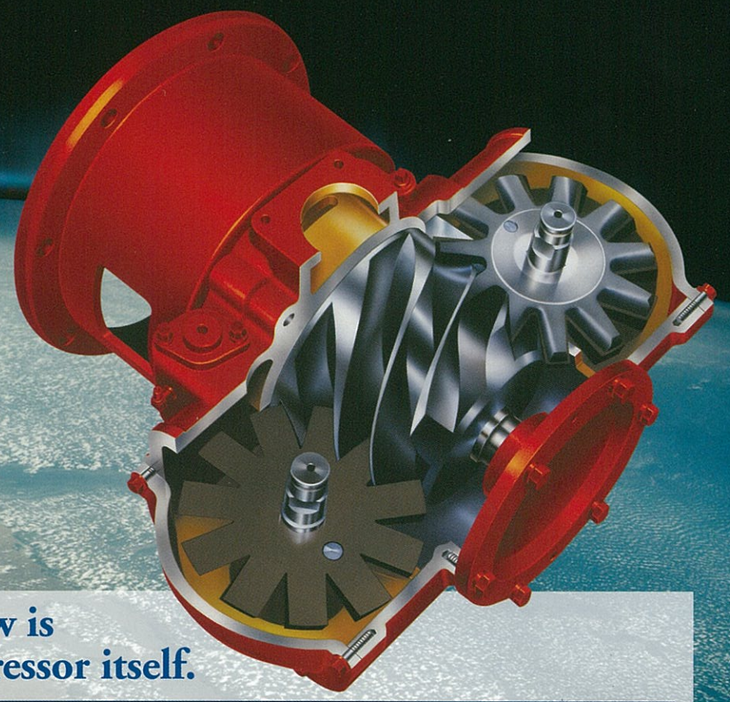
Zgaiard X
Zgaiard

OIL INJECTION AIR COMPRESSOR

MITSUI SEIKI

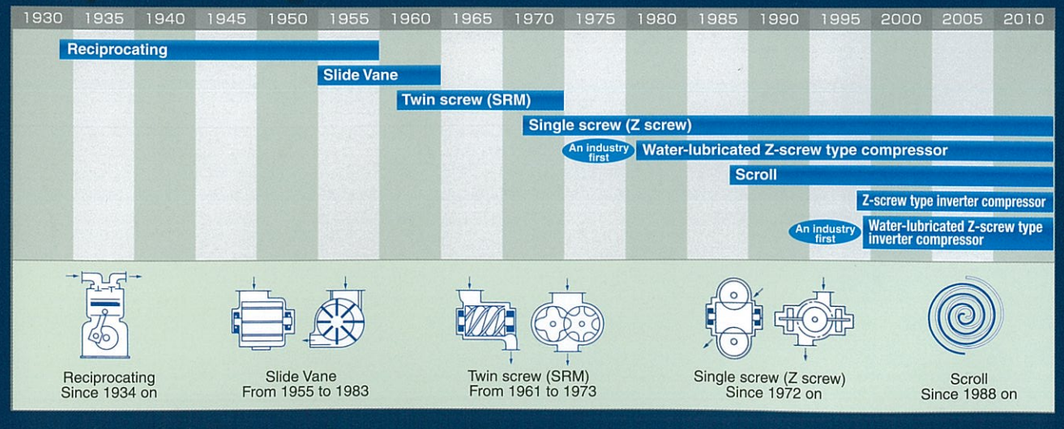
Zscrew
a world-class compression mechanism



Evolution of Zscrew is evolution of compressor itself.

Z-series is indeed the origin of the product series of the Mitsui Air Compressor. Since launched the Z screw air compressor on 1972, we have constantly responded the needs of the times that change day by day to evolve it as a high efficient, energy saving air compressor. Then, we launched the inverter controlled ZV series that have been improved to deal with the ongoing environmental issues. Now we have lined up the lower noise and space saving advanced model (Zgaiard) mounting the brand-new IPM (permanent magnet) motor to meet users' expectation. Please note also that the Scroll air compressor series(Escal), that have been receiving good reputations since their launching on 1988, are now graded up to have the more high efficiency and energy saving capability. They are most appropriate for countering the environmental issues to be required by the Earth and Industries.

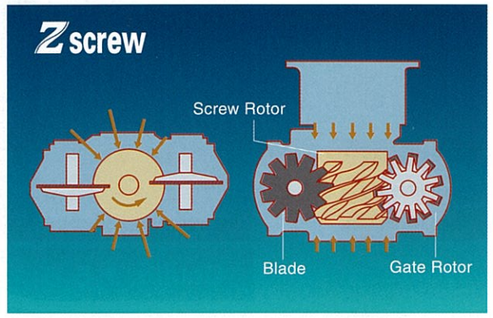
Compressors design



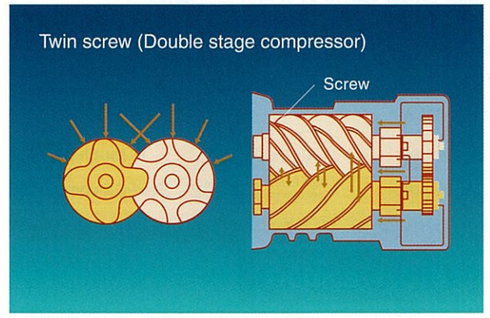
Simple construction and sealing effect realize excellent performance.

Primary factor of high efficiency and durability of "Z screw" is achieved by sealing gaps of each portion with oil in good balance by simple constitution consists of one screw rotor and two gate rotors. It holds noise and vibration in a minimum whereas efficiency does not deteriorate in low rotation either. "Z screw" of this superior mechanism. It extends the maintenance cycle marvelously and represents maximum capability in the inverter control.

Comparison of Z screw with Dry Twin screw

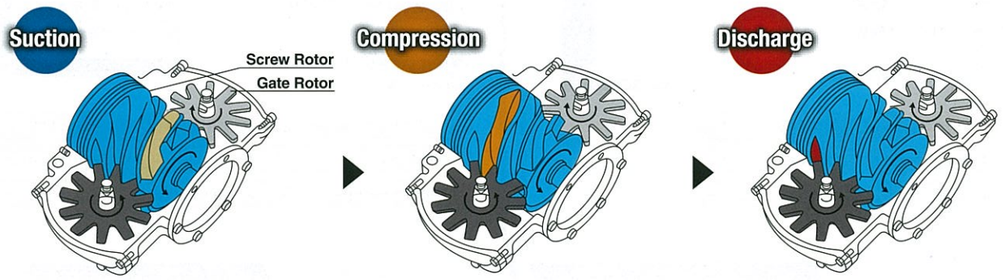


- Radial and axial loads eliminate each other, theoretically resulting a zero load



- Radial load and distance between the two screw axles place significant limitations on bearing load

Air flow

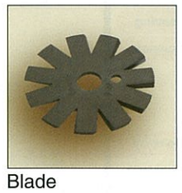


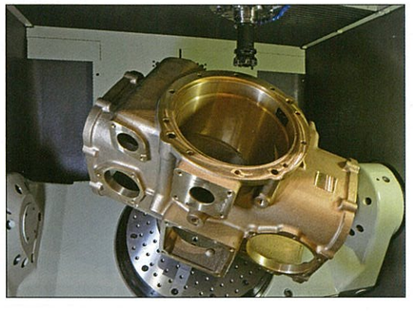
High reliability implemented by the precision

High precision technology of the MITSUI SEIKI, also known as a machine tool manufacturer, is utilized on processing the compression section to make up the Z screw air compression mechanism that realizes the high efficiency and high stability.


Gate Rotor


Screw Rotor


Blade



We offer a wide lineup of products to apply for any needs, from compact to large units.

MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

Ultimate high productive and energy saving achieved by the inverter control

ZgaiardX

Inverter Compressor

Air cooled 22 / 37kW
(option: water cooled 22 / 37kW)

22kW / 37kW

Inverter | Air Volume UP | IT touch panel | Energy saving
IPM motor | High temperature rigidity against global warming | Red-CX compatible | High efficiency
Increasing | Quick response start system | Z-mate compatible | Air cooled fan inverter

Details ▶ 5,6

Basic type with simple design optimized for environmental performance

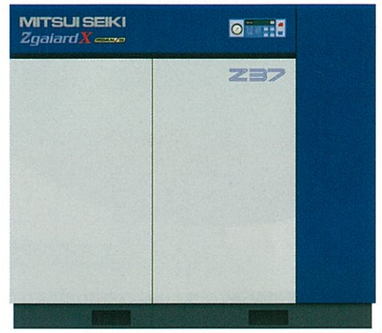
ZgaiardX

Basic Compressor

Air cooled 22 / 37kW
(option: water cooled 22 / 37kW)

22kW / 37kW

IE3 motor | Environmentally friendly | High efficiency
Air Volume UP | Red-CX compatible



Details ▶ 5,6

Zgaiard

Inverter Compressor

Air cooled 7.5～15kW

7.5kW / 11kW / 15kW

Inverter | Energy saving
Red-CX compatible | High efficiency
IE3 motor | Air Cooled fan inverter

Details ▶ 7

Zgaiard

Inverter Compressor

Air cooled 55 / 75kW

55kW / 75kW

Water cooled 55 / 75kW

55kW / 75kW

Inverter | Quick response start system | Z-mate compatible
IPM motor | IT touch panel | Energy saving
Increasing | Red-CX compatible | Air cooled fan inverter

Details ▶ 7

Zgaiard

Inverter Compressor

Air/ Water cooled 100 / 150kW

100kW / 150kW

Inverter | Energy saving
IPM motor | High efficiency
Red-CX compatible

Basic Compressor

Air/ Water cooled 100 / 150kW

100kW / 150kW

IE3 motor | High efficiency
Red-CX compatible

Details ▶ 7

Advanced scroll type

Escal series

Air cooled 3.7 / 5.5kW

IE3 motor
High efficiency
Compact

Details ▶ 10

Zgaiard

Basic Compressor

Air cooled 7.5～15kW

7.5kW / 11kW / 15kW

IE3 motor | High efficiency
Red-CX compatible

Details ▶ 8

Zgaiard

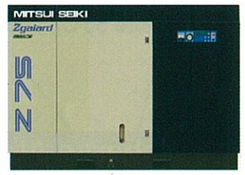
Basic Compressor

Air cooled 55 / 75kW

55kW / 75kW

Water cooled 55 / 75kW

55kW / 75kW



IE3 motor | High efficiency
Red-CX compatible

Details ▶ 8

Energy saving machine

Plural control system

Red CX

Averaging operating time | Averaging the operating time of inverter machine
Alternate operation | Turn back control
Permanent fixed operation | 2patterns of pressure settings by weekly timer
Start and stop in fixed order

Receiver tank

Instantaneous consumption
Energy saving
Lengthen machine's lifetime
Stable pressure supply

Details ▶ 11,12

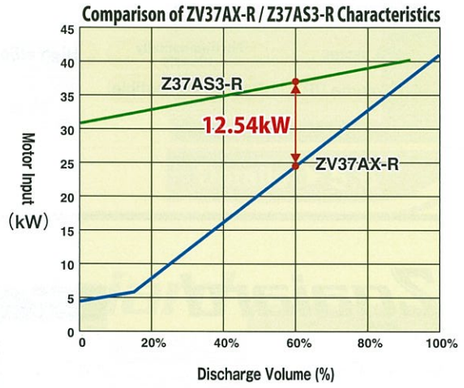
ZgaiardX series Inverter Compressor Basic Compressor 22/37kW

MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

NEW COMPRESSOR MIGHTY WORRIOR ZgaiardX !

HIGH PERFORMANCE ▫ HIGH EFFICIENT ▫ MULTI FUNCTION

Zgaiard X series use new generation "Z screw" compression mechanism to achieve up to 10% volume up from previous models.
Mounting Top Runner high efficiency motor and adopting new quick response system, now Zgaiard X series become more energy-saving to save the earth and customer cost together.
In addition to that, Zgaiard X become tougher(ambient temperature 50℃), and cleverer (new 7.0inch touch panel) !



■ Discharge Air Volume Up

As a machine tools manufacturer, ZgaiardX series achieve high performance air end.

	Previous series		ZgaiardX series
22kW Basic Type	3.9m³/min	5%UP	4.1m³/min
37kW Basic Type	6.5m³/min	6%UP	6.9m³/min

	Previous series		ZgaiardX series
22kW Inverter Type	3.8m³/min	10%UP	4.2m³/min
37kW Inverter Type	6.4m³/min	9%UP	7.0m³/min

■ Both Inverter Type / Basic Type New Features

○ Large Air Volume

New manufacturing technology and analysis enables high performance air end.
Up to 10% bigger air volume than previous models.

○ Top Runner Motor

Zgaiard series use Top Runner high efficient motor.
(Top Runner is Japanese high efficient motor regulation.)

PREMIUM IE3 MOTOR　PREMIUM IPM MOTOR

○ Tough Against Global Warming

Machine will not stop even ambient temperature become 50℃.
When discharge temperature become 95℃, compressor become cooling mode to maximize cooling function.
(※40℃ and higher ambient temperature may shorten electric parts life time.)

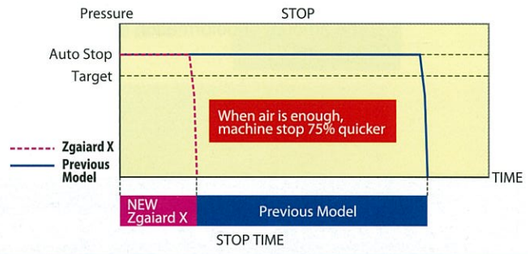
○ Easier Maintenance

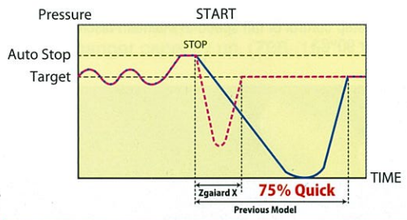
Oil flow piping design become modulized so that maintenance become easy and need fewer parts.

■ Inverter Type New Features

○ Quick Response System

・New quick response re-start system is added to AUCS(Auto Unloader Control System).
・ZgaiardX can now respond quickly to customer air demand fluctuations.

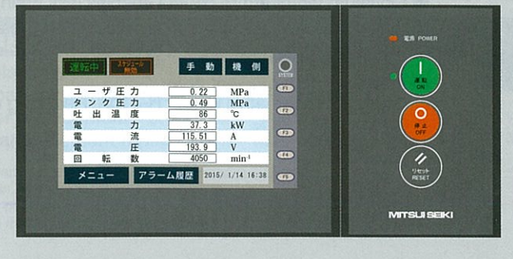




When customer start using air, ZgaiardX can re-start 75% quicker.

○ New 7.0inch Touch Panel IT Display

・Multi-function, Easy-operation LCD Touch Panel Display.
Data Downloading Function (Running data is downloaded to USB momory.)
Weekly Schedule Running Function (Setting by day and time.)
Sudden Power Failure Re-start Function (up to 20seconds)
2 Machines (Main unit/Back-up unit) Switching Operation(by connecting to other machine by wiring)
・Over-heat Pre-alarm Function
When ambient temperature become 45℃, machine shows Pre-alarm.
Ambient temperature sensor and USB memory enables more efficient machine operation.
・Compressor Remote Monitoring Application Function.
Remote monitoring function by Smart Phones and Tablets. Alarm e-mailing function(option).
PC monitoring software Z-mate(option) is also available.



・Sudden Power Failure Re-start (up to 20 seconds)
・Weekly Schedule Running Function
・2 Machines Switching Operation Function
・Z-mate PC Monitoring Software(option).
・Data Sampling Function.(Discharge temperature, Ambient temperature, Pressure, kW, Voltage, Ampere, Tank pressure and Rotation speed.)
・Data can be downloaded to USB memory and viewed from PC.

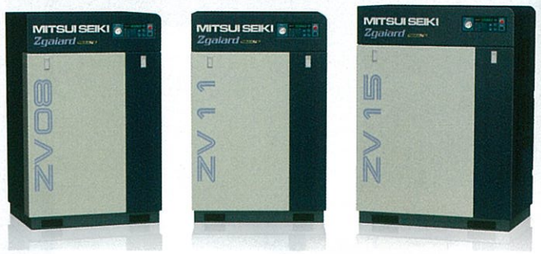
2 Machines Switching Operation Function
Main unit/Back-up unit auto exchange. It can be used with weekly operation function.

Inverter Compressor Zgaiard series 7.5~15kW

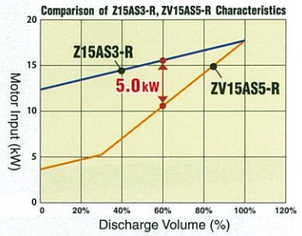
MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

Zscrew on new stage to head for future.

