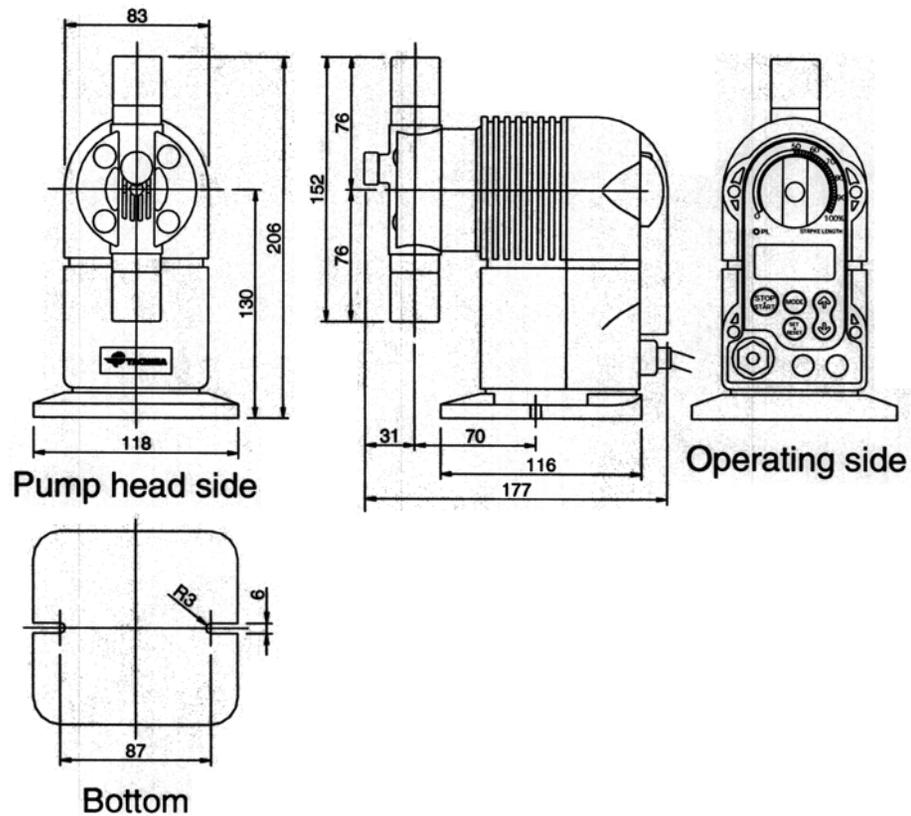
1 OUTLINE

The PZi4/8 has a high-grade chemical injection amount control function and an LCD display integrated into its compact body. It allows easy and reliable setup by key operation, control of injection amount by external input signals, and operation by level switch inputs, for example.

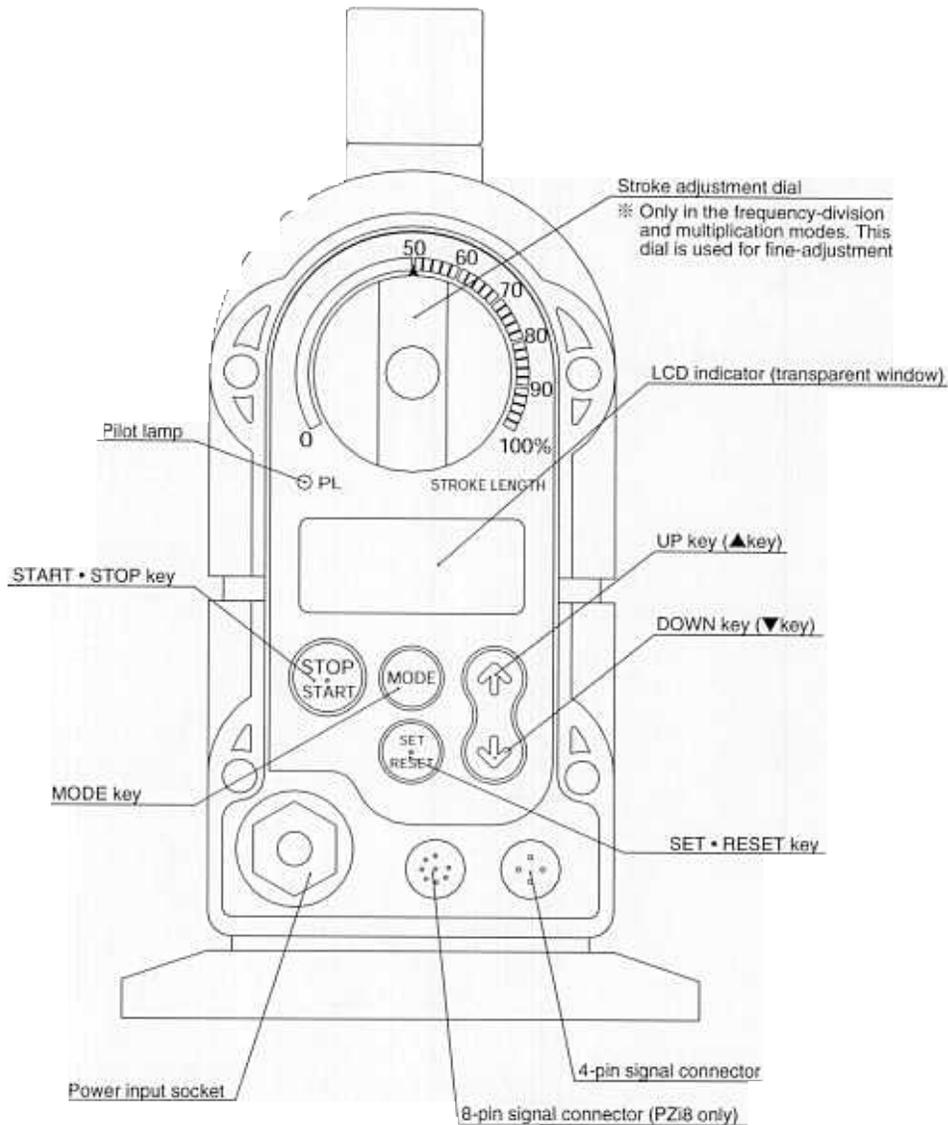
The PZi8 is provided with an interval function and other additional modes. Optional measured control of the discharge volume by our Flow Checker is also available.

2 EXTERNAL DIMENSIONS

2-1 Overview



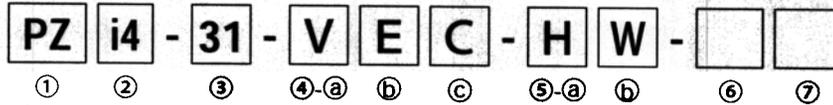
2-2 Layout of Operation/Display Panel



Note) In text descriptions, individual operations on dual-function keys are referred to by the required function.

- (Example) • To start pump operation ... START, STOP key
• To determine setting values ... SET, RESET key, etc.

3 MODEL SELECTION GUIDE



① Series name

PZ : PZ series

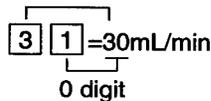
② Pump model

i4 : Input control
i8 : Input/output control

Optional function type:

iA : Auto flow set
iP : pH control
iR : Residual chlorine control
iN : Non-linearizing control

③ Model



31 : 30mL/min* * 28 mL/min in case of boiler specification
61 : 60mL/min
12 : 100mL/min

④ Liquid contact materials

(a) Pump head	(b) Valve seat/O-ring	(c) Check ball
A : Acrylic	E : EPDM	C : Ceramic
V : PVC	F : Special fluoro rubber	
6 : SUS316	T : PTFE	
F : PVdF		

* The CL type is a combination of the (a) Acrylic, (b) Special fluoro rubber, and (c) Ceramic specifications.

Remarks

● The above specifications cannot be freely combined. For details on liquid contact model combinations, see the "Standard Liquid Contact Materials Table" for each model. PTFE is used as the diaphragm material for all models.

⑤ Specifications

(a) Connection type	(b) Joint specifications	(c) Other specifications
H : Standard hose type	w : Standard (50mPa/s or less)	J : Domestic
T : PE tube type		
B : Boiler specifications		

● The above specifications cannot be freely combined. For details on connection type specifications, refer to the "Specifications Performance Table" for each model.

⑥ General specifications

S : Standard X : Special

Note) For optional function types other than PZi4 and PZi8, refer to the separately attached "PZ Series Operation Manual".

4 FEATURES

4-1 Common Terms

- Power supply can be used in a wide range of 100 to 240VAC. (Wide range voltage supply) The pump is free from the power voltage fluctuation.
- Operation keys and LCD display offer high-precision setup and a variety of control modes.
- Injection amount can be controlled and pump operation/stop can be controlled by input signals. Analog signals of 4-20 mA DC (0-20 mADC is available in the case of i8 model), pulse signals (flow meter signal, open collector, etc.), or open collector signal can be used for controlling the injection amount.
- Contact signals such as a level switch can be input directly as the operation/stop signal.

4-2 PZi8 (input/output control model)

Provided with a control signal output function in addition to the input control functions of PZi4. Signal during operation, operation synchronous pulse signals, and alarm signals can be output.

- An input port for signals from a TACMINA Flow Checker and drive power circuit are provided as standard.
- An input port is provided for extensive control.
- Counter and interval functions are provided as the self control function as standard.
- Parameter settings are open to users to enable detailed setup.
- Input/output port assignment is possible to provide many selections for functions.

