

FRENIC4000VM5/FM5

DC-link Inverter with Vector and V/f Control

HIGH-SPEED DATA COLLECTION SYSTEM

REMOTE WATCH OF USB BASE

ANALOG OUTPUT FOR CHART

FRENIC4000VM5/FM5

SPACE-SAVING CONSERVATION MAINTENANCE

AC Adjustable Speed Drive

Compact and Easy Maintenance

IGBT PWM Inverter

Multi-stage stacking structure adopted

300kVA or less capacity inverters have a consistent plug-in structure, enabling up to 12 units to be mounted on a single panel and allowing considerable space saving. Units of various sizes, and vector (VM5) and V/f controls (FM5) can be mixed (*).

| Inverter capacity [kVA] | No. of units mountable per panel |
|-------------------------|----------------------------------|
| 10, 15, 25 | 12 Maximum |
| 38, 50, 75 | 8 Maximum |
| 100, 150 | 4 Maximum |
| 225, 300 | 2 Maximum |
| 450, 600, 900 | 1 (panel structure) |

(*): The vector control (VM5) and V/f control (FM5) units are the same size.

No unit cooling fan

Cooling fans in each of the inverter and converter units have been eliminated; instead only the fans on the panel (panel top fans) are used for cooling. The reduced number of cooling fans subject to wear reduces the amount of maintenance work.

Enhanced maintainability

All the inverters can be maintained from the front panel. The inverter unit features a full plug-in structure, allowing built-in terminal blocks for external wires to be attached/detached collectively, while the power can be turned off on the motor side either electrically (via contactor) or manually (via breaker), or both.

Touch panel equipped with a liquid crystal display (*) (LCD)

Setting, running, monitoring and maintenance functions are all adjustable from the touch panel, equipped with a LCD on the unit front. The LCD displays various data as well as key operational guidance on the bottom, thus facilitating operation.

(*): Available in both Japanese and English (switchable)

FRENIC4000VM5
Vector control inverter
FRENIC4000FM5
V/f control inverter

Inverter panel external view



Enhanced support tools (option)

Analog output for chart, PC loader, web-based remote monitoring, a high speed data acquisition system and other support tools are enhanced.

Connectable to different transmission lines (option)

Connectable with a PLC or other high order controller at high speed and with limited wiring. In addition to Fuji's original D-line, T-link and SX bus, the PROFIBUS-DP, which is a typical open bus, is usable. It supports the transmission mode of the old FRENIC 4000 series models (VM2, VM3 and VM4).

Wide choice of plant control functions

Based on previous operational experiences in different plants to date, various control functions useful for plant control are provided.

Highly-effective plant operation

The DC-link system allows power operational and regenerative energy to be transmitted and received via a DC common bus for highly efficient plant operation.

Inverter panel (unit-type)