The quietest compressor in the industry.
Eco friendly strong high grade painting.
The biggest air volume in th same class.



Reduced power amounts
32% Reduced
Annual power consumption
450 thousand yen/year Reduced
Annual CO_2
17 t/CO_2 Reduced
(Air Discharge Volume of 60%) (15 kW, 0.7 MPa)



■ Quiet Performance

- 3dB (A)※ quieter from the previous model!
- Achieves industry's quietest performance.
  ※Comparison of 15kW machine
- Fan Inverter control
  (Non-step control of fan speed to maintain discharge temperature under 90°C.)

■ Improvement of the frame's stiffness

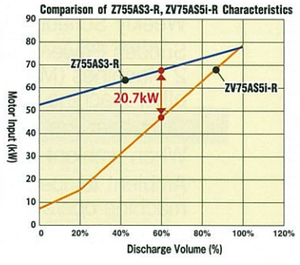
- The frame's stiffness has been improved so that it can perform sufficiently wherever it is placed.
- We analyzed the structure of machine when it is supported in 3 points and when it is carried by forklift truck. The amount of deformation has been reduced by half.

Inverter Compressor Zgaiard series 55 / 75kW

MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

Ultimate high productive and energy saving achieved by inverter control

Reduced power amounts
30% Reduced
Annual power consumption
1.86 million yen/year Reduced
Annual CO_2
68 t/CO_2 Reduced
(Air Discharge Volume of 60%) (75 kW, 0.7 MPa)



■ Space-saving and Stylish looking

- Setup floor space is 17%※ less than the previous model!
  ※Comparison to the previous ZV75 machine
- Powerful and dignified styling.

■ Improvement of the operability

- Color LCD touch-panel
- With instant-starting system, it can be rebooted quickly.

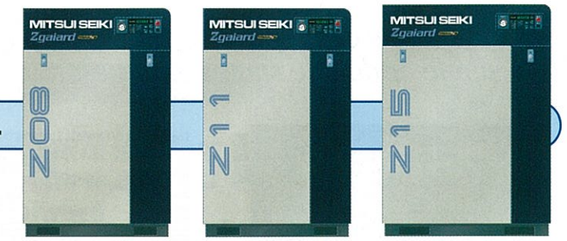
■ Environmental measure

- IPM Motor direct connection drive with no power loss.
- Optimum temperature control enables less drain generation.
- It doesn't go abnormal stop when ambient temperature is 45℃
  ※Using over 40℃ environment shortens life span of electrical component. ※only dryerless.
- Improved high efficient dryer.
  Using new alternative CFCs, R-410A. Reducing refrigerator consumption 22%

Zgaiard series Basic type 7.5~15kW

MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

Compact but powerful basic type



Powerful compact machine with direct motor connection.

■ Maintenance saving

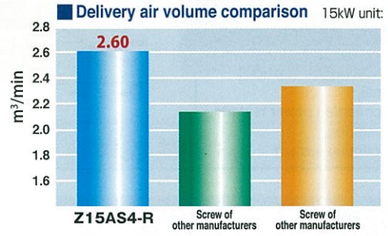
- Motor direct connection drive with no power loss
- Maintenance works applicable from front shutter
- No belt maintenance realized by Direct drive
- Long life cycle realized by decreased Bearing load

■ Space-saving and Stylish looking

- Setup floor space is 22%※ less than the previous model !
  ※Comparison of Z15 machine
- Powerful and dignified styling

■ Simple structure

- Reduced piping
- Removal of consumable parts through one-touch operation
- Most appropriate direct drive with Z screw



■ Environmental measure

- Adopted an environmentally-friendly alternative Freon R-407C to prevent ozone layer destruction.
- Adopted the SUS plate type dryer heat exchanger. Improved anti-corrosion. (Z08~15)
- Dryer heat exchanger capacity up. (Z08~15)

Zgaiard series Basic type 55 / 75kW

MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

Z series is the origin of Mitsui Seiki air compressor.

■ Long life cycle and reduction of maintenance works

- Setup floor space is12%※ less than the previous model.
- Environment-Friendly Plastic Paint.

■ Environmental response

- Using new alternative CFCs, R-410A.
- Reducing refrigerator energy consumption 22%.
- It doesn't go abnormal stop when ambient temperature is 45℃.

■ Reduction of Maintenance works

Maintenance work from the front door.
Realized the man-hour reduction

■ Long life maintenance

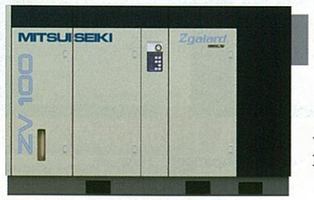
① Oil replacement→6,000 hrs
② Oil separator element replacement→6,000 hrs
③ Oil filter replacement→6,000 hrs
④ Air cleaner element replacement→650mmAq

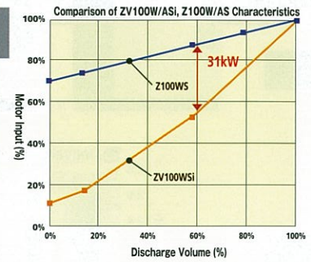
※Maintenance cycle varies depending on the operating condition. Remember the sooner action.
※Add the oil when oil decreased during operation.
※Replace the whole oil when replacing it.

Inverter Compressor Basic type Zgaiard series 100/150kW

MITSUI SEIKI OIL INJECTION TYPE SCREW COMPRESSOR SERIES

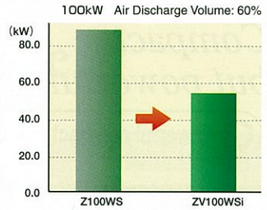
Only Z screw can realize high efficiency equal to single or double stage compressor.



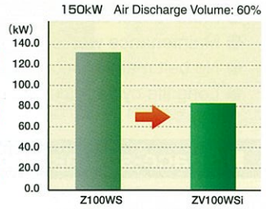


IT Package (option)
IT touch panel,
Scheduled operation power restarts,
Alternate operation,
Remote monitoring system

100kW
Reduced power amounts
35% Reduced
Annual power consumption
2.79 million yen/year Reduced
Annual CO_2
102 t/CO_2 Reduced
(Air Discharge Volume of 60%) (100 kW, 0.7 MPa)

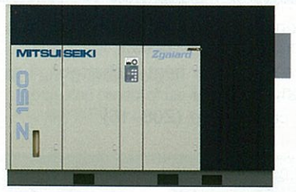


150kW
Reduced power amounts
38% Reduced
Annual power consumption
4.5 million yen/year Reduced
Annual CO_2
165 t/CO_2 Reduced
(Air Discharge Volume of 60%) (150 kW, 0.7 MPa)

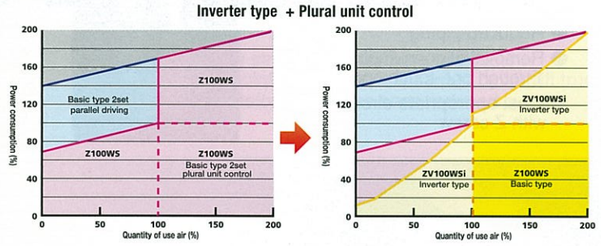


- Air Discharge Volume: 60%
- Power Charges: 15 yen/kWh
- Running Time: 6,000 h/year

Larger effect of energy saving by the combined operation of standard machine and inverter machine



The effectiveness can be maximized with Basic machine operates at full load and Inverter machine to absorb load fluctuation.

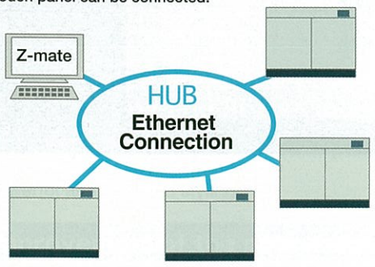


Select the Optional System to Suit Your Needs

Monitor operating status in real time
Remote Monitoring System Z-mate

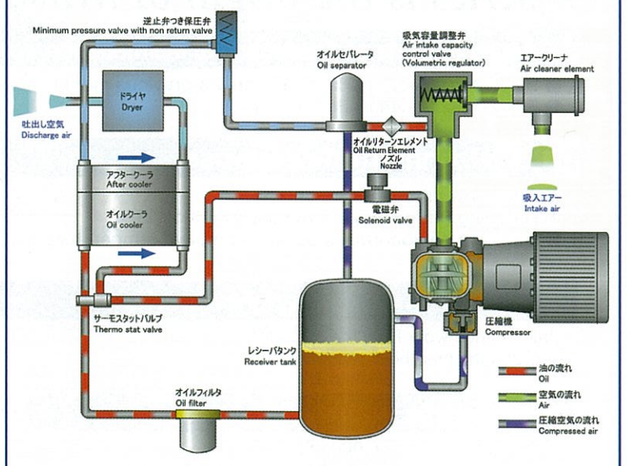
From a computer, you can monitor the operating status of up to 10 air compressors connected over a in-house LAN system or other Ethernet connection. You can also save monitoring data and operating air compressors by remote control.