4-3 Special Function Model

- iA : Can be interlocked with a Flow Checker in addition to the function of i8 model, to achieve measurement batch operation by measuring the actual discharge volume.
- iP : pH control can be achieved by combination with a pH meter without the need to use a controller.
- iR : Residual chlorine control can be achieved by combination with a residual chlorine meter without the need to use a controller.
- iN : Provided with an internal non-linearizer function to achieve non-linear control.

5 SPECIFICATIONS

Specifications	PZi4	PZi8	Special Function Model
5-1 Functions			
Manual operation 0 to 300 spm setting	Key Operation	Key Operation	Key Operation
Automatic operation Analog signal input Proportional band setting, shift setting	○	○	○
Automatic operation Pulse signal input Frequency-dividing ratio 1/1 to 1/9999 Multiplication 1 to 9999	○	○	○
Special Function Model *1	—	—	○
5-2 Display			
spm display	spm	spm, %, mL/min	spm, %, mL/min
Mode state display (current mode, unit)	○	○	○
Setup screen, parameters, and error display	○	○	○
5-3 Alarm display, external alarm output			
External stop input	Display	Display, output	Display, output
Input analog signal Out-of-range error *2	Display	Display, output	Display, output
Input pulse signal Memory over *3	Display	Display, output	Display, output

*1 See "4-3 Special Function Model."

*2 Automatic operation during the analog signal input

*3 Automatic operation during the pulse signal input

Specifications	PZi4	PZi8	Special Function Model
5-4 I/O Signal Specifications (number of ports)			
1) Digital input (high-speed port) <ul style="list-style-type: none"> • No-voltage pulse or open collector • Input resistance Approx. 2kΩ • Max. number of pulses 7500 pulse/min • Min. width of pulses 4 msec (when ON time) 	1 port (IN1)	2 ports (IN1, 3)	2 ports (IN1, 3)
2) Digital input (low-speed port) <ul style="list-style-type: none"> • No-voltage pulse or open collector • Input resistance Approx. 2kΩ • Max. number of pulses 600 pulse/min • Min. width of pulses 50 msec (when ON time) 	1 port (IN2)	2 ports (IN2, 4)	2 ports (IN2, 4)
3) Analog input <ul style="list-style-type: none"> • Input resistance Approx. 110Ω 	1 port DC4~20mA	1 port DC0/4~20mA	1 port DC0/4~20mA
4) Digital output <ul style="list-style-type: none"> • DC 3mA 25V or less 	None	2 ports (OUT1, 2)	2 ports (OUT1, 2)
5) Power supply unit for Flow Checker <ul style="list-style-type: none"> • +5V 	None	1 port	1 port

Specifications	All Models	PZi8/Special Function Model	—	
5-5 Pin Connections				
Port No.	4-pin Connector	8-pin Connector *1	Default *2	
Digital input	IN1(high-speed port) IN2(low-speed port) IN3(high-speed port) IN4(low-speed port)	1(+)-4(common) 3(+)-4(common) — —	— — 1(+)-3(common) 7(+)-3(common)	Pulse input Stop input Flow Checker input Start input
Analog input	2(+)-4(-)	—	Analog input	
Digital output	OUT1 OUT2	— —	4(+)-6(common) 5(+)-6(common)	Package alarm Operation sync pulse
Power supply unit for Flow Checker	—	2(+)-3(-)	DC5V	

*1 PZi8 and special function models only

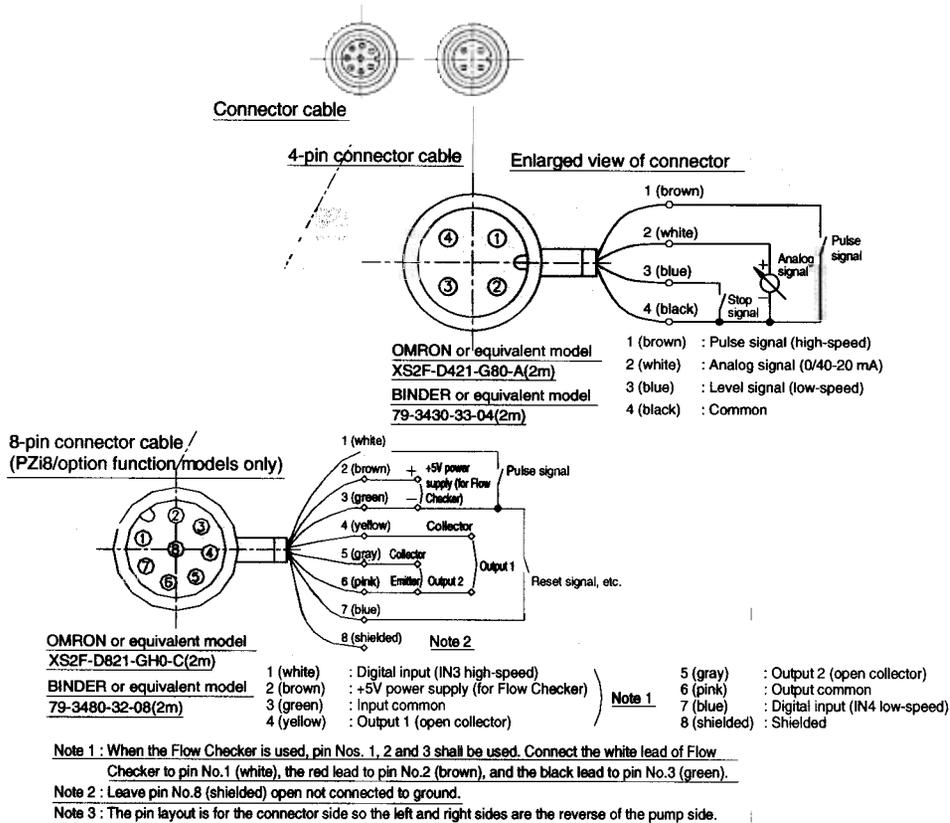
*2 The port cannot be assigned on the PZi4 model.

Specifications	All Models	PZi8/Special Function Model
5-6 Pin No. and code color		
Pin No.	4-pin connector	8-pin connector
1	Brown	White
2	White	Brown
3	Blue	Green
4	Black	Yellow
5		Gray
6		Pink
7		Blue
8		Shielded

* In the case of recommended signal (See next page.)

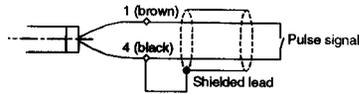
5-7 Connecting Signal Leads (cable with connectors)

Specification All Models PZi8/Special function model

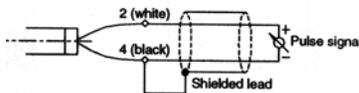


5-8 How to Extend Signal Leads

When extending the pulse signal of 4-pin



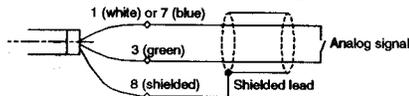
When extending the analog signal of 4-pin



Note 3 : When extending the pulse signal/analog signal, use a shielded cable, and connect the shield to pin No.4.

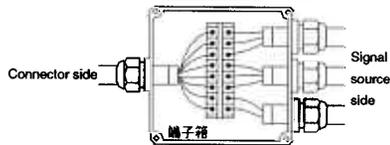
Leave the shield on the signal source side open. (shielded lead should be 0.5 mm² or more, max. extended length should be 100m)

When extending the pulse signal of 8-pin



Note 4 : When extending the pulse signal/analog signal, use a shielded cable, and connect the shield to pin No.8. Leave the shield on the signal source side open. (shielded lead should be 0.5 mm² or more, max. extended length should be 100m)

Connecting the signal lead and shield



Note 5 : Place the connector for the signal cable and shield in a waterproof terminal box.

6 MODE FUNCTIONS

Description of Operations and Functions

PZi4 PZi8 Special Function Model

- Manual operation :The number of strokes (spm) can be set directly on the operation panel.
(Set within the range 0 to 300 digitally in single-step increments.)
- Automatic operation :Control is performed by changing the number of strokes per minute by external signals (analog signal, pulse signal).
- Timer operation :The count and timer functions are automatically turned ON/OFF according to an internal timer.
(The PZi4 is not provided with this function.)
- Stop input signal control :Pump operation is controlled by non-voltage contact signals from a level switch or other device.
(External stops and control by alarms can be set.)

When setting modes, the applicable model is indicated as PZi4, PZi8 or Special Function Model. If none of these is indicated, the mode itself is not provided on any model.

6-1 Manual mode

1. Basic operation

- ① The number of strokes can be set digitally in single-step increments within the range 1 to 300 spm by the UP,DOWN key on the operation panel.
- ② With the PZi8 and special function models, the display unit (spm) can be switched to % or mL/min.

2. Purpose of use

- Test operation after pump installation
- Temporary operation, for example, when an error occurs during automatic operation (e.g. signals are not output)
- The stroke speed during automatic operation (multiplication, count, interval) can be changed.

3. LCD display

During a pump stoppage	During pump operation	During setting
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> STP 300 spm MAN </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> MAN 138 spm </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> STP 138 spm MAN </div>

* indicates blinking display.

4. Operation control signal

Basically, there is no need to supply signals from the outside in the manual mode. However, operation can be paused by a stop input (continuous signal) from the outside.

