PDF-W 0054-02

IWAKI

Pneumatic drive bellows pumps

FS series

A small, lightweight and low-cost pump series has been realized owing to an increased stroke speed.

The FS series represents the latest air-driven bellows pumps
developed by drawing upon our high level of expertise
which was established through years of experience and achievement.
The increased speed of pump strokes enabled us to reduce the size and weight
of the product and accompanying manufacturing costs.
The FS series pumps are easy to operate as each is usable in a wide range of liquid temperatures.
The heart of the pump is the versatile R-shaped bellows
which are employed to make high-pressure discharge possible and ensure a long life.
The FS series can deal with a number of difficult tasks;
from circulation of washing water and circulation/transfer of CMP slurry to the feeding of chemical liquid.

High-speed Strokes
An increase in the speed of pump strokes (240 spm maximum) resulted in a reduction of size, weight and costs involved in the manufacture of the pump as well as a decrease in pulsation.
Note: Pump strokes are different depending on the pump model. For details, please refer to the table of specifications.

Contamination-free Design
All of the parts which come into contact with liquid are made of fluororesin. The pump is designed so no metal portion is exposed. The exterior is also coated with fluororesin. The use of a shaft seal (patent pending), our own development, has the effect of remarkably decreasing the production of particles.

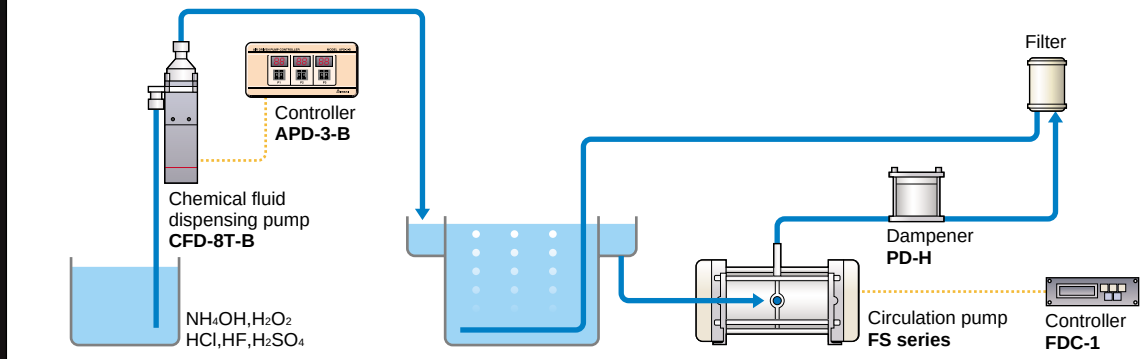
Wide Range of Liquid Temperatures/ High-Pressure Discharge
As it can handle liquids with temperatures ranging from 5 - 180˚C with discharge pressures up to 0.45MPa, the pump is usable not only for washing processes and CMP processes but also for feeding chemical liquids.

Facility of Maintenance
The proximity switch can be replaced without disassembling the pump and regular tightening of stud bolts is unnecessary, resulting in reduced downtime.

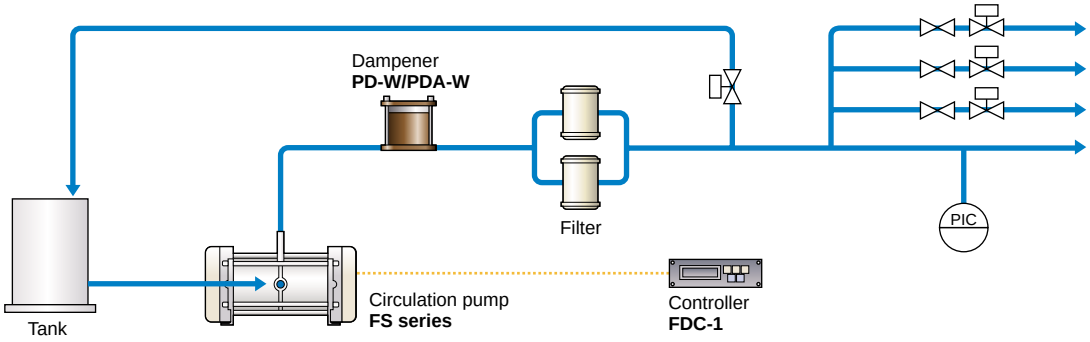
Sensor Drive System
The pump uses the sensor drive system which opens/closes the solenoid by means of a proximity switch built internally. Therefore, when connected to various controllers, the discharge can be controlled or managed easily.