※Only air compressor models with a built-in LCD monitor IT touch panel can be connected.



Ethernet is a registered trademark of Xerox Corp.

Unprecedented compression mechanism implemented by long experience



Escal series 3.7/5.5kW

MITSUI SEIKI OIL INJECTION TYPE SCROLL COMPRESSOR SERIES

ESCAL45R

Scroll compressor 3.7kW/5.5kW

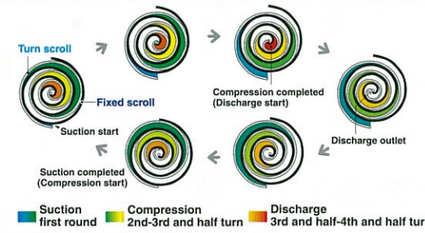
Advanced scroll air compressor Escal applicable to meet the 21st century. Compact unit most appropriate to deal with environmental issues adding to its established performance and realized high efficiency and energy saving

Scroll air compressor to deal with environment and energy saving

■ Escal's Quiet

Non-contact and low noise, low vibration scroll rotation without tip sealing is achieved by the high precision machining center of MITSUI SEIKI.

■ Compression process of the Scroll compressor



■ Escal's Functionality

- Monitor panel pursuing simple use
  Featured is exceeded operation ability equipped with the Operation status display, Error display, Maintenance display and so on as self-diagnosis function.
- Auto dry timer as standard equipment to prevent the occurance of drain. It automatically controls any drain likely to occur when the humidity is high or operation load is low.
- Mounted with the totally-enclosed external fan motor to confront dust and humidity.
- Applicable to set the advance operation of the Dryer. The Dryer shall start working first and Air Compressor automatically starts working one minute after.

■ Escal's Reliability

- Drastically improved reliability and durability of the air dryer.
- A heat exchanger is plate-type made of all stainless steel.
- The air dryer became compact due to big heat conduction coefficient.
- Reduce pressure loss to 1/3 of past model.

■ Escal's Kindness

- Safety-friendly protective devices
  (against motor overload, discharge temperature error, Dryer error, reversed phase)
- Adopted an environmentally-friendly alternative Freon R-407C of ozone layer depletion coefficient zero
- Unit layout considering the operation ability based on ergonomics.

■ Escal's Energy-saving

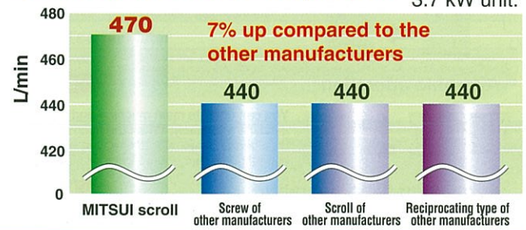
Auto start/stop system combined with the high energy saving unloader system. Applicable to deal with the intermittent and continuous operation. Also applicable to set the continuous unloader system depending on the air application condition.

■ Escal's Power

High efficient power created by gentle and smooth revolution. Overwhelming delivery airflow volume maximum in the class is presented by sealing effect of oil membrane continually created in compression chamber.

■Delivery air volume comparison

3.7 kW unit:



■ Escal's Maintenance capability

- Its filter element is a cartridge type, which is easily replaceable by opening the front shutter.
- Tip seal need changing is not used.

Red CX

Regulate Eco Drive Controller

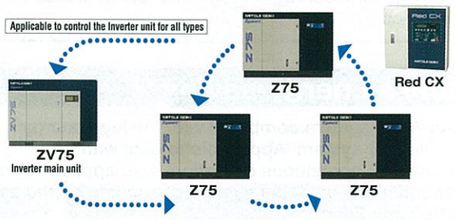
Attempts energy saving by driving minimum required numbers of plural air compressors according to air consumption (Maximum controlled unit: eight unit.). Digital pressure indication enables driving of the minimum number in precise pressure range. Further energy saving is materialized by combination of inverter machine and standard un-loader machine or plural unit control of inverter machine only.

Plural units control examples

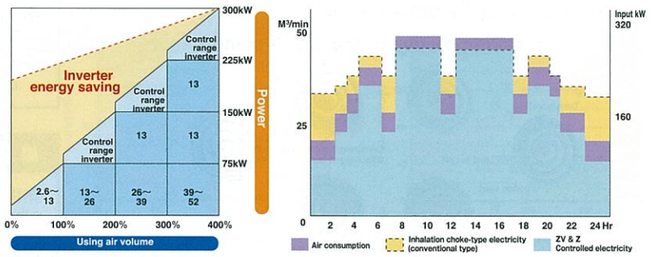
ZV&Z Control　ZV 75kW×1set + Z 75kW×3set　Free air delivery 52m³/min

● In case of 1 set of inverter machine
Inverter machine runs first and stops last. Ideal driving is enabled as the standard machine runs with full load whereas the inverter machine runs by controlled number of the rotation depending on load fluctuation.

● In case of plural number of inverter machines
Double loop driving with rotation function of inverter machine is viable.

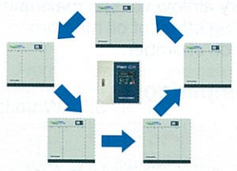


■ Simulation of Air usage conditions: Max46m³/min ↔ Min20m³/min



Function of plural unit Control System

Averaging operating time　Additional function

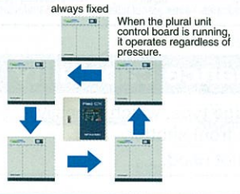


Pressure sensor detects air pressure and starts / stops compressor. Red CX chooses which compressor to start / stop in order to average the operating time. Having operated for a certain time, running compressor averages the operating time in rotating.

Alternate operation　New function

You can operate main machine and subordinate machine alternately. When the main machine has run for a certain time, subordinate one starts to run in exchange so that operating time is averaged.

Permanent fixed operation　New function



You can set which compressor to run all the time. The fixed compressor starts to operate first and continue running. The other compressors can be running in all operation pattern.

Start and stop in fixed order　New function

If you set starting order, it starts and stops in that roatation.

Averaging the operating time of inverter machine　Additional function

If you use both standard machine & inverter machine
Standard machine runs in the way averages the operating time. Inverter machine rotates in optional time.

Turn back control　New function

If sizes of machines are different
Set starting order. Compressors start to run in that order stop reversely.

2 pattern of pressure setting by weekly timer　New function

ex.) You can set different pressure day and night / weekdays and the weekend.

Receiver tank

Material	SS400·SM490A	**Attachment**	safety valve, pressure gauge, drain valve
Color	Munsell 7.5Y7/1	**Certification**	the second sort pressure vessel certificate

Applicable compressor	Tank capacity (L)
3.7～5.5kW	100～200
7.5～15kW	200～400
22kW	400～700
37kW	700～1000
55kW	1000～2000
75kW	1500～3000

※Further, for general application, it is recommended to install the air tank of delivery air capacity 10～20%.

※Please ask us when you choose vessel's volume in terms of pressure, air consumption or holding time.

Model	Tank capacity (L)	Maximum allowable pressure MPa	Mass (kg)	Outer diameter D (φmm)	Height H (mm)	Air outlet / inlet connection diameter Socket	Flange
MTA-01	98	1.00	60	359	1400	Rc3/4	
MTA-02	201	1.00	115	462	1660	Rc1	
MTA-03	298	1.00	150	512	1921	Rc1-1/2	
MTA-04	395	1.00	180	612	1863	Rc1-1/2	
MTA-05	498	1.00	270	666	1978	Rc1-1/2	
MTA-07	698	1.00	330	766	2072		50A
MTA-10	991	1.00	440	868	2253		50A

※About 1500～6000L vessels, please ask us.
※If you use oil-free air, we recommend having inside epoxy-coated(option).
※There is no duty to submit registration of vessel setting, please observe safety regulation of boilers and pressure vessels based on Industrial Safety and Health Act.
※Designs of product may be changed without prior notice. Ask us about detailed information.