6-2 Analog mode

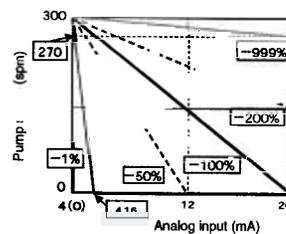
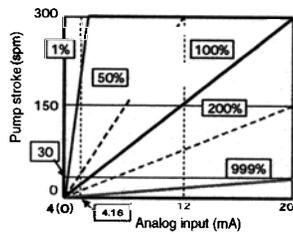
PZi4 PZi8 Special Function Model

1. Basic operation

- ① Analog input signals from the outside are received, and automatic operation is performed within the range 0 to 300 spm according to the setting value (proportional band and shift amount).
- ② The ramp for the number of strokes in response to analog input can be set by proportional band (1 to 999% for both increments and decrements). This proportional curve can be shifted in parallel towards the vertical axis by a shift amount ($\pm 100\%$).
- ③ The number of strokes changes linearly in response to the analog input signal from the outside.

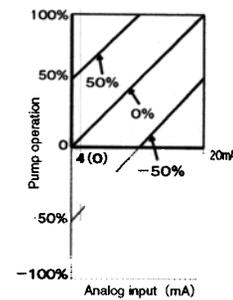
Proportional band function

The proportional band can be set within range ± 1 to $\pm 999\%$. The increment/decrement polarity can also be easily changed.



Shift function

Shift can be set within the range $\pm 100\%$.



2. Purpose of use

Flow rate proportional injection, etc.

3. LCD display

- During a pump stoppage :
- During pump operation :
- Analog input value is displayed by pressing the UP key.
- During setting :
- During setting a proportional band shift

4. Operation control signal

4-20 mA DC or 0-20 mA DC (PZi8 and special function models only)

6-3 Frequency-division mode

PZi4

PZi8

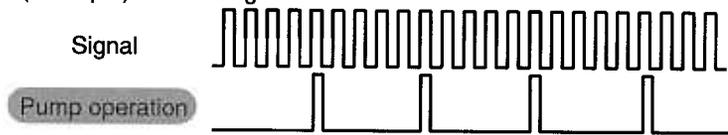
Special Function Model

1. Basic operation

- ① Pulse signals from the outside are received, and automatic operation is performed according to the frequency-dividing ratio setting value.
- ② The frequency-dividing ratio can be set within the range 1/1 to 1/9999.

Frequency-dividing ratio (1/1 to 1/9999)

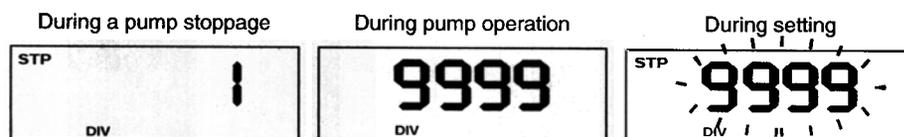
(Example) 1/5 dividing ratio



2. Purpose of use

- Flow rate proportional injection, etc. The number of strokes changes proportionally to the number of input pulses from the outside.
- Used when there is a large number of pulses from a flow meter or other instrument, and the chemical injection amount is too great. (setting in direction for reducing injection amount)
- Fine-adjustment of discharge volume is performed by the stroke adjustment dial.

3. LCD display



4. Operation control signal

No-voltage contact or open collector signal

6-4 Multiplication mode

PZ14

PZ18

Special Function Model

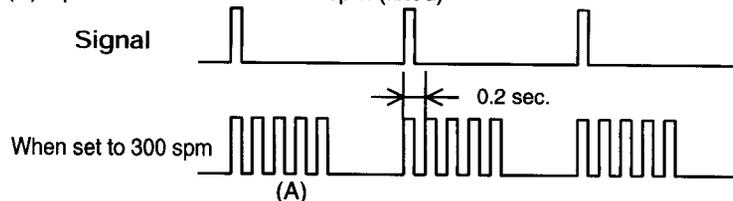
1. Basic operation

- ① Pulse signals from the outside are received, and automatic operation is performed by the number of strokes corresponding to the multiplication.
- ② The multiplication can be set within the range 1 to 9999. At this time, the pump operates at the number of operation strokes (spm) set in the manual mode.

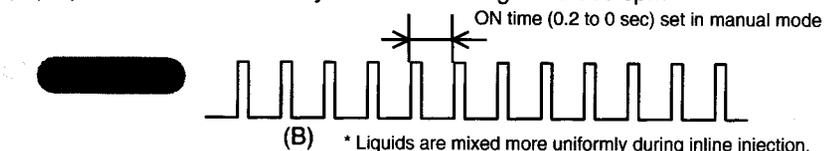
Multiplication (can be set within range 1 to 9999)

As the default setting, external signals are canceled when an external pulse input signal is input again during pump operation. External pulse input signals can also be held and stored to memory by setting in this mode.

(A) Operates five times at 300 spm (fixed)



(B) Operates five times at any value within range 1 to 300 spm

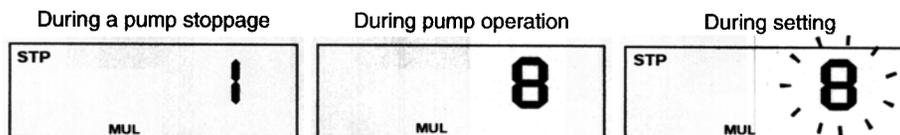


* Liquids are mixed more uniformly during inline injection.

2. Purpose of use

- This mode is used for flowrate proportional injection, etc. The pump operates proportional to the number of externally input pulses.
- Used when there are a few number of pulses from a flow meter or other instrument, and the chemical injection amount is too small. (setting in direction for increasing injection amount)
- Fine-adjustment of discharge volume is performed by the stroke adjustment dial. (See 9. SETUP EXAMPLES.)

3. LCD display



4. Operation control signal

No-voltage contact or open collector signal

6-5 Count mode

PZ18

Special Function Model

1. Basic operation

- ① The start signal is received and the pump operates for the number of preset times. (batch processing)
- ② The setting value can be set by a combination of 1 to 9999 times and $\times 1$, $\times 10$, $\times 100$, $\times 1000$ multiplication.
- ③ Start signal can be selected from an external input and STOP/START.
- ④ The end signal (100 msec one-shot signal) can be output when operation for the preset count ends.

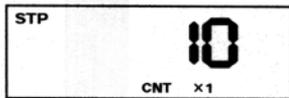
2. Purpose of use

This mode is used in sites where fixed amounts are repeatedly injected. Operation can be easily instructed or confirmed from the outside by the start and end signals, for example, the batch feeding by a belt conveyor.

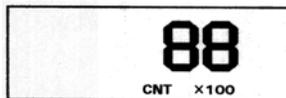
(for example, during batch injection to a container on conveyor belt)

3. LCD display

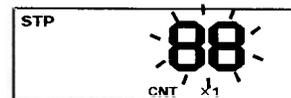
During a pump stoppage



During pump operation



During setting



During setting (Multiple)



4. Operation control signal

[Start signal]

No-voltage contract or open collector signal

START/STOP key

6-6 Interval mode

PZi8 Special Function Model

1. Basic operation

- ① Intermittent operation by the preset ON and OFF times is repeated.
* The ON/OFF state during a start can be changed by parameters.
- ② The setting values of each of the ON and OFF times is set from 1 to 9999 minutes (in 1-minute increments).
- ③ Operation can be paused by input of an external stop signal.

Interval operation time chart

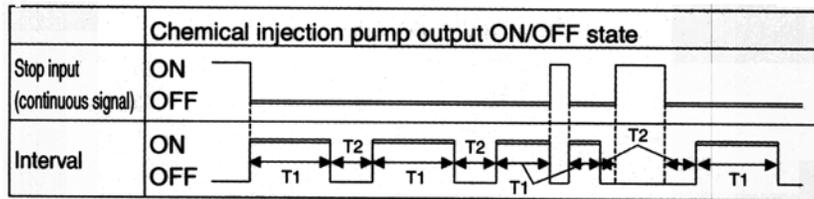


Figure 2. Operation Time Chart

- 1) T1=ON time setting (0 to 9999 min)
T2=OFF time setting (1 to 9999 min)
- 2) When the stop signal turns ON, counting of both T1 and T2 is discontinued.
In case of T1, operation stops on the PZi8.

* When an external stop is applied, timers in the interval mode also are paused.

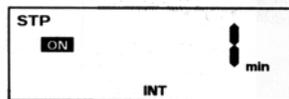
2. Purpose of use

This mode can be used in sites where control is performed by alternate ON/OFF operation.

- Can be used for skipped operation at sites, for example, small amounts of chemicals are injected for air conditioning.
- Small amounts can be injected by operation control by combining intermittent operation and stop input.

3. LCD display

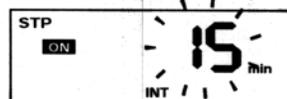
During a pump stoppage



During pump operation



When the ON time is set



When the OFF time is set



4. Operation control signal

Stop input: Operation is paused by input of an external stop signal.

7 *INSTALLATION*

Refer to the "PZ Series Operation Manual."