Example of Installation

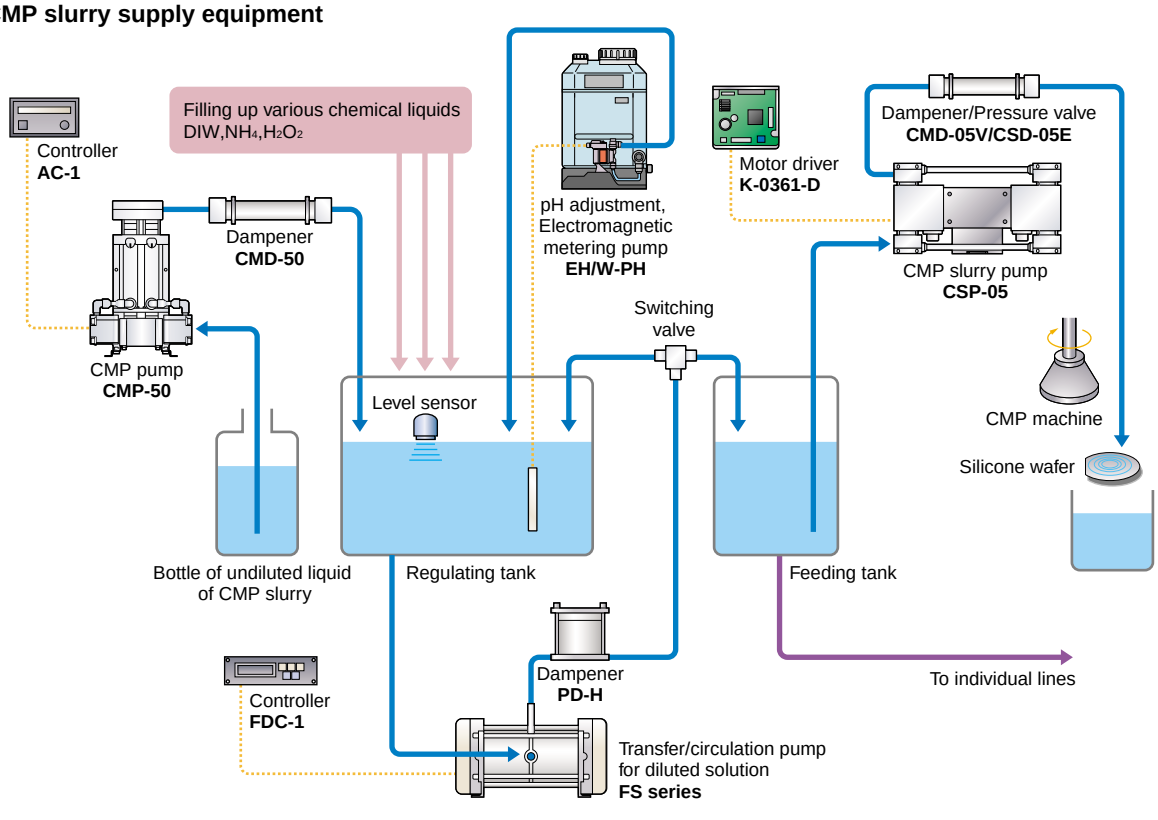
200/300mm wafer wet-bench



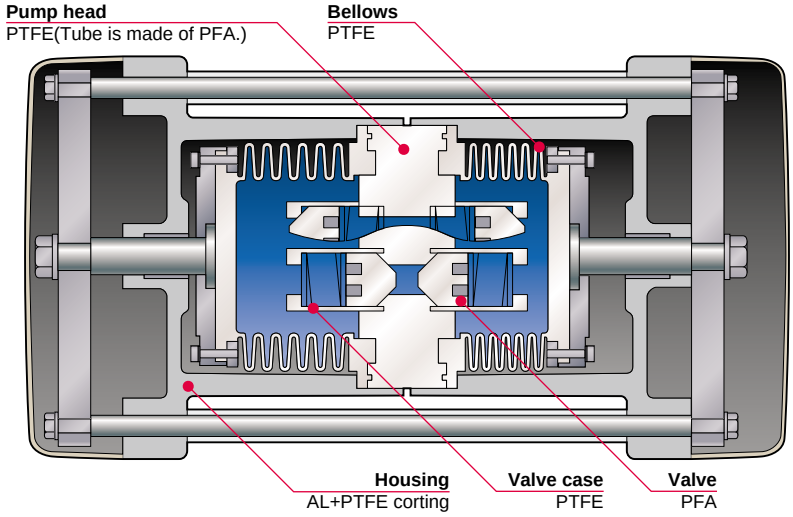
Chemical supply process



CMP slurry supply equipment



Construction and materials



Specifications

Model		FS-15HT1/T2			FS-30HT1/T2			FS-60HT1/T2		
Max. discharge capacity	L/min	15			30			55		
Max. air supply pressure	MPa	0.15 – 0.5	0.15 – 0.3	0.15 – 0.2	0.15 – 0.5	0.15 – 0.3	0.15 – 0.2	0.15 – 0.5	0.15 – 0.3	0.15 – 0.2
Liquid temperature range	˚C	5 – 50	51 – 100	101 – 180	5 – 50	51 – 100	101 – 180	5 – 50	51 – 100	101 – 180
Max. air consumption	NL/min	200	160	110	370	280	170	670	440	300
Max. stroke speed*	spm	240			220			200		
Pump connection size		1/2" PFA tube			ø19xø16mm PFA tube			ø25xø22mm PFA tube		
Supply air connection size		Rc1/4			Rc1/4			Rc3/8		