Clean air system

Put a combination of various filters in the piping in proportion to the required air cleanness to obtain much more clean compressed air.

use	result
Line filter	
Air tool. Air motor, Air press, general painting, spray lubrication	Dry air nominal filtering rating : 1～5μm In such a case that inclusion of a certain oil or dust after waterelimination was allowed.
Line filter + mist filter	
For instrumentation, static painting, dry, electronic parts	Dry and oil eliminated air nominal filtering rating : 0.1～0.01μm In such a case that the air eliminated almost all the water, oil and dust was required.
Line filter + mist filter + activated carbon filter	
For medicament, food, brewing, ozone generator, scientific analysis equipment and caisson shielding	Dry, oil and smell eliminated air nominal filtering rating : 0.003～0.01μmin In such a case that the air eliminated almost all the water, oil, dust and smell was required.

Customizing specification option

Medium pressure (1.3MPa) specification	Delivery pressure is set to 1.37MPa. Most appropriate for the use of Laser unit and the like (applicable to Z15, 22kW)
Low voltage volume increase specification	Discharge air volume shall be lowered to increase the delivery air volume (applicable to the Increasing type ZV 22kW～75kW)
380V-400V different voltage	Applicable to change the main circuit voltage. Electricity 200V shall be self supplied to the Operation circuit and Dryer power supply through the Down transformer.
Cold region specification	Countermeasure shall be supplied for the cold region to operate the unit in a safe condition. The unit shall automatically keep the heat when the atmosphere temperature dropped to prevent the Dryer and Drain from freezing up.
Outdoor specification	Waterproof package applicable to install outdoor to confront the rain flooding.
Water cooling type	Applicable to replace the cooling unit with a water cooling type when the application of the air cooling type was difficult under environmental condition such as not possible to ensure the ventilation (applicable to 22kW and 37kW)
ASME specification tank	Applicable to change the tank built-in the compressor to ASME code specification for delivery abroad (except for USA).

* Some specifications are not applicable depending on the unit type. Please contact us for details.

Zgaiard ZV series

・Inverter 7.5kW~75kW

model		ZV08AS5-R	ZV11AS5-R	ZV15AS5-R	Zgaiard X ZV22AX-R	Zgaiard X ZV37AX-R	ZV55AS5i-R	ZV75AS5i-R	ZV55WS5i-R	ZV75WS5i-R
Delivered air pressure (MPa)		0.7[0.60~0.93]		0.7[0.53~0.93]	0.7[0.53~0.93] (0.5)※					
Free air delivery (m³/min)		1.2	1.8	2.6	4.2(4.5)※	7.0(7.4)※	9.5(11.0)※	13.0(14.0)※	9.5(11.0)※	13.0(14.0)※
Intake air pressure & temperature		Atmospheric pressure (2~40℃)								
Main motor power (kW)		7.5	11	15	22	37	55	75	55	75
Power source voltage (50/60Hz,V)		200/200·220								
Motor type		3-phase squirrel cage, 2P totally-enclosed external fan			Totally enclosed fan cooled IPM motor					
Starter		Inverter starter								
Drive system		Direct coupled motor								
Cooling system		Air cooled							Water Cooled	
Fan motor power (kW)		0.4 (Inverter control)		0.9 (Inverter control)	0.75 (Inverter control)	2.2 (Inverter control)	3.0 (Inverter control)		0.08/0.12	0.08/0.12x2
Oil fill ration (L)		10		13	15	20	60			
Dryer	Air dew point at outlet (℃)	10 (under applied pressure)※								
	Electricity consumption (kW)	0.360/0.412·0.436		0.568/0.632·0.636	1.1/1.3	1.4/1.7	1.9/2.4	2.4/2.8	1.9/2.4	2.4/2.8
	Used refrigeration	R-407C			R-410A					
	Refrigeration amount (g)	380		490	650	1050	1050	1300	1050	1300
Discharge pipe diameter (R)		3/4		1	1 1/2		2			
Dimension	Width (Dryer less) (mm)	905	1050		1280(1160)	1750(1550)	2325(1848)	2398(1938)	2325(1848)	2398(1938)
	Length (mm)	705	750				1200			
	Height (mm)	1400		1450	1490	1550	1700	1800	1700	1800
Total mass (Dry state) (kg)		430	480	560	590	830	1440	1630	1450	1600
Noise level (dB(A))		52	53	54	54	58	66	69	64	65

Cautions:Dryer of low pressure specifications (option) shall be separate type. Please contact us for dryer dimensions and mass.
※: Values in ( ) are the free air delivery for 0.5MPa specification (option)
* Values with ambient temperature of 30; and rated discharge pressure.
○Noise values measured in noiseless environment at distance of 1.5meters from front, at height of 1m, with load of 100% (at 0.7MPa)
○ Specifications for 22 to 37kW water-cooled unit available on request (option)
○ Cooling water volume (water temp. 32;): 55kW: 80L/min; 75kW: 110L/min

Notation

ZV-15AS5-R
① ② ③ ④ ⑤
①ZV Series ②15kW ③Air-cooling ④Type name ⑤Built-in air dryer

ZV-22AX-R
① ② ③ ④ ⑤
①ZV Series ②22kW ③Air-cooling ④Type name ⑤Built-in air dryer

Zgaiard ZV series

・Inverter 100kW / 150kW

model		ZV100AS2i	ZV150AS2i	ZV100WS2i	ZV150WS2i
Delivered air pressure (MPa)		0.7[0.54~0.93]			
Free air delivery (m³/min)		19.0	26.0	19.0	26.0
Intake air pressure & temperature		Atmospheric pressure (2~40℃)			
Main motor power (kW)		100	150	100	150
Power source voltage (50/60Hz,V)		400			
Motor type		Totally enclosed fan cooled IPM motor			
Starter		Inverter starter			
Drive system		Direct coupled motor			
Cooling system		Air cooled		Water cooled	
Fan motor power (kW)		5.5		0.15/0.22	
Oil fill ration (L)		80	100	80	100
Discharge pipe diameter (R)		JIS 10K 3B (80A) Flange			
Dimension	Width (Dryer less) (mm)	(2860)	(3600)	(2650)	
	Length (mm)	1350			
	Height (mm)	1900	2155	1750	
Noise level (dB(A))		78	78	74	74

○Noise values measured in noiseless environment at distance of 1.5meters from front, at height of 1m, with load of 100% (at 0.7MPa)
○ Cooling water volume (water temp. 32;): 100kW: 130L/min; 150kW: 200L/min

ESCAL series

・Scroll 3.7kW / 5.5kW

model		ESCAL 45A2-R	ESCAL 46A2-R	ESCAL 65A2-R	ESCAL 66A2-R
Delivered air pressure (MPa)		0.83			
Free air delivery (m³/min)		470		730	
Intake air pressure & temperature		Atmospheric pressure (2~40℃)			
Capacity control method		Select the auto start/stop or unloader type			
Main motor power (kW)		3.7		5.5	
Power source voltage (50/60Hz,V)		200/200·220			
Motor type		3-phase squirrel cage 4P totally enclosed external fan			
Starter		Direct ON start			
Drive system		V belt drive			
Cooling system		Air cooled			
Oil fill ration (L)		3.5		4.5	
Dryer	Air dew point at outlet (℃)	10 (under applied pressure)※			
	Electricity consumption (kW)	0.296	0.260·0.236	0.296	0.260·0.236
	Used refrigeratioin	R-407C			
	Refrigeration amount (g)	280			
Discharge pipe diameter (R)		1/2			
Dimension	Width (Dryer less) (mm)	785			
	Length (mm)	505			
	Height (mm)	1140(790)			
Total mass (Dry state) (kg)		240		260	
Noise level (dB(A))		49		52	

* Values with ambient temperature of 30; and rated discharge pressure.
○Noise values measured in noiseless environment at distance of 1.5meters from front, at height of 1m, with load of 100% (at 0.83MPa)

Notation

ZV-55WS5i-R
① ② ③ ④ ⑤ ⑥
①ZVi Series ②55kW ③Water-cooling ④Type name ⑤Built-in air dryer

ESCAL45A2-R
① ② ③ ④ ⑤ ⑥
①ESCAL Series ②4=3.7kW 6=5.5kW ③5=50Hz 6=60Hz ④Air-cooling ⑤Type name ⑥Built-in air dryer

⚠Safety instructions

1. Free air delivery is the volume of delivery air discharged when air pressure is applied to the intake (atmospheric pressure). (JIS B 8341)
2. Do not use delivery air for respirator equipment whose discharge is inhaled directly.
3. Maintain ventilation so that intake air temperature does not exceed 40;.
4. Contact us for guaranteed values.
5. Do not drain water discharge from the compressor directly into rain gutters. Follow any applicable wastewater regulations. Please contact your Mitsui Seiki sales representative if you have any questions or problems.