Specifications

VM5/FM5

Common specifications

(*): Option

| | | | |
|---------------------|--|-----------------------------|--|
| Type | Common to FRENIC4000VM5/FM5 | | |
| Main circuit system | Voltage-type IGBT sine wave PWM inverter | | |
| Output voltage | 3-phase, 400V AC | | |
| Overload capability | 150% for 1min | | |
| Control function | Start/stop | Key operation | Touch panel, Loader (*) |
| | External signal | External signal | Contact input, Analog input ($\pm 10V$) |
| | | Transmission link operation | D-line/T-link (*), SX bus (*), PROFIBUS-DP (*) |
| | Contact input | | Built-in 12 points + 4 points (*) (2 points selectable $\times 1$, $\times 2$) |
| | Speed setting | | Various transmission links, External signals, Touch panel, Loader (*) key operation |
| | Operation status signal | | • Relay output (built-in 9 points + 8 points (*)) 3 points selectable (Y1, Y2, Y3) • Analog output (built-in 4 points + externally mounted 4 points (*) + built-in 2 points (*)) |
| | Rotating motor pickup | | The rotating motor is picked up in inverter operation (SY0). |
| | Restart after momentary power failure | | Inverter is restarted without stopping the motor. |
| | Touch panel | | Each constant setting, Startup conditions, Control data digital display, Fault cause display, Fault point data display |
| | Loader (*) | | Setting item, Startup conditions, Control data digital display, Fault cause display, Fault trace data display (*) |
| | Analog output | | Analog output of arbitrary control data |
| | Charge lamp | | Comes on when residual voltage (25V DC or larger) is in the main circuit. |
| | | | |
| Protection | Protection level | | Classified into the following 4 levels. • Major fault: Trips instantly. • Medium fault: Quickly decelerates and trips to stop after the set time has elapsed. • Minor fault 1: Cannot be restarted once it is stopped. • Minor fault 2: Display only |
| | Overvoltage | | Actuated when the DC main circuit voltage exceeds 790V DC |
| | Undervoltage | | On detecting undervoltage of DC intermediate voltage, inverter stops. |
| | Overheat | | Protects the inverter by detecting the temperature of the heat sink inside the inverter. |
| | Short-circuit | | Detected by "overcurrent." |
| | Overcurrent | | Actuated when the output current peak value exceeds the overcurrent level (fixed). |
| | Ground fault | | By the operation of the converter side ground fault detection relay, inverter stops. |
| | Motor (*) | | Protected by electronic thermal function and temperature detection. "Overload", "Motor overheat", "Startup congestion", "Overspeed" |
| | | | |
| | | | |
| Environ-ment | Installation location | | Indoors, Free from corrosive gas, inflammable gas, dust, or explosive gas |
| | Ambient temp. | | 0 to +40°C |
| | Ambient humidity | | 20 to 90% RH (no condensation) |
| | Cooling method | | Forced air-cooled system |
| | Altitude | | Up to 1000m |
| | Vibration | | 4.9m/s ² or lower (at 10 to 50Hz) |
| | Storage (ambient temp.) | | - 5 to +40°C |
| Applicable standard | | JEC-2410 (JIS, JEM, etc.) | |

(*)1: Stores and displays control data of 225 points for the past two 1ms sampling.
(*)2: Only VM5 has the function of "motor overheat" and "overspeed" protection.