Ambient temperature	˚C	0 – 40								
Drive system		By proximity switch								

*180 spm maximum with feed air pressures between 0.3 and 0.5 MPa.

Pump identifications

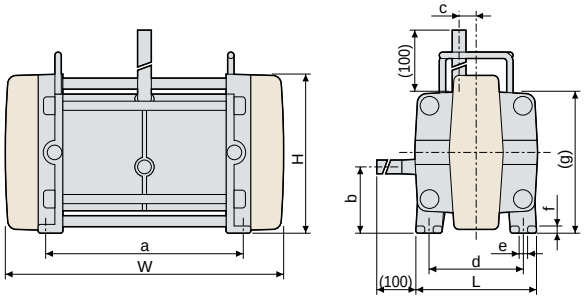
FS - 15 H T1 - 01

1 2 3 4 5

1	**Sries code**	lwaki pneumatic drive bellows pump FS series	**4**	**Sealing structure of pump head/bellows**	**T1**: Tube connection (suction opening / discharge opening) / Bellows separation type **T2**: Tube connection (suction opening / discharge opening) / Welded one-piece structure
2	**Pump size**	**15**: Max. discharge capacity 15L/min **30**: Max. discharge capacity 30L/min **60**: Max. discharge capacity 60L/min	**5**	**Special specification**	Without code: Standard specificaion **01**: Special specification (01,02 ...)
3	**Liquid temperature**	**H**: Usable for 180˚C			