Zgaiard Z series

・Basic 7.5kW~37kW

model		Z085AS4-R	Z086AS4-R	Z115AS4-R	Z116AS4-R	Z155AS4-R	Z156AS4-R	Zgaiard X Z225AX-R	Zgaiard X Z226AX-R	Zgaiard X Z375AX-R	Zgaiard X Z376AX-R
Delivered air pressure (MPa)		0.7									
Free air delivery (m³/min)		1.2		1.8		2.6		4.1		6.9	
Intake air pressure & temperature		Atmospheric pressure (2~40℃)									
Capacity control method		Power-saving AUCS Automatic start/stop selection									
Main motor power (kW)		7.5		11		15		22		37	
Power source voltage (50/60Hz,V)		200/200·220									
Motor type		3-phase squirrel cage, 2P totally-enclosed external fan									
Starter		Direct ON start						3-contactor, star delta start			
Drive system		Direct coupled motor									
Cooling system		Air cooled									
Fan motor power (kW)		0.4				0.9		0.75		2.2	
Oil fill ration (L)		10				13		15		20	
Dryer	Air dew point at outlet (℃)	10 (under applied pressure)※									
	Electricity consumption (kW)	0.360	0.412·0.436	0.360	0.412·0.436	0.568	0.632·0.636	1.1	1.3	1.4	1.7
	Used refrigeratioin	R-407C						R-410A			
	Refrigeration amount (g)	380				490		650		1050	
Discharge pipe diameter (R)		3/4				1				1 1/2	
Dimension	Width (Dryer less) (mm)	905		1050				1280		1750(1550)	
	Length (mm)	705		750							
	Height (mm)	1400				1450		1490		1550	
Total mass (Dry state) (kg)		400		460		540		680		970	
Noise level (dB(A))		53		55		56		54		59	

* Values with ambient temperature of 30; and rated discharge pressure.
○We have 0.83 / 0.88 / 0.93 MPa version (option). Please contact us for details.
○Noise values measured in noiseless environment at distance of 1.5meters from front, at height of 1m, with load of 100% (at 0.7MPa)
○ Specifications for 22 to 37kW water-cooled unit available on request (option)

・Basic 55kW~75kW

model		Z555AS4-R	Z556AS4-R	Z755AS4-R	Z756AS4-R	Z555WS4-R	Z556WS4-R	Z755WS4-R	Z756WS4-R
Delivered air pressure (MPa)		0.7							
Free air delivery (m³/min)		9.5		13.0		9.5		13.0	
Intake air pressure & temperature		Atmospheric pressure (2~40℃)							
Capacity control method		Power-saving AUCS Automatic start/stop selection							
Main motor power (kW)		55		75		55		75	
Power source voltage (50/60Hz,V)		200/200·220							
Motor type		3-phase squirrel cage 2P totally-enclosed external fan							
Starter		3-contactor, star delta start							
Drive system		Direct coupled motor							
Cooling system		Air cooled				Water Cooled			
Fan motor power (kW)		3.0				0.08	0.12	0.08	0.12
Oil fill ration (L)		60							
Dryer	Air dew point at outlet (℃)	10 (under applied pressure)※							
	Electricity consumption (kW)	1.9	2.4	2.4	2.8	1.9	2.4	2.4	2.8
	Used refrigeratioin	R-410A							
	Refrigeration amount (g)	1050		1300		1050		1300	
Discharge pipe diameter (R)		2							
Dimension	Width (Dryer less) (mm)	1990(1550)		2240(1800)		1990(1550)		2240(1800)	
	Length (mm)	1200							
	Height (mm)	1700							
Total mass (Dry state) (kg)		1620		1750		1610		1700	
Noise level (dB(A))		66		69		65		66	

* Values with ambient temperature of 30; and rated discharge pressure.
○We have 0.83 / 0.88 / 0.93 MPa version (option). Please contact us for details.
○Noise values measured in noiseless environment at distance of 1.5meters from front, at height of 1m, with load of 100% (at 0.7MPa)
○ Cooling water volume (water temp. 32;): 55kW: 80L/min; 75kW: 110L/min

・Basic 100kW~150kW

model		Z1005AS2	Z1006AS2	Z1505AS2	Z1506AS2	Z1005WS2	Z1006WS2	Z1505WS2	Z1506WS2
Delivered air pressure (MPa)		0.7							
Free air delivery (m³/min)		19.0	18.2	27.0	26.0	19.0	18.2	27.0	26.0
Intake air pressure & temperature		Atmospheric pressure (2~40℃)							
Capacity control method		Power-saving AUCS Automatic start/stop selection							
Main motor power (kW)		100		150		100		150	
Power source voltage (50/60Hz,V)		400/440							
Motor type		3-phase squirrel cage, 2P totally-enclosed external fan							
Starter		Direct coupled motor							
Cooling system		Air cooled				Water cooled			
Fan motor power (kW)		5.5				0.08	0.12	0.08	0.12
Oil fill ration (L)		80		100		80		100	
Discharge pipe diameter (R)		JIS 10K 3B (80A) Flange							
Noise level (dB(A))		78				74			

○We have 0.83 / 0.88 MPa version (option). Please contact us for details.
○Noise values measured in noiseless environment at distance of 1.5meters from front, at height of 1m, with load of 100% (at 0.7MPa)
○ Cooling water volume (water temp. 32;): 100kW: 130L/min; 150kW: 200L/min

Notation

Z-1005AS2
① ② ③ ④ ⑤
①Z Series ②100kW ③5=50Hz 6=60Hz ④Air-cooling ⑤Type name

Compressor installation

Precautions for installation location

Some installation environments can damage the compressor or cause malfunctions. Please follow the precautions below in order to ensure the efficient, safe, and long-term use of your compressor.

Installation environment

⚠ Avoid installing outdoors, in semi-outdoor locations, in locations exposed to rain, and the like.
⚠ Avoid installing in locations exposed to dust or toxic gases.
⚠ Install in a location with an ambient temperature between 2 and 40;.
(We recommend the optional cold-weather specification if installing in temperatures of 2; and lower)

Location

⚠ Install on a firm, level floor.
⚠ Install in a spacious, well lit location enabling operation to be monitored easily.
⚠ There should be no impediments to transporting the unit to/from the location or performing maintenance.

Electrical wiring

⚠ All electrical wiring during installation must be done in accordance with technical standards. Electrical leaks, worn insulation, overcurrent, short circuits, open-phase driving, and defective protective equipment could cause sparks from the electrical wiring or electronic circuits.
⚠ Install a non-fuse breaker on the main power line if the model so requires.
⚠ Connect a ground cable to prevent electrical leaks.
⚠ Never remove protective equipment or perform modifications that disables an electronic circuit's protective features.

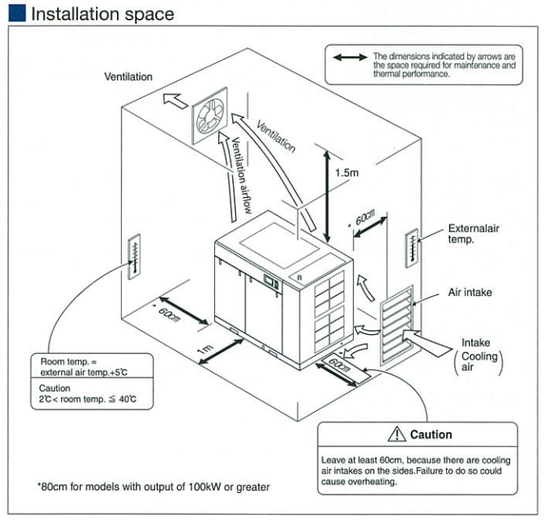
Maintenance

⚠ We recommend conducting maintenance and inspection ahead of the standard schedule in accordance with the installation environment and location.

Ventilation

⚠ The compressor room must be ventilated. Install a ventilation fan, duct, or the like so that the ambient temperature does not exceed 40;. Failure to do so could cause the compressor to overheat, or damage the insulation of electrical components.