8 *PREPARING FOR OPERATION*

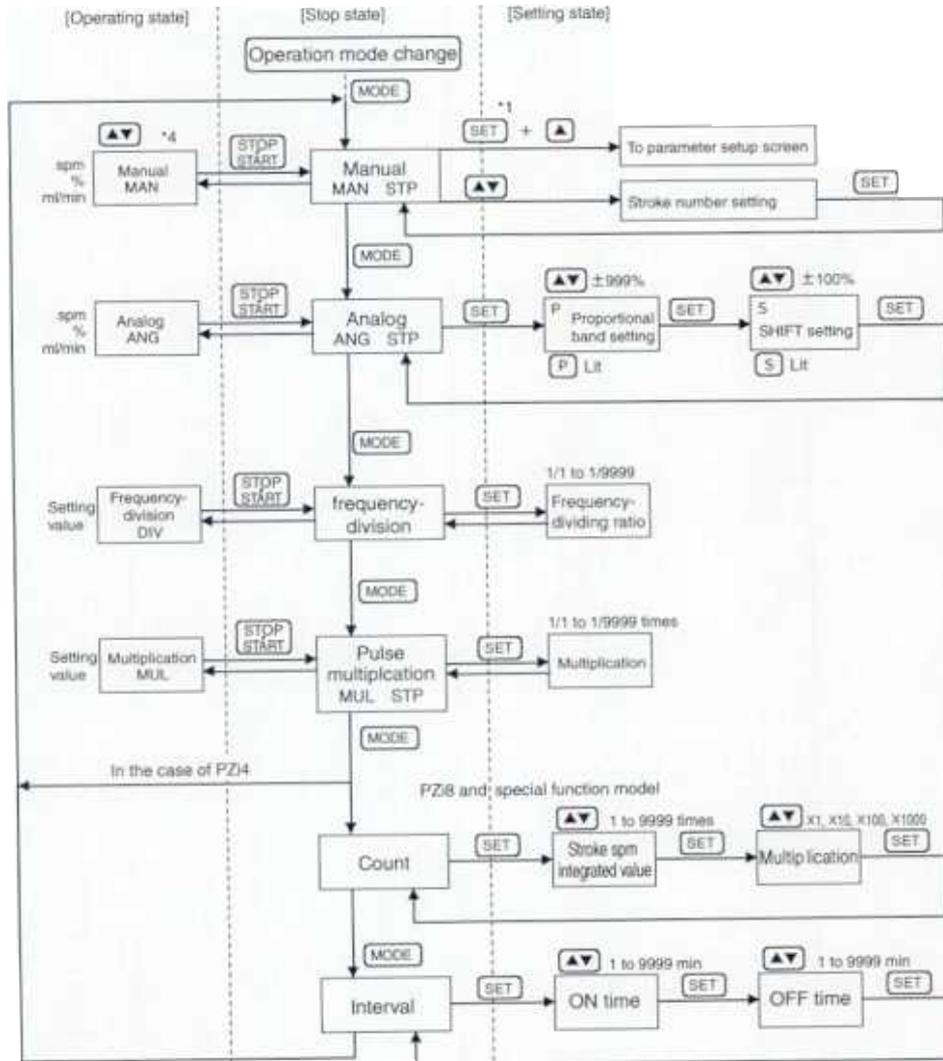
Check the installation state of the PZi, hoses on the discharge and suction sides, and power supply and signal lead connections. If there are no problems for installation, turn the power ON.

9 *SETTING UP OPERATION*

9-1 Changing the Operation Mode

For PZi, the manual and automatic (pulse, analog, etc.) control methods can be switched by changing the operation mode. Switch the mode by the MODE key on the operation panel during a pump stoppage.

9-2 Basic Operation Flow



*1 : The parameter setup screen is moved by pressing the ▲ key for three seconds with the SET key pressed only during a manual pump stoppage.

*2 : In the manual mode only, the setting value can be changed by pressing the ▲▼ keys during both a pump stoppage and operation, and the setting value determined by pressing the SET key.

Remarks

If the key is not pressed for five seconds at [Setting state], the newly set value is canceled, and the STP state is returned to. In the [Setting state], the setting value blinks, and lights by pressing the ▲▼ keys. The value is scanned.

9-3 Changing the Mode

PZI4 PZI8 Special Function Model

Mode	Display	Operation	Explanation
Manual		Power ON	The display shows the default state. (manual mode) When the power is next turned ON, the previous operation is stored to memory. (If the power is turned OFF and then back ON again during operation, the pump starts up in the run mode.) "MAN" is displayed at the bottom of the screen.
		(MODE)	To change the mode, press the MODE key. (The manual mode changes to the analog mode.)
Analog			This is the display screen for the analog mode. "ANG" is displayed at the bottom of the screen. The current input mode (4-20mA) is displayed.
		(MODE)	Pressing the MODE key changes the mode as follows: Manual → Analog → Frequency-division → Multiplication.
Pulse division			This is the display screen for the frequency-division mode. "DIV" is displayed at the bottom of the screen.
		(MODE)	
Pulse multiplication			This is the display screen for the multiplication mode. "MUL" is displayed at the bottom of the screen.
		(MODE)	
	<p>⋮</p> <p>PZI4 ⋮ Returns to the manual mode.</p> <p>PZI8 and special function model⋮ Returns to the count mode.</p> <p>⋮</p>		

Note 1 : The mode can be changed only when pump operation has stopped.

Note 2 : The currently set mode is displayed abbreviated as MAN, ANG, etc. at the bottom of the screen.

Mode	Display	Operation	Explanation
Count			<p>Pressing the MODE key while the pulse multiplication mode is stopped returns the PZi4 to the manual mode. On the PZi8 and special function model, the mode changes to the count mode.</p>
			<p>This is the display screen for the count mode. "CNT" is displayed at the bottom of the screen.</p>
			<p>This is the display screen for the interval mode. "INT" is displayed at the bottom of the screen. The ON time is displayed.</p>
Interval			<p>Pressing the MODE key while the interval mode is stopped returns to the manual mode.</p>

Note1 : The mode can be changed only when pump operation has stopped.

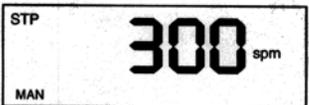
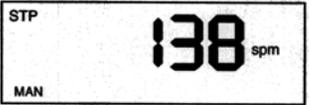
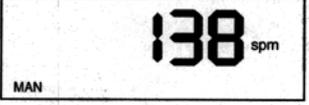
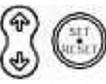
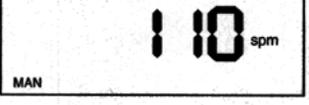
Note 2 : The currently set mode is displayed abbreviated as MAN, ANG, etc. at the bottom of the screen.

9-4 Setting Manual Mode (changing the number of strokes)

PZi4

PZi8

Special Function Model

Display	Operation	Explanation
		<p>Default is 300 spm. "MAN" is displayed at the bottom of the screen.</p>
		<p>Press the UP, DOWN key to set the number of pulses within the range 0 to 300 spm. (in single step increments)</p>
		<p>The number of strokes (spm) blinks.</p>
		<p>Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.)</p>
		<p>The number stops blinking and lights. This completes changing of the setting value.</p>
		<p>Press the START key to start pump operation.</p>
		<p>The pump enters the run mode, and STP goes out.</p>
		<p>The number of strokes can also be changed during operation. Change the number of strokes by the UP, DOWN keys, and determine the setting value by the SET key.</p>
		

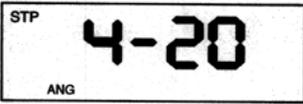
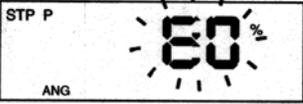
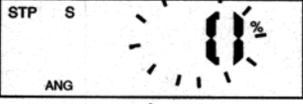
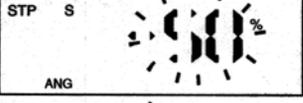
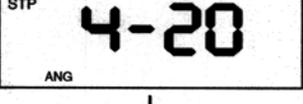
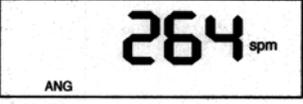
* The number of strokes (spm) set here is reflected in the multiplication, count and interval modes.

9-5 Setting the Analog Mode

PZi4

PZi8

Special Function Model

Display	Operation	Explanation
		<p>Default is 4-20 mA DC. (On the PZi8, the default can be changed to 0-20 mA in parameters.) "ANG" is displayed at the bottom of the screen.</p>
		<p>Pressing SET key with pump operation stopped enters the proportional band setup screen. (default: 100%)</p>
		<p>This is the proportional band setup screen. The present value is blinking, and "P" is displayed at the top left.</p>
		<p>Press the UP,DOWN key to set the proportional band within the range -999 to +999%.</p>
		<p>The setting value is displayed but not yet determined.</p>
		<p>Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) After determining the setting value, the shift amount setup screen is entered. (default: 0%)</p>
		<p>When the proportional band setting value is determined, the "P" at the top left disappears, and an "S" is displayed in its place. This indicates the shift amount setup screen.</p>
		<p>Press the UP,DOWN key to set the shift amount within the range -100 to +100%.</p>
		<p>The setting value is displayed but not yet determined.</p>
		<p>Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) The stop state in the analog mode is returned.</p>
		<p>The stop state in the analog mode is returned.</p>
		<p>Press the START key to start pump operation.</p>
		<p>The current number of strokes is displayed. (On the PZi8, % and mL can be displayed instead of spm by changing the parameter setting.)</p>

*Settings cannot be changed during operation. To change a setting, first stop pump operations.