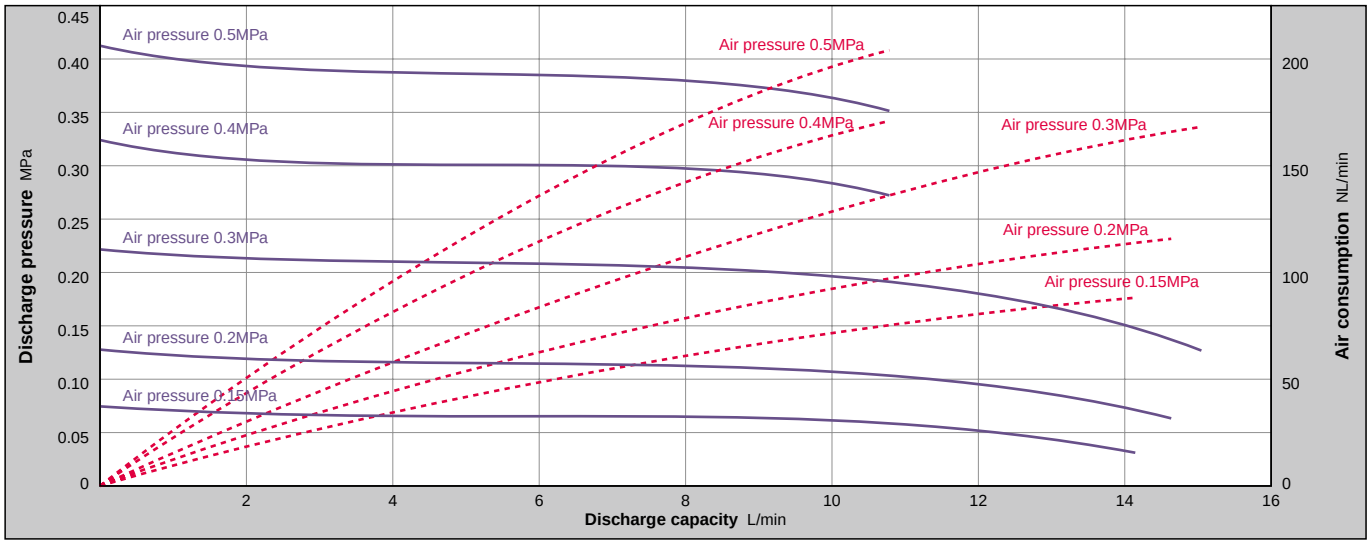
Dimensions in mm

Model	W	L	H	a	b	c	d	e	f	g
FS-15HT1/T2	315	120	166	213	77	15.5	96	10	8	144
FS-30HT1/T2	390	151	208	272	93	23	115	10	9	180
FS-60HT1/T2	441	194	251	317	107	27	152	12	11	224