Installation space



Installation Requirements Please consult with Mitsui Seiki or a designated service shop for details

Model	Non-fuse breaker		Power transformer	Secondary wiring cable 22 kW or 10 m, 37 kW or 20 m				Cooling tower For CT outlet temp. of 32℃
	200/220V	400/440V	Capacity*(200/400V)	200/220V	Grounding cable	400/440V	Grounding cable	
Z08AS4-R	100AF-60AT	50AF-40AT	15KVA	8mm²M5	5.5mm²M5	3.5mm²M4	5.5mm²M4	—
Z11AS4-R	100AF-100AT	50AF-50AT	20KVA	14mm²M5	14mm²M5	5.5mm²M4	14mm²M5	—
Z15AS4-R	100AF-100AT	100AF-60AT	25KVA	22mm²M8	14mm²M5	14mm²M5	14mm²M5	—
Z22AX-R	225AF-200AT	100AF-100AT	35KVA	38mm²M10	22mm²M5	22mm²M8	22mm²M5	10t or more
Z37AX-R	※1 NV250-SEV,HEV NF250-SEV,HEV-225AT	NV250-SEV,HEV NF250-SEV,HEV-150AT	55KVA	100mm²M10	22mm²M5	38mm²M8	22mm²M5	10t or more
Z55AS4-R	NF400-SEW,HEW-400AT	225AF-225AT	75KVA	150mm²M12	38mm²M8	60mm²M10	38mm²M8	—
Z55WS4-R	NF400-SEW,HEW-400AT	225AF-225AT	75KVA	150mm²M12	38mm²M8	60mm²M10	38mm²M8	15t or more
Z75AS4-R	※2 NV400-SEW,HEW NF400-SEW,HEW-400AT	※1 NV250-SEV,HEV NF250-SEV,HEV-225AT	105KVA	200mm²M12	38mm²M8	100mm²M10	38mm²M8	—
Z75WS4-R	※2 NV400-SEW,HEW NF400-SEW,HEW-400AT	※1 NV250-SEV,HEV NF250-SEV,HEV-225AT	105KVA	200mm²M12	38mm²M8	100mm²M10	38mm²M8	20t or more
ZV08AS5-R	50AF-50AT	30AF-30AT	20KVA	5.5mm²M6	5.5mm²M6	2mm²M6	2mm²M6	—
ZV11AS5-R	100AF-75AT	50AF-40AT	25KVA	8mm²M6	8mm²M6	3.5mm²M6	3.5mm²M6	—
ZV15AS5-R	225AF-125AT	100AF-60AT	30KVA	22mm²M8	14mm²M8	8mm²M6	8mm²M6	—
ZV22AX-R	225AF-150AT	100AF-75AT	45KVA	38mm²M8	22mm²M8	14mm²M6	14mm²M6	10t or more
ZV37AX-R	225AF-225AT	225AF-125AT	65/75KVA	100mm²M10	38mm²M10	22mm²M8	22mm²M8	10t or more
ZV55AS5i-R	400AF-350AT	225AF-175AT	90/85KVA	100mm²M10	38mm²M10	60mm²M8	22mm²M8	—
ZV55WS5i-R	400AF-350AT	225AF-175AT	90/85KVA	100mm²M10	38mm²M10	60mm²M8	22mm²M8	15t or more
ZV75AS5i-R	400AF-400AT	225AF-225AT	125KVA	150mm²M12	38mm²M12	60mm²M10	38mm²M10	—
ZV75WS5i-R	400AF-400AT	225AF-225AT	125KVA	150mm²M12	38mm²M12	60mm²M10	38mm²M10	20t or more
ZV100AS2i	—	400AF-250AT	200KVA	—	—	100mm²M12	38mm²M12	—
ZV100WS2i	—	400AF-250AT	200KVA	—	—	100mm²M12	38mm²M12	30t or more
ZV150AS2i	—	400AF-350AT	250KVA	—	—	100mm²M12	38mm²M12	—
ZV150WS2i	—	400AF-350AT	250KVA	—	—	100mm²M12	38mm²M12	40t or more
ESCAL4A2-R	30AF-30AT	30AF-20AT	7KVA	3.5mm²M4	3.5mm²M4	2mm²M4	2mm²M4	—
ESCAL6A2-R	50AF-50AT	30AF-30AT	10KVA	5.5mm²M4	5.5mm²M4	3.5mm²M4	3.5mm²M4	—

◎Use a recommended SEW or HEW circuit breaker (made by Mitsubishi Electric Corporation). (If changing in same frame)
◎If you use our designated NF series of non-fuse circuit breakers, use the NV series of designated leak-electricity circuit breakers (made by Mitsubishi Electric Corporation).
◎Use power lines with a size of 55kW or less when the continuous maximum allowed temp. is 75; (e.g. NIV power lines). If the ambient temperature is 50; or less, it is assumed that the wiring separation will be 20m or less.
◎Use power lines with a size of 75kW or more when the continuous maximum allowed temp. is 90; (e.g. LMFC power lines). If the ambient temperature is 50; or less, it is assumed that the wiring separation will be 20m or less.
※Use tripping current adjustable size (x14) breaker

Ventilating the compressor room

Be very careful to ventilate the compressor room!

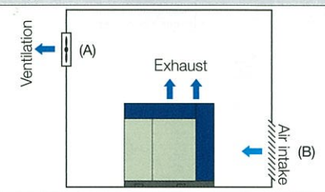
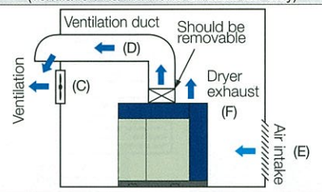
The compressor room must be ventilated. Install a ventilation fan, duct, or the like so that the ambient temperature does not exceed 40℃. Failure to do so could cause the compressor to overheat, or damage the insulation of electrical components.

Ventilation volume

Some installation environments can damage the compressor or cause malfunctions. Please follow the precautions below in order to ensure the efficient, safe, and long-term use of your compressor.

Installation environment

⚠ Avoid installing outdoors, in semi-outdoor locations, in locations exposed to rain, and the like.
⚠ Avoid installing in locations exposed to dust or toxic gases.
⚠ Install in a location with an ambient temperature between 2 and 40;.
(We recommend the optional cold-weather specification if installing in temperatures of 2; and lower)

	Figure A. Overall ventilation	Figure B. Duct ventilation (ventilation via main unit exhaust fan only)
Ventilation method		
Precautions	When whole compressor room ventilation without duct, please see below (A) figures. (These figures are when ⊿T=5.) Ventilation fan should be located high near ceiling and air intake should be located low near compressor air inlet side. Air speed at air intake should be less than 2m/sec. **Air intake (B)=Ventilation (A) + Free air delivery**	Please calculate the duct size based on calculation of duct resistance from compressor exhaust volume; pressure loss should be below 29.4Pa(3mmAq). Ventilation duct should be removable from compressor so that maintenance work become easier. Please note noise from compressor might leak through ventilation duct. Exhaust fan is needed even ventilation duct is supplied. This is for dryer exhaust. **Air intake (E)=Ventilation (C) + Heat exhaust (D or D+F) + Free air delivery**

Ventilation volume Please consult with Mitsui Seiki or a designated service shop for details

Model	Heat output (MJ/h)		Compressor exhaust volume (m³/min) Fig.B (D or D+F)		Ventilation volume (m³/min) Fig.A (A)		Ventilation volume (m³/min) Fig.B (C)	
	Compressor	Dryer	Compressor ≈(50/60Hz) (D)	Dryer ≈(50/60Hz) (F)	Dryerless	With dryer	Dryerless	With dryer
Z08AS4-R	27	5	20	16	75	89	4	18
Z11AS4-R	40	5	30	16	109	124	6	20
Z15AS4-R	54	7	40	16	149	169	8	28
Z22AX-R	83	11	35	22	230	259	12	41
Z37AX-R	140	18	75	47	387	437	20	69
Z55AS4-R	198	27	131/160	78	547	623	28	103
Z55WS4-R	40	27	36	78	109	185	6	81
Z75AS4-R	270	33	157/161	78	747	837	38	128
Z75WS4-R	54	33	36	78	149	240	8	99
ZV08AS5-R	27	5	20	16	75	89	4	18
ZV11AS5-R	40	5	30	16	109	124	6	20
ZV15AS5-R	54	7	40	16	149	169	8	28
ZV22AX-R	85	11	35	22	236	265	12	41
ZV37AX-R	142	18	75	47	392	442	20	69
ZV55AS5i-R	198	27	120	78	547	623	28	103
ZV55WS5i-R	40	27	36	78	109	185	6	81
ZV75AS5i-R	270	33	190	78	747	837	38	128
ZV75WS5i-R	54	33	72	78	149	240	8	99
ZV100AS2i	360	—	310	—	1000	—	50	—
ZV100WS2i	72	—	42	—	200	—	10	—
ZV150AS2i	540	—	400	—	1500	—	75	—
ZV150WS2i	108	—	42	—	300	—	15	—
ESCAL4A2-R	14	2	15	25	39	44	2	8
ESCAL6A2-R	20	3	19	29	55	62	3	11