Standard interface

VM5/FM5

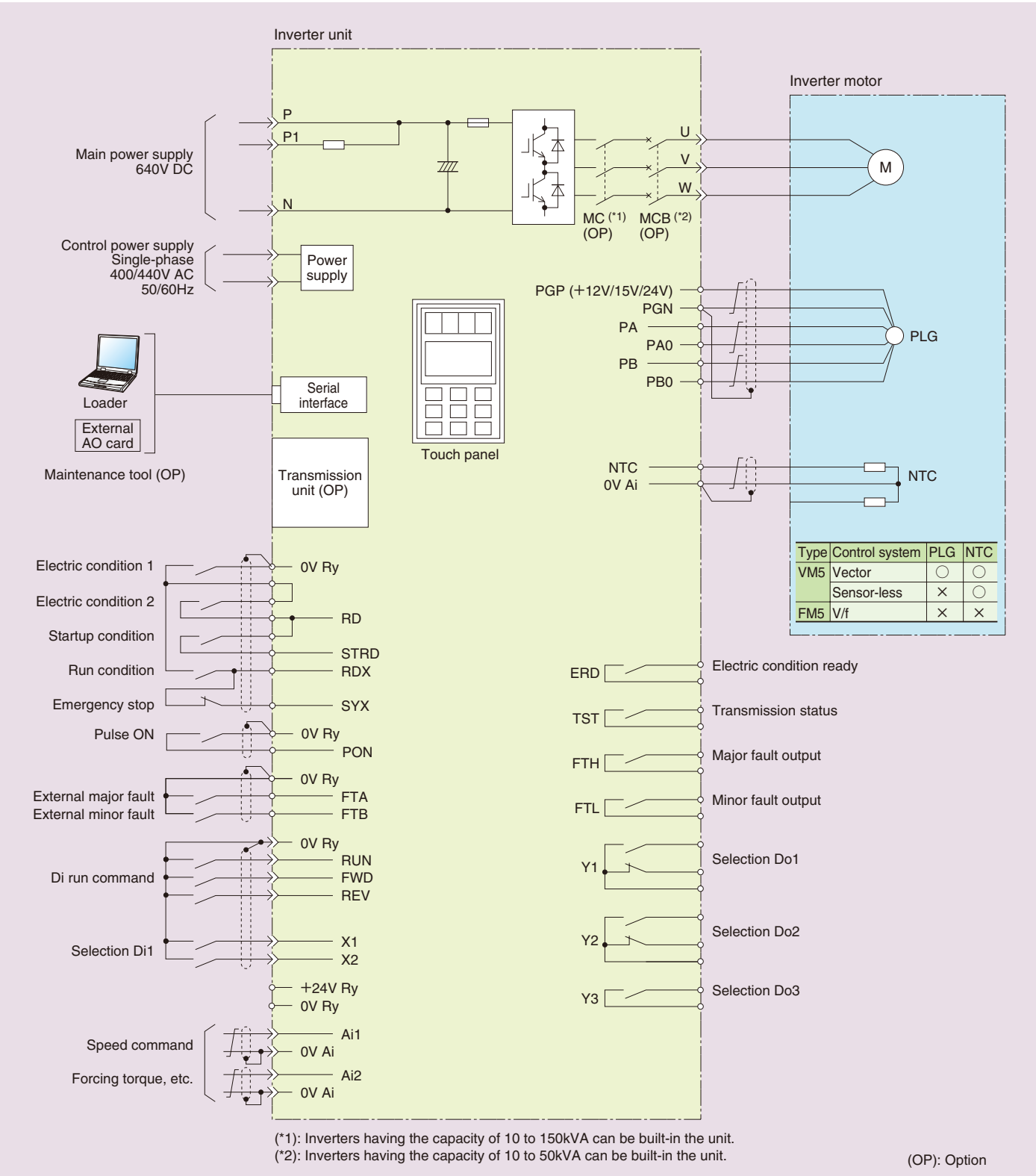
Individual specifications

(*): Option (**): To be developed

| | | | |
|------------------------------------|--------------------------------|---|--|
| Type | | FRENIC4000VM5 | |
| Motor control system | | ·Vector control ·Sensor-less vector control | |
| Function | Speed control | | ASR fixed cycle 1ms |
| | Vector control | Maximum speed | 200Hz on inverter output frequency basis |
| | | Control range | 1:1000 |
| | | Control response | 40Hz (mechanical systems not included) |
| | | Speed control accuracy | ±0.005% of the maximum speed |
| | | PG frequency | 100kHz or lower |
| | Sensor-less vector control | Torque accuracy | ±5% of the rated torque, ±3% (VMT5) (*) |
| | | Maximum speed | 200Hz on inverter output frequency basis |
| | | Control range | 1:100 (0.5Hz or larger) |
| | | Control response | 4Hz (mechanical systems not included) |
| | | Speed control accuracy | ±0.5% of the maximum speed |
| | Torque accuracy | ±5% of the rated torque | |
| | Setting resolution | | ±0.005% of the max. speed (20000d/100%) |
| | Acceleration/deceleration time | | 0 to 550.00s Linear (break point) acceleration/deceleration Acceleration/deceleration settable by transmission 2 types of deceleration for emergency stop |
| | Control function | Multiplex winding motor driving | Up to 18 windings (6 multiplexing) without the output reactor |
| | | Start/stop operation selection | The timing for releasing the brake or starting ASR can be controlled by 3 different signals (SY1, 2 and 3 by transmission) |
| Droop control | | Torque drooping characteristics according to the speed. A fixed drooping type or speed command proportional type. | |
| Torque control | | Torque limit (2 types of transmission) Torque compensation (Transmission 2 types + analog input 1 point) Mechanical loss torque is compensated by polygonal approximation with set value (forward/reverse: 14 points) | |
| Torque bias | | Analog torque setting, Transmission torque setting (2 lines), Mechanical loss pattern, etc. | |
| Observer | | Load disturbance observer Vibration suppression observer | |
| Acceleration/ deceleration forcing | | Upon calculating the acceleration/deceleration torque based on the moment of inertia J and acceleration | |
| Backlash correction | | Corrects backlash during mechanical drive by several motors | |
| Higher setting | | Sets the speed higher than normal to cope with load impact | |
| ω2 lock | | Applies an electromagnetic brake during excitation to prevent the motor from needless rotation | |
| di/dt limitation | | Limits the gradient of the torque current command | |
| Special braking | | Stops the motor without regeneration (**) | |