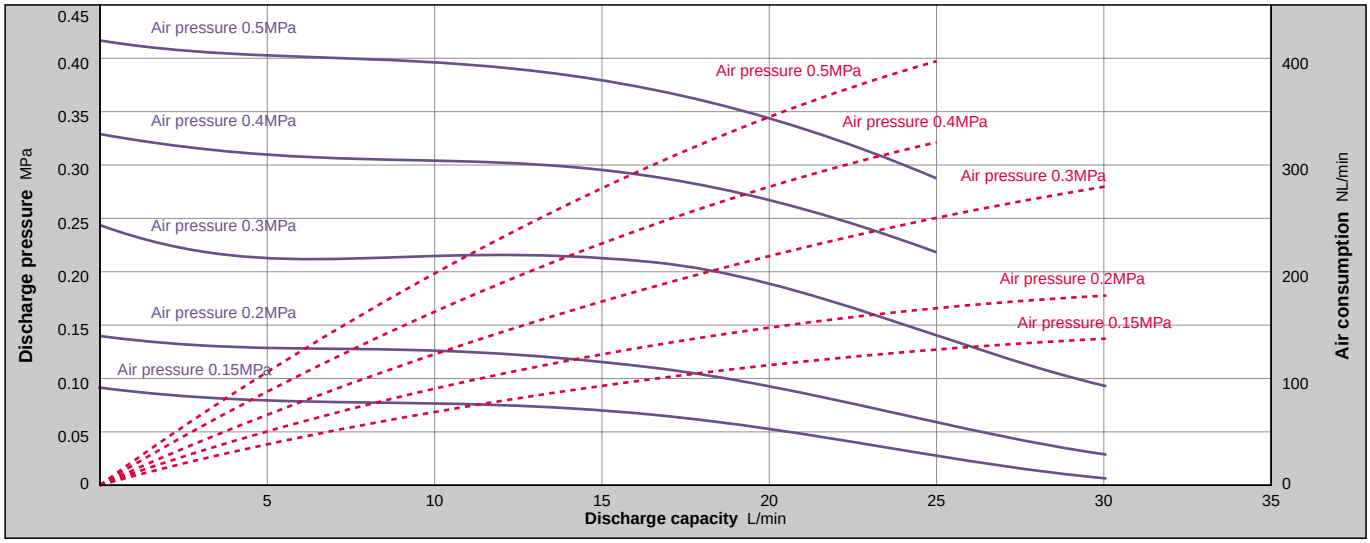


Performance curves

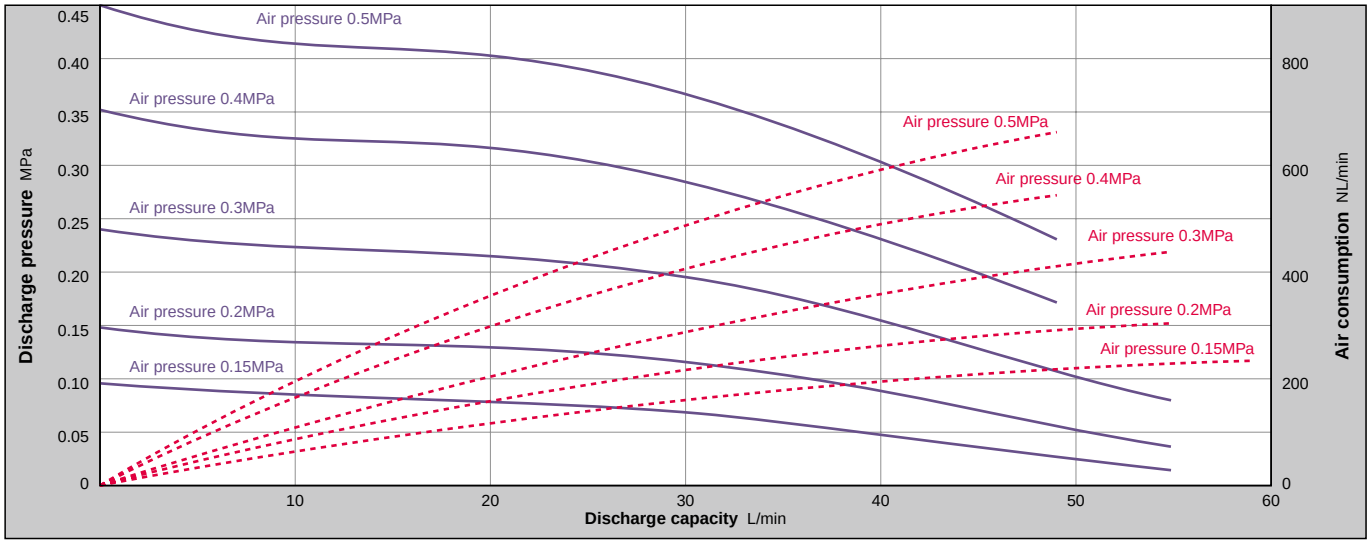
FS-15HT1/T2



FS-30HT1/T2



FS-60HT1/T2



Optional accessories

Dampener

Installation of a dampener on the discharge side of the pump will reduce pulsation and prevents particle formation through filter and pipe vibration.

PD-H (for wet use)

This compact and low-cost dampener is exclusively for wet use.
It is constructed so that liquid can be drained from the bellows easily.
A leak sensor is included in its standard equipment.

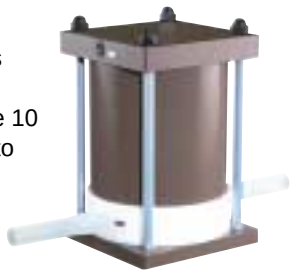
Specifications

Model	PD-15H		PD-30H		PD-60H	
Applicable pumps	FS-15HT1/T2		FS-30HT1/T2		FS-60HT1/T2	
Max. supplied air pressure MPa	0.3	0.2	0.3	0.2	0.3	0.2
Liquid temperature range ˚C	5 - 100	101 - 180	5 - 100	101 - 180	5 - 100	101 - 180
Connection size	1/2" PFA tube		ø19 x ø16mm PFA tube		ø25 x ø22mm PFA tube	
Supply air connection size	Rc1/8					
Wet-end materials	PTFE, PFA					

Note: Unusable under higher pressure than the specified level.