*The current analog input value is displayed by pressing the  or  key during a pump stoppage.

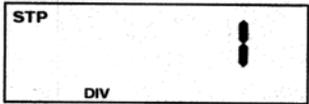
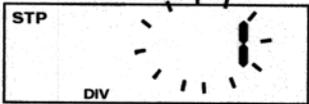
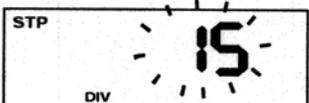
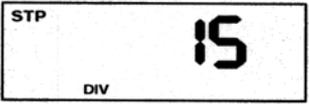
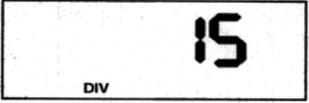
*Set a minus (-) value to set a decrease in the proportional band setting.

9-6 Setting the Frequency-Division Mode

PZ14

PZ18

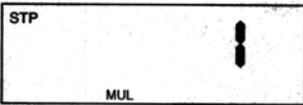
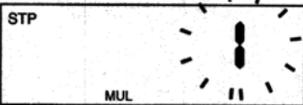
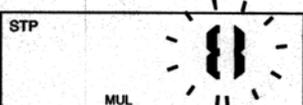
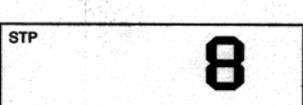
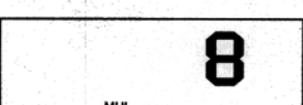
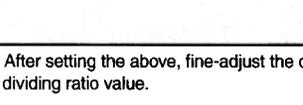
Special Function Model

Display	Operation	Explanation
		<p>Default is "1" (When the display indicates 1, the set dividing ratio is 1/1.) "DIV" is displayed at the bottom of the screen.</p>
		<p>Pressing SET key with pump operation stopped enters the division ratio setup screen.</p>
		<p>The current value starts blinking.</p>
		<p>Press the UP, DOWN key to set the dividing ratio within the range 1/1 to 1/9999. (In this setup, set the denominator of dividing ratio.)</p>
		<p>The setting value is displayed but not yet determined. (The example in this screen is 1/15.)</p>
		<p>Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) The stop state in the frequency-division mode is returned to. This completes the setting, and the display stops blinking and stays lit.</p>
		
		<p>Press the START key to start pump operation.</p>
		<p>STP disappears and pump operation starts. The pump starts to operate in accordance with external signals.</p>

After setting the above, fine-adjust the discharge volume using the stroke adjustment dial matched to the calculated dividing ratio value.

9-7 Setting the Multiplication Mode

PZi4 PZi8 Special Function Model

Display	Operation	Explanation
		The multiplication default is "1". "MUL" is displayed at the bottom of the screen.
		Pressing SET key with pump operation stopped enters the multiplication setup screen.
		The present value starts to blink. Press the UP, DOWN key to set the number of pulses within the range 1 to 9999.
		The setting value is displayed but not yet determined. Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) After the setting value is determined, the multiplication stop mode is returned.
		The setting is completed, and the display stops blinking and stays lit.
		Press the START key to start pump operation.
		STP goes off, and the pump enters the run mode. The pump starts to operate according to external signals.

* After setting the above, fine-adjust the discharge volume using the stroke adjustment dial matched to the calculated dividing ratio value.

9-8 Setting the Counter Mode

PZi8 Special Function Model

Display	Operation	Explanation
<p>STP CNT x1 10</p>		"CNT" and the multiplication factor (×1, ×10, ×100, ×1000) are displayed at the bottom of the screen.
<p>STP CNT x1 10</p>		Pressing SET key enters the number of strokes setup screen. The present value starts to blink.
<p>STP CNT x1 88</p>		Press the UP, DOWN key to set the number of strokes within the range 1 to 9999. The setting value is displayed but not yet determined.
<p>STP CNT x1 88</p>		Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) The setting value is determined, and the multiplication factor setup screen is entered.
<p>STP CNT x1 88</p>		The number of strokes lights, and multiplication starts to blink.
<p>STP CNT x100 88</p>		Press the UP,DOWN key to change the multiplication in four stages: ×1, ×10, ×100 or ×1000. The multiplication factor setting value is displayed but not yet determined.
<p>STP CNT x100 88</p>		Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) The setting value is determined, and stop state in the pump mode is entered.
<p>STP CNT x100 88</p>		The number of strokes and multiplication factor light to indicate that the settings are determined. Press the START key to start pump operation. In this state, the pump starts to operate by the start signal from the outside. (The pump startup mode can be changed in parameter P-31.)

Note) This function is not provided on PZi4.

9-9 Setting the Interval Mode

PZ18 Special Function Model

Display	Operation	Explanation				
		"INT" is displayed at the bottom of the screen. ON or OFF is displayed at the left. If the start operation state is ON, ON is displayed. (This can be changed in parameter P-30.)				
		Pressing SET key enters the ON time setup screen.				
		ON is displayed at the left of the screen, and the present value of the ON time blinks.				
		Press the UP,DOWN key to set the ON time within the range 1 to 9999.				
		The setting value is displayed but not yet determined.				
		Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) After the setting value is determined, the display moves to the OFF time setup screen.				
		The ON display disappears, and OFF is displayed. Also, the present value of the OFF time blinks.				
		Press the UP,DOWN key to set the OFF time within the range 1 to 9999 minutes.				
		The setting value is displayed but not yet determined.				
		Press the SET key to determine the setting value. (To cancel the setting value, do not operate the key for five seconds.) The setting value is determined, and the interval stop state is returned to.				
		ON is displayed at the left, and the setting value of the ON time is displayed.				
		Press the START key to start pump operation.				
		Counting starts and the display is decremented from the setting value.				
		<table border="1"> <tr> <td>15, 14, 13, ...1</td> <td>138, 137...</td> </tr> <tr> <td>ON time</td> <td>OFF time</td> </tr> </table>	15, 14, 13, ...1	138, 137...	ON time	OFF time
15, 14, 13, ...1	138, 137...					
ON time	OFF time					

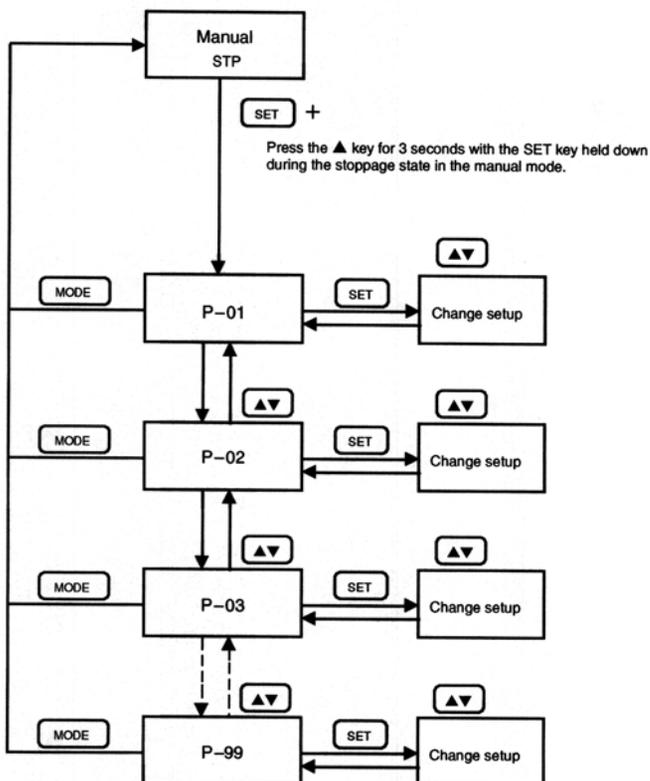
Note) This function is not provided on the PZ14.

10 SETTING UP PARAMETERS

10-1 PARAMETER SETUP FLOW

PZ18 Special Function Model

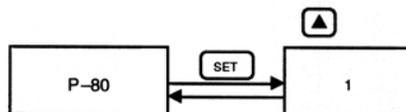
Remarks : For meanings of parameters, refer to "11. Data Parameter List".



* The parameter-setting screen can be activated only from the manual mode (pump stoppage state).
 * Pressing the SET key in the setting change screen determines the newly set parameter setting.
 Note) On the PZ4, the parameter setups cannot be changed.

IMPORTANT!

• DO NOT change the parameters that are not explained in the parameter list. They are used for internal processing.



Remarks:

• To return the parameters to the values at the factory shipment time, select 1 in P-80 and then press the SET key.

10-2 Setting the Parameters

PZi8 Special Function Model

Display	Operation	Explanation
		Make sure that "STP" and "MAN" are displayed.
		Pressing the UP key for 3 seconds with the SET key held down enters the parameter setup screen.
		This is the parameter number selection screen.
		Press the UP, DOWN key to change to the desired parameter number (For details, see the Parameter Tables.)
		Press the SET key at the parameter number that is to be changed to enter the setting change screen.
		The present value is displayed.
		Set the parameter referring to the parameter table.
		Press the SET key to determine the selected value.
		The original parameter number is displayed.
		After you have finished setting the parameters, press the MODE key to return to the original display.

Note) Parameters can be continuously changed until the MODE key is pressed.