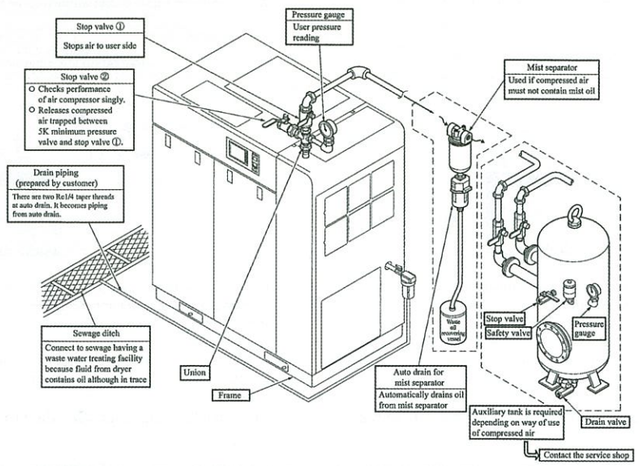
Calculating ventilation requirement

$$Q = \frac{n \times H \times 1000}{1.2 \times \triangle T \times 60}$$

Q: Required ventilation volume (m³/min)
H: Heat output per unit (MJ/h)
n: Number of units△
T: Tolerated temperature rise (t1-t0)
(t1: tolerated indoor temp. (℃); t0: outside tem. (℃)) T is generally calculated as 5℃.

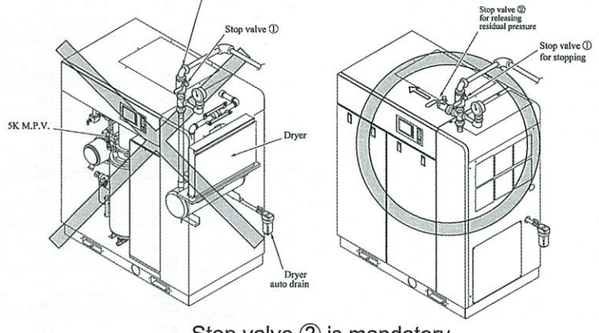
Piping

- Do not connect pipes with union joints or flange joints, so that they do not impede overhauls and the like.
- Make sure that the diameter of the main pipe is at least as large as the discharge outlet, in order to minimize the drop HV pressure. Install an approximately 1/100 slope to enable draining from the piping.
- Use a pipe diameter with enough leeway to reduce resistance, in accordance with the installed length of the piping.
- Install stop valves on the compressor discharge outlet, on both the user side and discharge side, in order to facilitate maintenance.
- Install air tanks, filters, and the like as needed, in accordance with the plant's air usage.
- See the installation manual for further details.



⚠Warning

If stop valve ② illustrated above is below, compressed air would remain in 5K minimum pressure valve, after cooler, dryer and stop valve ① and maintenance could be impossible upon removing the dryer auto drain or its piping. If piping is detached as it is, air would jet out strongly. Be sure to mount the stop valve ② shown above.



Stop valve ② is mandatory.

Pure oil

MITSUI genuine Compressor oil is lubrication oil developed for the Z screw. It is made up to fully perform its function and survive the long time operation. Please care to use the MITSUI genuine oil for the MITSUI products. Also pay attention not to use it mixed with another type oil.

Z-6000

Z-3000

Energy saving diagnosis

Attempts energy reduction of total facilities by a realistic implementation plan in view of general standpoint. Proposing a plan in view of "contribution to earth environment" in a middle term viewpoint and switching to clean energy.

Maintenance

[**Oil type**]

- Check the oil level of the Compressor every day.
- Adjust the amount of the drain (water) from the oil chamber in proportion to the load condition.
- Life cycle of the compressor oil is approximately 6,000 hours (for genuine oil Z-6000 compressor oil)
  Replace the oil immediately after passed the life cycle.
  Sooner replacement, if necessary as the dirt condition even not attained 6,000 hours, would help maintain good condition.
- Life cycle of the oil separator element is approximately 6,000 hours. Replace the oil separator element immediately after passed the life cycle.
- Life cycle of the oil filter is approximately 6,000 hours. Replace the oil filter immediately after passed the life cycle.
  (Replacement period for the compressor oil, oil separator and oil filter shall become sooner according to the application circumstance).
- If a dust filter is blocking, it cause trouble. Clean filters regularly.
- Replace the Air cleaner element if the Monitor lamp lights up.
- Use Mitsui Seiki dedicated parts for maintenance part certainly.
- Execute other maintenance work based on Instruction Manual.

Have maintenance performed by a Mitsui Seiki Kogyo-certified technician (a service shop designated by Mitsui Seiki Kogyo).

Industrial Health and Safety Law
"Ordinance on Safety of Boilers and Pressure Vessels"

Mitsui Seiki Kogyo Technician Certificate

We distribute guides for safely installing and maintaining your compressor (published by the Japan Society of Industrial Machinery Manufacturers). Please read them together with your operation manual.

"Safe air compressor installation"

"Maintenance tips for safe, energy-efficient use of air compressors"

Laws and regulations relating to compressors

Industrial Health and Safety Law
"Ordinance on Safety of Boilers and Pressure Vessels"

[Overview]
- Vessels with maximum pressure of 0.2MPa or higher, with capacity of 40L or higher
- Vessels with maximum pressure of 0.2MPa or higher, with internal diameter of 200mm or more, and length of 1,000mm or more

[Documents to submit]
- Second-class Pressure Vessel Description Handling Instructions
- Second-class Pressure Vessel Description (Original)

◎Note: It is not necessary to submit these document, but keep them in a secure place, because they are important.

[Installation and use]
- Pressure vessels cannot be modified
- Perform self inspections at least once a year, and keep a record
- Adjust pressure delivered by safety valve
- Use a pressure gage with a maximum meter reading of 1.5 to 3 times the maximum pressure used, with a display that makes it easy to check the maximum pressure used.

Basic Environment Law
"Noise Abatement Act/Vibration Control Law"

[Overview]
- Applies to compressors with rated drive output of 7.5kW or more. Check with the Pollution Section of your municipal office, because the regulation values differ by prefecture.

[Documents to submit]
- At least 30days before installing the compressor, you must submit a notice of start or change of construction to your prefectural government via the Pollution Section of your municipal government.

[Installation and use]
- The noise and vibration at the boundary of the plant grounds must be within the regulated levels.

"Law Concerning the Recovery and Destruction of Fluorocarbons" (Japanese Law)

The users of Classified Product(Commercial Refrigeration and A/C with CFC, HCFC and HFC) are required to conducted below three items.
①Products must be installed at adequate location.
②Periodical check (once per 3month) by user and recording the result.
③When leakage was found, user have the responsibility of repairing the products . Re-filling of refrigerant without repair is prohibited.
In case of bigger size refrigerate products.
In case of products with refrigerator capacity of bigger than 7.5kW, annual inspection by engineer with enough experience and knowledge (such as manufacturer and refrigerator maintenance engineer) is required by law.

Laws and regulations relating to the environment and energy conservation

Energy conservation laws
(Energy Conservation Act)

Enacted April 1, 2006 (revision)

- Purpose
  Reduce average annual energy per unit of production by at least 1%.
- Key points of revision
  Improve energy efficiency measures of factories and offices obligated to conserve energy through the central management of heating and electricity.

Global warming laws
(Law for the Promotion of Measures to Deal with Global Warming)

Enacted April 1, 2006 (revision)

- Kyoto Protocol Target Achievement PlanThe target is to reduce CO_2 emissions from industry by 8.6% from 1990 levels by the year 2010.
- Key points of revisionA system for calculating, reporting, and publishing greenhouse gases was introduced.