PD-W/PDA-W (for chemical liquid feeding)

This dampener is well suited for feeding chemicals because of its high pressure specification. The ranges of liquid temperatures are 10 to 100˚C for the PD type and 10 to 180˚C for the PDA type.

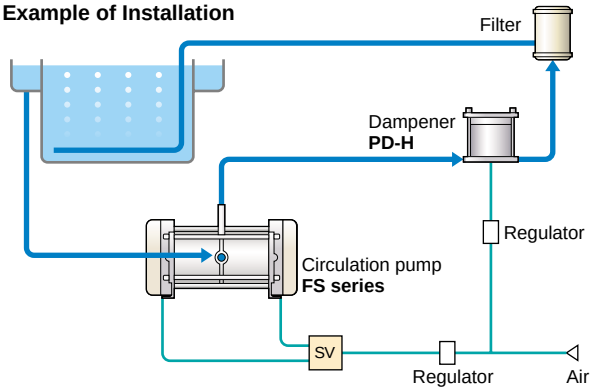


Specifications

Model	PD-20W	PD-40W	PDA-20W	PDA-40W
Applicable pumps	FS-15, 30HT1/T2	FS-60HT1/T2	FS-15,30HT1/T2	FS-60HT1/T2
Max. supplied air pressure MPa	0.5		0.5	
Liquid temperature range ˚C	10 - 100		10 - 180	
Connection size	ø19 x ø16mm PFA tube	ø25 x ø22mm PFA tube	ø19 x ø16mm PFA tube	ø25 x ø22mm PFA tube
Supply air connection size	Rc1/4			
Wet-end materials	PTFE, PFA			

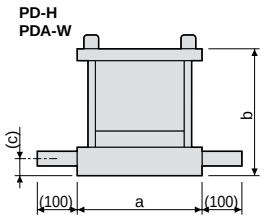
Note: Unusable under higher pressure than the specified level.

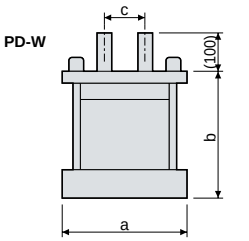
Example of Installation



Dimensions in mm

Model	a	b	c
PD-15H	110	110	19.5
PD-30H	116	124	22.5
PD-60H	142	186	25.5
PDA-20W	148	215	33
PDA-40W	188	255	36
PD-20W	144	215	50
PD-40W	184	250	70





Quick Exhaust Valve

Its installation on the discharge side of the pump will reduce pulsation and prevent particle formation through filter and pipe vibration.

Quick Exhaust Valve QEV

When this is installed between the pump and the solenoid, corrosion of the solenoid due to return air is prevented. It also reduces exhaust resistance to allow the bellows to move smoothly.

Specifications

Model	Connection size	Applicable pumps
QEV-8V	Rc1/4	FS-15,30HT1/T2
QEV-10V	Rc3/8	FS-60HT1/T2

Pump Controller/Driver

The solenoid is turned on and off in response to signals from the built-in proximity switch of the pump which reliably drives the pump . Two types of controllers and one type of driver are available.