11 SET UP EXAMPLES

11-1 Example of Flow Rate Proportional Control in Chlorine Sterilization by a Pulse Transmitting Flow Meter

PZI model pumps receive the no-voltage contact pulse signal from the outside to control the pump injection amount (number of strokes) of the pump.

The following describes two examples of pump control achieved by combination with a pulse generating type flow meter.

11-1-1 Using the frequency-division function

[Conditions]

Max. flow rate of raw water	10m ³ /hr (167L/min)
Target chlorine injection rate	1.0mg/L
Sodium hypochlorite concentration	12%
Pump model	PZI□-31 type (injection amount per stroke: 0.1mL)

(1) Select the flow meter.

TACMINA provides the pulse generating type flow meters shown in the following table. Select the optimum model of flow meter according to the pipe aperture and the flow rate of raw water.

In this example, NVW-50RC is selected.

Aperture (mm)	Model	Flow rate Range (m ³ /hr)	Pulse (L/P)	Loss Head (m)	Remarks
13	LN-13DRC	0.15~1.2	0.1	~0.9	Screw connection
20	LN-20RC	0.2~1.6	0.1	~0.8	Screw connection
25	LN-25RC	0.23~1.8	0.1	~0.8	Screw connection
30	VWK-30RC	0.4~6	1	~1.1	Screw connection
40	VWK-40RC	0.4~6.5	1	~0.8	Screw connection
50	VWK-50RC	0.8~9.6	5	~1.4	Screw connection
50	NVW-50RC	1.25~15	5	~1.2	Flange connection (JIS10K)
65	VW-65RC	1.75~20	5	~1.0	Flange connection (JIS10K)
75	VW-75RC	2.5~30	5	~0.9	Flange connection (JIS10K)
100	VW-100RC	4~48	5	~0.9	Flange connection (JIS10K)
125	VW-125RC	5~60	50	~0.7	Flange connection (JIS10K)
150	VW-150RC	7.5~90	50	~0.9	Flange connection (JIS10K)

(2) Set the dilution rate.

① Calculate the logical injection rate with undiluted chemical (Q')

$$\begin{aligned} \text{Injection rate } Q' \text{ mL/min} &= \text{Target injection rate (mg/L)} \times \frac{\text{Max. flow rate of raw water (m}^3\text{/hr)}}{60} \times \frac{100}{\text{Sodium hypochlorite concentration}} \\ &= 1.0 \times \frac{10}{60} \times \frac{100}{12} \\ &= 1.39 \text{ mL/min} \end{aligned}$$

② Calculate the actual injection rate.

* The following example assumes that undiluted chemical is injected as dilution is not desirable as a gas lock countermeasure or to ensure uniform mixing

$$\begin{aligned} \text{Actual injection rate } Q \text{ mL/min} &= \text{Undiluted chemical injection rate } Q' \text{ mL/min} \times \text{dilution rate} \\ &= 1.39 \times 1.0 \\ &= 1.39 \text{ (mL/min)} = 83.4 \text{ (mL/hr)} \end{aligned}$$

Accordingly, the injection rate should be 1.39 mL/min (12% sodium hypochlorite solution) by the PZI pump at the maximum flow rate.

③ Set the frequency-dividing ratio.

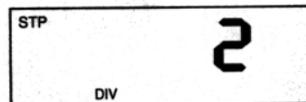
Calculate the frequency-dividing ratio N by the following formula:

$$\begin{aligned} \text{Frequency-dividing ratio } N &= \frac{\text{Number of pulses (n pulses/hr) on flow meter per unit time} \times \text{Discharge volume (VmL/pulse) per pump stroke}}{\text{Actual injection rate (QmL/hr) per unit time}} \\ n &= \frac{\text{Max. flow rate of raw water (L/hr)}}{\text{Flow rate L per pulse of flow meter}} \quad (\text{from flow meter specifications}) \\ &= \frac{10000}{5} \\ &= 2000 \text{ pulses/hr} \\ v &= 0.1 \text{ mL/pulse (from pump specifications)} \end{aligned}$$

$$N = \frac{2000 \times 0.1}{83.4} = 2.4$$

As the frequency-dividing ratio must be an integer not greater than the calculated value, discard the digits past the decimal point. The resulting value is "2".

④ Set the frequency-dividing ratio.



⑤ Set the stroke adjustment dial.

As digits for the frequency-dividing ratio past the decimal point have been discarded, the injection rate will be too great if this value is left as it is. To compensate for this, fine-adjust using the stroke adjustment dial.

Calculate the setting value by the following formula.

$$\begin{aligned} \text{Stroke adjustment dial setting value (\%)} &= \frac{\text{Frequency-dividing ratio setting value}}{\text{Frequency-dividing ratio calculated value}} \dots\dots\dots\text{⑤} \\ &= \frac{2}{2.4} \times 100 (\%) \\ &= 83.3 (\%) \end{aligned}$$

* This numerical value is for reference purposes only.

11-1-2 Using the pulse multiplication mode

As the pulse-generating unit (per pulse) of the flow meter is large, it is more convenient to use the "multiplication function" in the following instances with the undiluted chemical injection method that uses the "frequency-dividing function" as in 9-1-1.

- When the injection interval is too wide, which may cause uneven concentration, or
- When diluted chemical is used

[Conditions]

Assume that a flow meter having a large pulse-generating unit is selected in 11-1-1.

Transmission unit of flow meter (L/P) 50 (L/P) = 0.05 (m³/P)

Target chlorine injection rate 1.0mg/L

Sodium hypochlorite concentration 12%

Type of chemical injection pump PZI□-31 (injection rate per pulse: 0.1 mL)

① Calculate the logical injection rate Q(mL) per flow meter pulse.

$$\begin{aligned} &= \text{Flow rate (m}^3\text{) per flow meter pulse(m}^3\text{)} \times \text{Target injection rate (mg/L)} \\ &\quad \times 100/\text{Sodium hypochlorite concentration (\%)} \\ &= 0.05 \times 1.0 \times 100/12 \\ &\approx 0.417 \end{aligned}$$

② Set the multiplication factor.

$$\begin{aligned} &= \text{Logical injection rate (mL) per pulse} / \text{Injection rate (mL) per pump pulse} \\ &= 0.417/0.1 \\ &\approx 4.17 \text{ times} \end{aligned}$$

Remarks

- The advantages of this method include the following:
 - The concentration is more likely to be uniform in raw water the higher the dilution ratio increases.
 - Response during control is faster and accuracy increases.
 - There is less clogging of injection points.

③ Set the pulse multiplication factor.

Set the multiplication factor as a value greater than the calculated value and as the integer closest to the calculated value. In this example, set "5".



④ Set the stroke adjustment dial.

As the numerical value for the multiplication factor has been rounded up, the injection rate will be too great if this value is left as it is. To compensate for this, fine-adjust using the stroke adjustment dial.

Calculate the setting value by the following formula.

$$\begin{aligned} \text{Stroke adjustment dial setting value (\%)} &= \frac{\text{Calculated value of set multiplication}}{\text{Actual set multiplication factor}} \\ &= \frac{4.17}{5} \times 100 (\%) \\ &= 83.3 (\%) \end{aligned}$$

* This numerical value is for reference purposes only.

⑤ Set the number of strokes (spm).

If the flowmeter signal is input at the default setting, liquid will be injected at a rate of 300 spm. However, increasing the interval up to the next pulse will result in uneven injection.

On PZi pumps, the number of strokes (spm) can be changed in the manual mode setting.

Shortest pulse interval :

$$n = \frac{\text{Raw water max. flowrate (L/hr)}}{\text{Flowrate per flowmeter pulse (L)}} = \frac{10000}{50} = 200(\text{pulse/hr})$$
$$= 3.3 (\text{pulse/min}) = 1\text{pulse}/18 \text{ seconds}$$

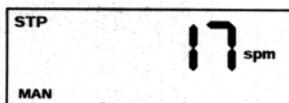
Number of pump strokes (spm):

As the pump should operate by five strokes per 18-second interval

$$\left(5 \text{ strokes} \times \frac{60 \text{ seconds}}{18 \text{ seconds}} \right) = 16.6$$

Injection unevenness can be reduced by setting to as small a value above 17 spm.

In this example, a value between 17 to 20 spm is suitable.



11-2 Control by 2-point Level Switch

(1) Change the parameters.

Change P-07 (IN4) to "6: Level switch input".

Set P-12 to "0" (operation is continued when an alarm occurs).

Set P-08 to "5" (level error alarm is output).

(2) Connect the signals.

- Connect the lower limit signal (IN4) across pins 7 (+) and 3 (common) on the 8-pin connector.
- Connect the lower/lower limit signal (IN2) across pins 3 (+) and 4 (common) on the 4-pin connector.
- Connect the alarm output signal (OUT1) across pins 4 (+) and 6 (common) on the 8-pin connector.

11-3 Pulse Signal Noise Countermeasures

If the influence of power supply frequency causes the pump to malfunction during pulse input, this noise influence can be reduced by switching to the low-speed port. (In the case of the signal less than 600 pulse/sec.)

* See "5-4 I/O Signal Specifications."

(1) Change the parameters.

Change P-04 (IN1) to "0" (Unusable).

Change P-04 (IN2) to "1" (Pulse input signal).

(2) Connect the signal.

Connect the pulse signal (IN2) across pins 3 (+) and 4 (common) on the 4-pin connector.

11-4 Flowrate Display

The indication (setting) in each mode can be set to mL/min by setting the maximum discharge volume (at 300 spm) of the pump in parameters.

(1) Set the parameters.

- Set P-10 to 0.1 to 600 (mL/min).

- * Set according to the pump specifications or actual measured value.

- Set P-11 to "2: mL/min"

- * Changing the stroke adjustment dial causes the indicated value to deviate.

The indicated value is the value calculated from the number of strokes (spm).

11-5 Actual Indicated Flowrate by Flow Checker

The actual flowrate can be indicated by combining the pump with a Flow Checker and pressing the **MODE** key during operation in each mode.

(1) Set the parameters.

- Set P-20 to "1: Actual flowrate indication ON".
- * If the display is unstable, increase the P-21 (running average) and P-22 (display update time) values. Increasing these values causes display response to deteriorate.
- * If the actual measured discharge volume deviates from the indicated volume, fine-adjust P-26 (basic unit).

(2) Wiring

Function	Flow Checker	PZi8/Special Function Model
Pulse signal	1. White	8-pin connector 1 (white)
+5V power	2. Red	8-pin connector 2 (brown)
Input common (-)	3. (Black)	8-pin connector 3 (green)

11-6 Flow Monitor Timer by Flow Checker

The pump is used in combination with a Flow Checker as a flow monitor timer. Abnormal flow can be detected by one of the following two values.

- ① Pulse interval
- ② Flowrate lower limit value

Select the detection method in parameter P-23.

(1) Set the parameters.

- a) ● Select P-23 "1: Error detection time."
 - Set P-24 within range 1 to 9999 seconds.
- b) ● Select P-23 "2: Flowrate lower limit value."
 - Set P-25 within range 0.1 to 999.9 mL/min.

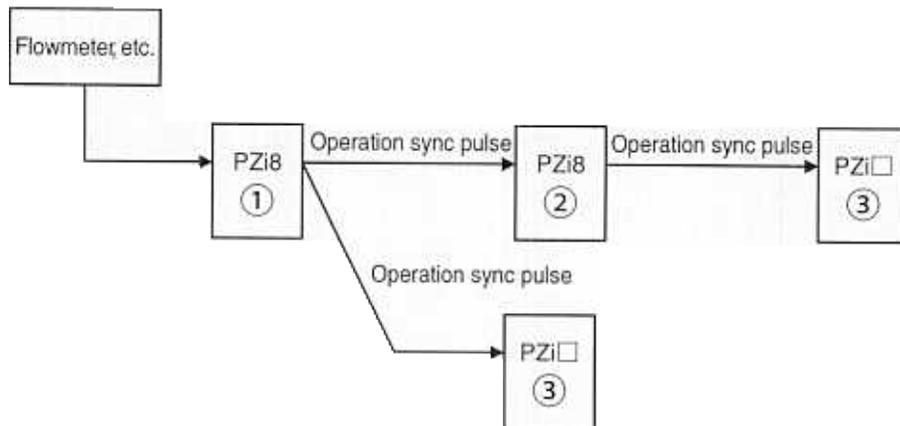
(2) Wire in the same way as 11-2-4.

* Operation when an alarm occurs can be selected in parameter P-13.

(0: Continued operation, 1: Pause, 2: Pump operation stopped)

11-7 Control of Multiple Pumps by a Single Signal

In the following kind of application, a pulse divider is generally used. This, however, is not required on the PZi8.



- * On the PZi8 and special function model, two signals can be output.
- * After receiving the operation sync pulse, the PZi can also perform frequency-division and multiplication on that signal.
- * When the dividing ratios differ, connection is performed using the lower of the two dividing ratios (larger number of pump operations).

(1) Set the parameters.

Set P-8 and P-9 of PZi8 (1) pump to "2: Operation sync pulse output".

* The operation sync pulse output is set for both OUT1 and OUT2.

* Pumps (2) and (3) are used in the pulse dividing (multiplication) mode.

12 Input/Output Port Assignments Change

12-1 Input/Output Signals (Port Assignments)

PZi8

Special Function Model

The PZi8 and special function model has four pulse input ports and two pulse output ports. However, these functions are not assigned in the standard specification. In this case, the ports can be switched to make effective use of the limited number of I/O ports. Note, however, that functions other than "0: Unusable" cannot be assigned in duplicate on input ports.

* See "13-2 Table 1: Input Signal Assignments" and "13-3 Table 2: Output Signal Assignments."

1) Setting of input signals (The following functions can be assigned to inputs 1 to 4.)

0. Unusable

Disables use of the input signal port.

(This function is used, for example, when changing ports to avoid duplicate assignments.)

1. Pulse input signal

Performs pulse input for frequency-division and multiplication.

2. Stop input

Pump operation can be paused by inputting this signal during operation.

(Pump operation is stopped by shorting across terminals, and pump operation is started by leaving terminals open.)

When this signal is input, only the STOP key is enabled and pump operation is stopped. The function of other keys is not accepted.

3. Present value reset

Resets and restarts the current value of the counter and interval modes.

4. Alarm reset

Cancels alarm output that is output when an alarm occurs, or pump stoppage according to the setting when an alarm occurs. If the alarm re-occurs even after performing a reset, the alarm cannot be cancelled unless the alarm-reset signal is entered once more.

5. Flow Checker

This function acts as a flow monitor timer. Alarms are displayed and output when there is no pulse input within the preset time period (set in parameters) or when output falls below the discharge volume lower limit value.

6. Level switch signal input

Alarms are displayed and output when the signal input is ON.

The pump operating state when an alarm occurs can be set by parameter P-12. (default: pump pause)

2) Setting of output signals (The following functions can be assigned to outputs 1 and 2.)

0. Unusable

Disables use of the output signal port.

1. Package alarm

The signal is output when an alarm signal is input. This signal is canceled when the alarm is reset or the signal is reset by the switch.

2. Operation sync pulse output

A single pulse signal is output per stroke synchronized with solenoid drive.

3. Operation signal output

This signal is output continuously during operation.

Output is also stopped during a stop performed on the operation panel and a pause from the outside.

4. End signal output

When the count preset in the count mode is exceeded, the end signal (100 msec width) is output.

Individual alarm outputs

Alarms are output individually. See "13-3 Table 2: Output Signal Assignments."

3) How to assign ports

Set the respective function No. to parameters P-04 to P-09.

4) Cautions when Assigning Ports

1. Pulse input port

- The input port cannot be assigned in duplicate except for assignment of "Unusable." First, set the duplicate assigned port to "0: Unusable" and then set the function No. to the desired port.
- On the PZi4, there are two inputs on the 4-pin connector. Input control functions, however, are fixed and cannot be changed.
- The 4-pin connector and 8-pin connector each have two inputs. Input control functions can be changed in parameters.

1) High-speed port

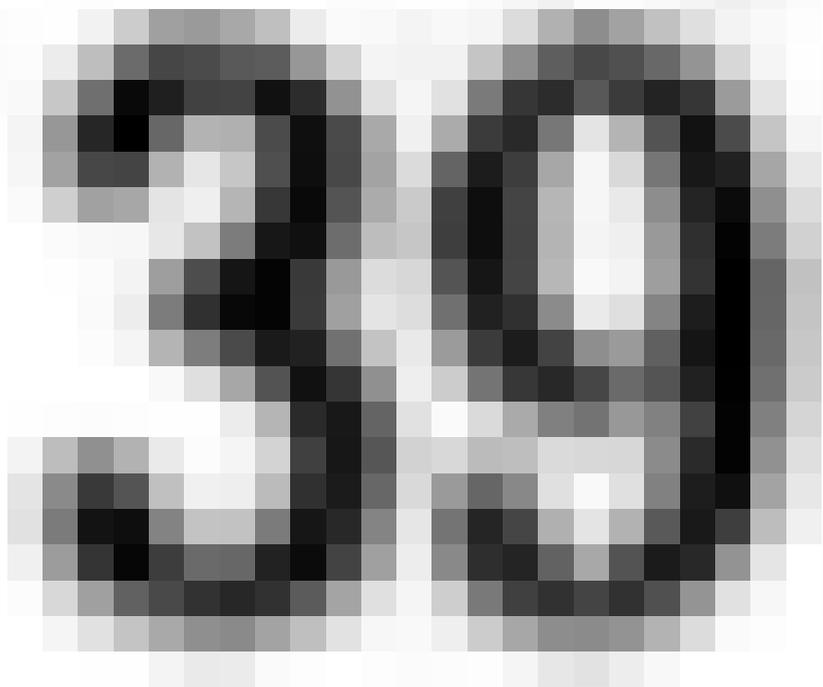
Flow Checker signals can be used only on the high-speed port.

2) Low-speed port

Malfunction caused by noise can be prevented by using the low-speed port if malfunction occurs by pulse input.

2. Output ports (PZi8 only)

- All assignments for output ports can be assigned twice or more.
- Two output ports provided with the 8-pin connector.