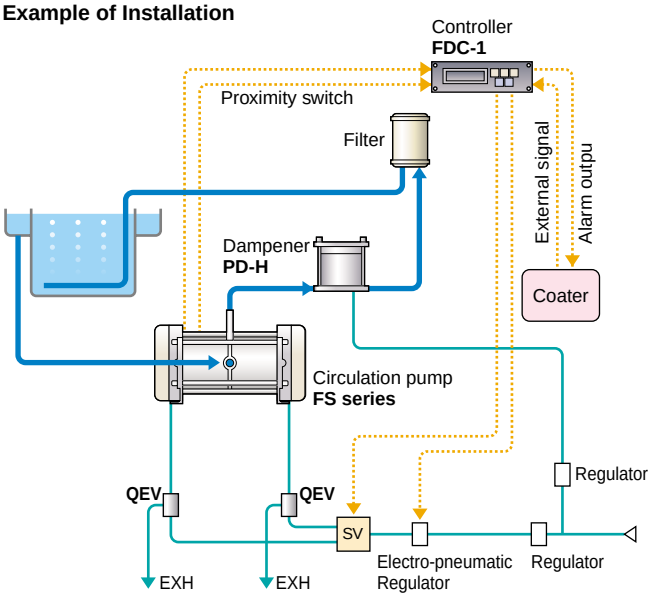
Pump controller FDC-1

As it controls the pump at a fixed level of discharge when it is connected to a electro-pneumatic regulator, stable circulation and filtration continue despite possible fluctuation of a discharge load due to clogging of the filter or some other reason. Since the difference between the inside pressure and the outside pressure of the bellows can be held at a minimum level, an increase in the life of the bellows is to be expected. Monitoring of the flow rate, the number of strokes and total count are possible. There are two operation modes; the AUTO mode by external signals and the MANU mode for manual operation. In addition to the sensor mode for operation by the proximity switch, the timer mode is provided as standard equipment. This means that if the proximity switch fails, the operation can be continued in the timer mode. Alarm displays such as leak alarm, pump malfunction alarm are available.

Specifications

General specification	Power source	DC24V±10%
	Power consumption	24VA max.
	Ambient temperature	0 – 50˚C
	Working atmosphere	Without corrosive gas in surrounding areas
Input specification	Start, Alarm reset	No-voltage contact or open collector Voltage ON: 3V maximum Voltage OFF: 18V maximum
Output specification (external output)	Leak alarm Pump malfunction alarm Life alarm First alarm	Output form: NPN open collector Switching capacity: DC24V 0.4A
Dimensions in mm	W158 x D152 x H48	

Example of Installation



Pump controller AC-1

This is a low-cost controller. It has alarm functions for any abnormal stoppage of the pump or breaking of the bellows.

Specifications

Power source	AC100V±10% 50/60Hz	
Power consumption	24VA max.	
Ambient temperature	0 – 60˚C	
Working atmosphere	Without corrosive gas in surrounding areas	
External output	Detection of break of bellows	Output form: Relay contact output AC250V 5A
	Time-up function	
Dimensions in mm	W144 x D146 x H72	

Pump driver FD-3

As it controls the pump at a fixed level of the discharge when it is connected to an electro-pneumatic regulator (available as an option), stable circulation and filtration continues despite possible fluctuation of a discharge load due to clogging of the filter or some other reason. Since the difference between the inside pressure and the outside pressure of the bellows can be kept at a minimum level, an increase in the life of bellows is to be expected. It is possible to set or change the remote control and the number of strokes by external signals. The length of time required for one shot of the pump (reference time) can be set. If the pump operates within a period which is less than the reference time, the time-up alarm is output to provide an alert concerning the malfunctioning of the pump. If the bellows break, a leak alarm is output. The cost is quite reasonable.

Note: A flow indicator, a feed air pressure indicator and an integrating stroke indicator are available as options. For details of these products, please call us.

Specifications

General specification	Power source	DC24V±10%	
	Power consumption	24VA max.	
	Ambient temperature	0 – 55˚C	
	Working atmosphere	Without corrosive gas in surrounding areas	
Input specification (external input)	External starting signal	AUTO operation	Relay contact
	External stroke-number change signal	Input impedance	0 – 100% at 0 – 5Ω
		AUTO operation	Relay contact Contact ON: Variable by external signal Contact OFF: Variable by volume
	Switching of maximum stroke number of pump	4-stage switching by dip switch in printed board	
Output specification	Leak alarm	Output form	Relay contact output DC30V 5A
	Time-up alarm output		
Dimensions in mm	W120 x D120 x H40		

IWAKI World-wide Network

ISO9001
JQA-1173

Thorough quality-control measures and constant pursuit of efficiency have helped Iwaki establish a superior production system.

IwakiI Saitama plant

Iwaki Miharu plant