13 DATA

13-1 List of Parameters

PZi8 Special Function Model

Control Parameter List

No.	Item	Description	Parameter
P-01	Analog mode	Type of input signals	0: 4-20 1: 0-20
P-02	Frequency-division/ multiplication mode	Count of surplus pulse signal	1 to 9999 buffer size
P-03		Remained pulses when stopped by the external stop signal	0: Save 1: Clear
P-04	Input 1(high-speed)	Function	See Table 1
P-05	Input 2(low-speed)		See Table 1
P-06	Input 3(high-speed)		See Table 1
P-07	Input 4(low-speed)		See Table 1
P-08	Output 1(O.C.)	Function	See Table 2
P-09	Output 2(O.C.)		See Table 2
P-10	Display	Max. displayed discharge volume value	0.1 to 600
P-11		Display unit	0: spm 1: % 2: mL/min
P-12	Alarms	Level	0: Operation continued 1: Pause (temporary stop)
P-13		Injection monitor	2: Pump stopped
P-14		Analog error	0: Operation continued 1: Pause (temporary stop)
P-15	Mode screen display	ANG: Analog mode	0: Disabled 1: Enabled
P-16		DIV: Pulse frequency-dividing mode	0: Disabled 1: Enabled
P-17		MUL: Pulse multiplication mode	0: Disabled 1: Enabled
P-18		CNT: Counter mode	0: Disabled 1: Enabled
P-19		INT: Interval mode	0: Disabled 1: Enabled
P-20	Flow Checker	Actual flow rate display	0: No 1: Yes
P-21		Running average count	1 to 20 times
P-22		Display update time	0 to 60
P-23		Flow monitor timer	0: Disabled 1: Detection time of errors 2: Lower limit of flow rate
P-24		Timer time	1 to 9999 (sec)
P-25		Lower limit alarm of discharge volume	0.1 to 999.9
P-26		Basic unit of Flow Checker	0.90 to 1.10 (mL/pulse)
P-30	Interval mode	Operation at starting time	0: ON 1: OFF
P-31	Counter mode	Start trigger	0: Start key 1: External input
Option	P-80	Reset	Reset to the setting at the factory shipment 0: Disabled 1: Effective

Note) Parameters cannot be changed on the PZi4 model.

Default	Explanation
0	4-20 mA or 0-20 mA analog signals supported
1	Number of pulses to hold
1	Makes remaining pulses to store/clear at an external signal stop
1	Any value can be selected from Table 1.
2	Only selected function is enabled (Port and function are assigned simultaneously.)
5	Two or more assignments other than "0: Unused" cannot be set at the same time.
3	
1	Can be freely selected from Table 2.
2	Only the selected functions are effective. (Port assignment and function assignment are performed simultaneously.)
30.0	Max. value (reference value) to be displayed when mL/min. is selected on P-11.
0	Unit is displayed as spm or %, mL/min.
1	Selects operation when an alarm occurs.
0	The pause function temporarily stops operation when an alarm occurs, and operation is automatically resumed when the alarm is canceled.
1	Select the operation when an analog error occurs.
1	When "Disabled" is selected, the mode will be hidden.
1	
1	
0	
0	
0	The actual flow rate can be displayed by the MODE key during pump operation.
14	Sets the running average count.
2	Sets the display update of Flow Checker.
0	Turns the flow monitor alarm function. Detection time is set on P-24 and the lower limit value is set on P-25.
60	Time to clear display to zero after setting the alarm output and pulse input when there is no input pulse within the preset time
0.1	Displays and outputs the alarm when the discharge volume result is detected that is lower than the setting value while monitoring flow rate.
1.00	Changes the basic unit (/1 pulse) to convert according to the pulse from Flow Checker.
0	Default operation at starting
1	Sets the start reset method
0	When 1 is selected and SET, all values will be initialized to become the condition at the shipment. The value of P-80 returns to 0.

13-2 Input Signal Assignments

Code No.	Description	Application
0	Unused	No function
1	Pulse input signal	Used in frequency-division/multiplication mode
2	Stop input	When this signal is input, operation stops if the pump is in operation, or the START key cannot be used if LCD indication is blinking and pump operation has stopped.
3	Start reset input	Resets the present value to the setting value.
4	Alarm reset input	This input resets the alarm flag.
5	Flow Checker input	Display the actual discharge volume after the Flow Checker signal is received Pulse input corresponding to this input outputs an alarm.
6	Level input	Alarm is displayed and output when this input is present.

13-3 Output Signal Assignments

Code No.	Description	Application	Specifications
0	Unused	No function	—————
1	Package alarms	This signal is output when any alarm occurs.	Continuous
2	Operation pulse output	Pulse signal synchronized with solenoid drive	40 msec pulse
3	Operation signal	This signal is output during pump operation.	Continuous
4	End signal output	End signal when counting of the setting value ends in the countmeasuring mode.	100 msec pulse
5	Level error	Selected to output alarm outputs individually.	Continuous
6	Buffer overflow		
7	Analog error		
8	Injection monitor error		
9	Number of strokes exceeded		

* PZIA only

(Remarks)

For details on signal specifications, see "5-4 I/O Signal Specifications".

13-4 Error Codes

Code No.	Alarm type
1	ROM write error
2	Abnormal level
3	Buffer overflow
4	Analog error
5	Injection monitor error
6	Number of strokes exceeded

13-4-1 Explanation of alarm codes

Alarm Code No.	Type	State When Alarm Occurs	Remarks
1	ROM write error	Pump error	Operation is stopped.
2	Abnormal level alarm	When "Level input" is set for the input port, and that port is ON (shorted)	Selects the processing method on P-12.
3	Input pulse buffer overflow	When the number of input pulses increases momentarily during frequency-division/multiplication operation, and the preset buffer size is exceeded	Operation is continued even if an alarm is output.
4	Analog input error alarm (min to max)	When the input signal deviates from the stipulated range during pump operation in the analog input mode	Selects the processing method on P-14.
5	Injection monitor error alarm	When the next pulse does not arrive within the time preset by P-24	Selects the processing method on P-13 when the setting on P-23 is "1"

13-4-2 Mode when an alarm occurs (occurs only during operation)

Alarm Code No.	MAN	ANG	DIV • MUL	CNT • INT
1	●	●	●	●
2	●	●	●	●
3	—	—	●	—
4	—	●	—	—
5	●	●	●	●

● : Alarm occurring, — : Alarm not occurring

13-4-3 How to remedy alarms

<<No. 1>>

- Try turning the power OFF and then back ON again. If this does not remedy the alarm, a probable cause is a circuit error.

<<No. 2 to 5>>

- Press the RESET key to remedy.
- Remedy by resetting the alarm externally.
- Stop pump operation by the STOP key.

13-5 Display Details in Different Statuses in Each Mode

■ part blinks.

Mode	Status		Operation			External stop			Internal stop			Setting 1		Setting 2	
	Flow Checker	Code	Numerical value	Unit	Code	Numerical value	Unit	Code	Numerical value	Unit	Code	Numerical value	Unit	Code	Numerical value
Manual	Disabled	MAN	Setting value	*1	MAN STP	Setting value	*1	MAN STP	Setting value	*1					
	Enabled *9	MAN FLW	Flow rate measurement value	mL/min	MAN STP FLW	0.0	mL/min	MAN STP	Setting value						
Analog	Disabled	ANG	Output value		ANG STP	0		ANG STP	Setting value	*2					
	Enabled *9	ANG FLW	Flow rate measurement value	mL/min	ANG STP FLW	0.0	mL/min	ANG STP P	Proactive band setting value				ANG STP S	SHIFT setting value	%
	Disabled	DIV	Frequency-dividing ratio	Disabled	DIV STP	Disabled	Disabled	DIV STP	Frequency-dividing ratio	Disabled	Disabled				
	Enabled *9	DIV FLW	Flow rate measurement value	mL/min	DIV STP FLW	0.0	mL/min	ANG STP	Frequency-dividing ratio	Disabled	Disabled				
Multiplication	Disabled	MUL	Multiplication	Disabled	MUL STP	Multiplication	Disabled	MUL STP	Multiplication	Disabled	Disabled				
	Enabled *9	MUL FLW	Flow rate measurement value	mL/min	MUL STP FLW	0.0	mL/min	ANG STP	Multiplication	Disabled	MUL STP	Multiplication	Disabled		
Count	Disabled	CNT		Disabled	CNT		Disabled	CNT STP	Setting value	Disabled	Disabled				
	Enabled	CNT FLW	Flow rate measurement value		CNT STP FLW	0.0	mL/min	CNT STP	Setting value	Disabled	CNT STP	Setting value	Disabled	CNT STP	Setting value
Interval *9	Disabled	INT		min	INT STP	*4	min	INT STP	Setting value	min	INT STP	Setting value	min	INT STP	Setting value
	Enabled	INT FLW	Flow rate measurement value		INT STP FLW	0.0	mL/min	INT STP	Setting value	min	INT STP	Setting value	min	INT STP	Setting value

- *1 : spm or % or mL/min (see F.09) blink+0 display
- *2 : 4-20 or 0-20 (see F-01)
- *3 : Countdown display from setting value. Pump operation stops when count reaches 0 at the end of countdown.
- *4 : Countdown is paused, and standby state is entered. (pause function)
- *5 : ON/OFF display is switched and is according to the set time
- *6 : State at start of timer operation is displayed. Either of ON or OFF (see F-30)
- *7 : Countdown display from setting value. ON/OFF is switched at end of countdown.
- *8 : Digit setting or setting value of X1000, X100, X10, X1
- *9 : The mode and function are not provided on the FZ14 model



Liquid Control Technology

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