| | | | |
|----------------------|---------------------------------------|---|--|
| Type | | FRENIC4000FM5 | |
| Motor control system | | V/f controlled AVR | |
| Function | Output frequency | 2.5 to 200Hz | |
| | Frequency control range | 1:80 | |
| | Frequency control accuracy | ±0.01% of the maximum frequency | |
| | Field control range | 1:4 | |
| | Restart after momentary power failure | Inverter is restarted without stopping the motor. | |

| | | |
|----------------------|--|--|
| Transmission options | | |
| Card name | Use | |
| DSM card | Connects the inverter with the host PLC via D-line, T-link | |
| SX bus card | Connects the inverter with the host PLC via SX bus | |
| PSB card | Connects the inverter with the host PLC via PROFIBUS-DP | |

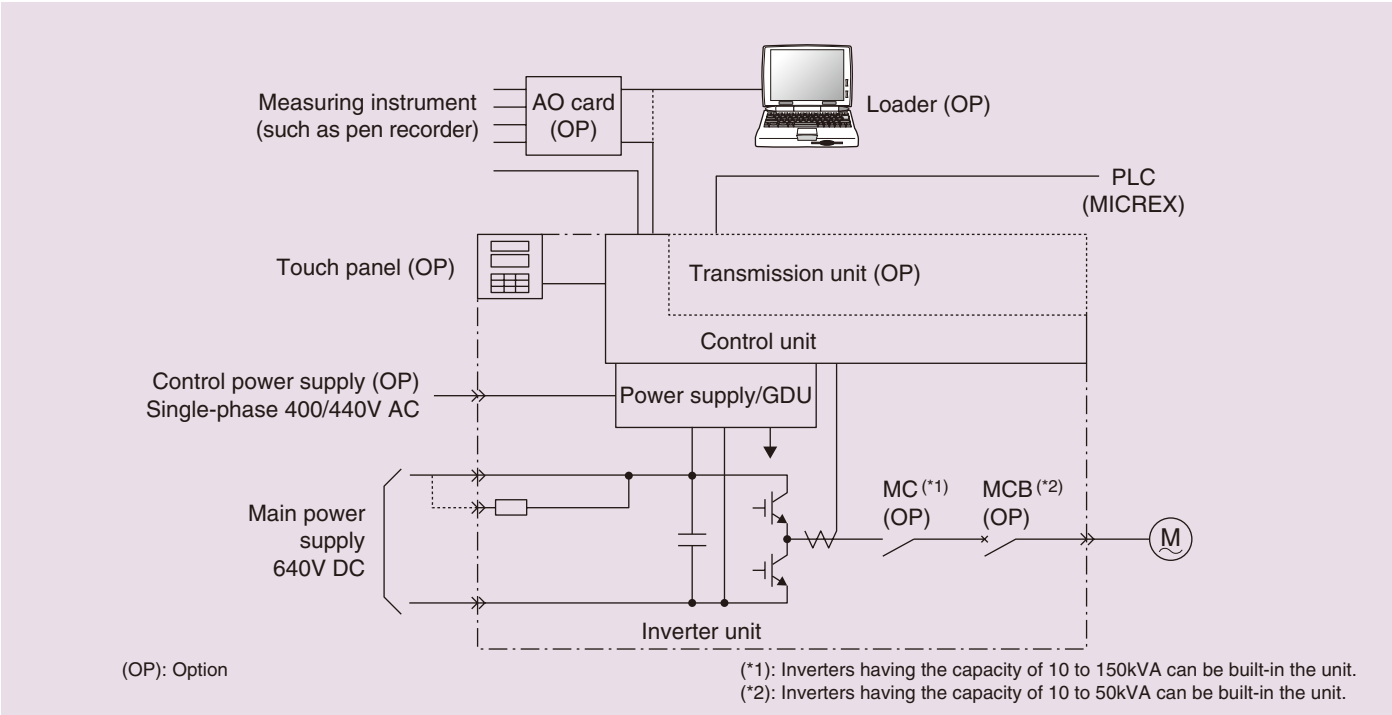


System configuration of inverter unit

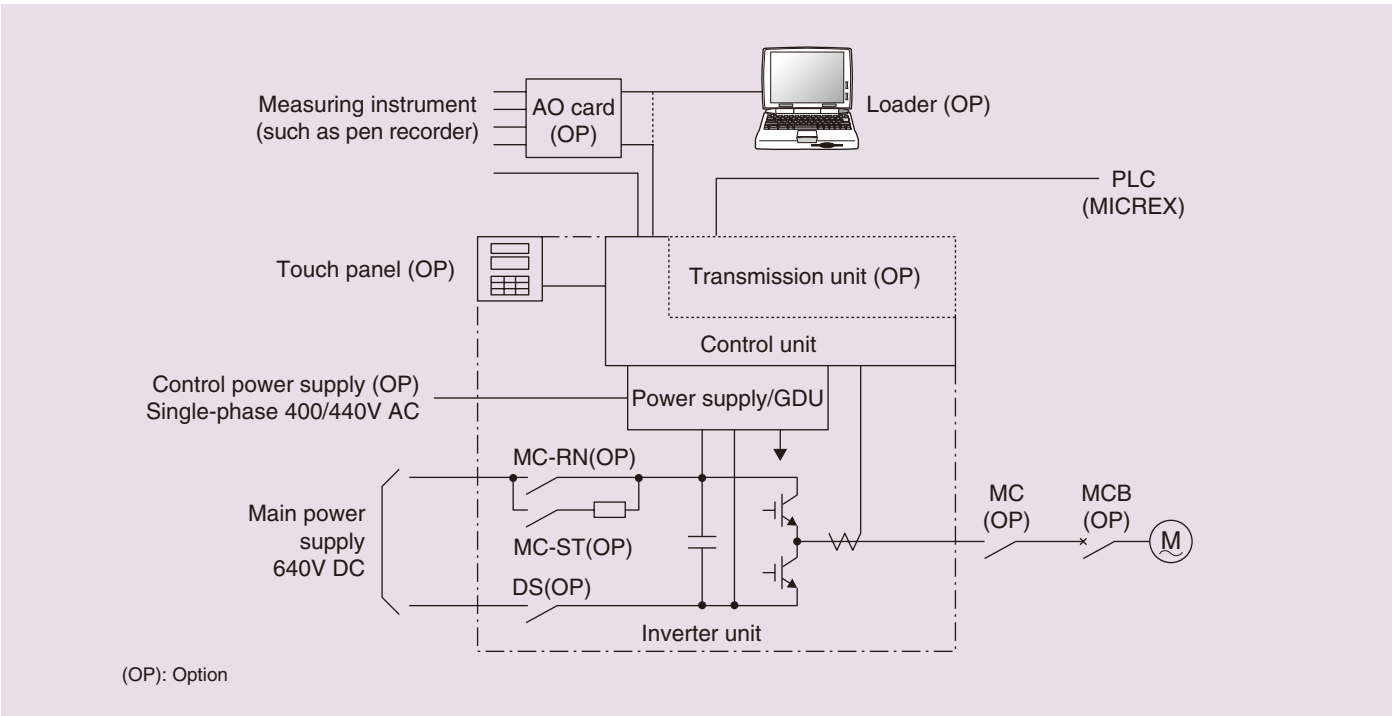
VM5/FM5

System configuration of the FRENIC4000 series

Unit type (10 to 300kVA)



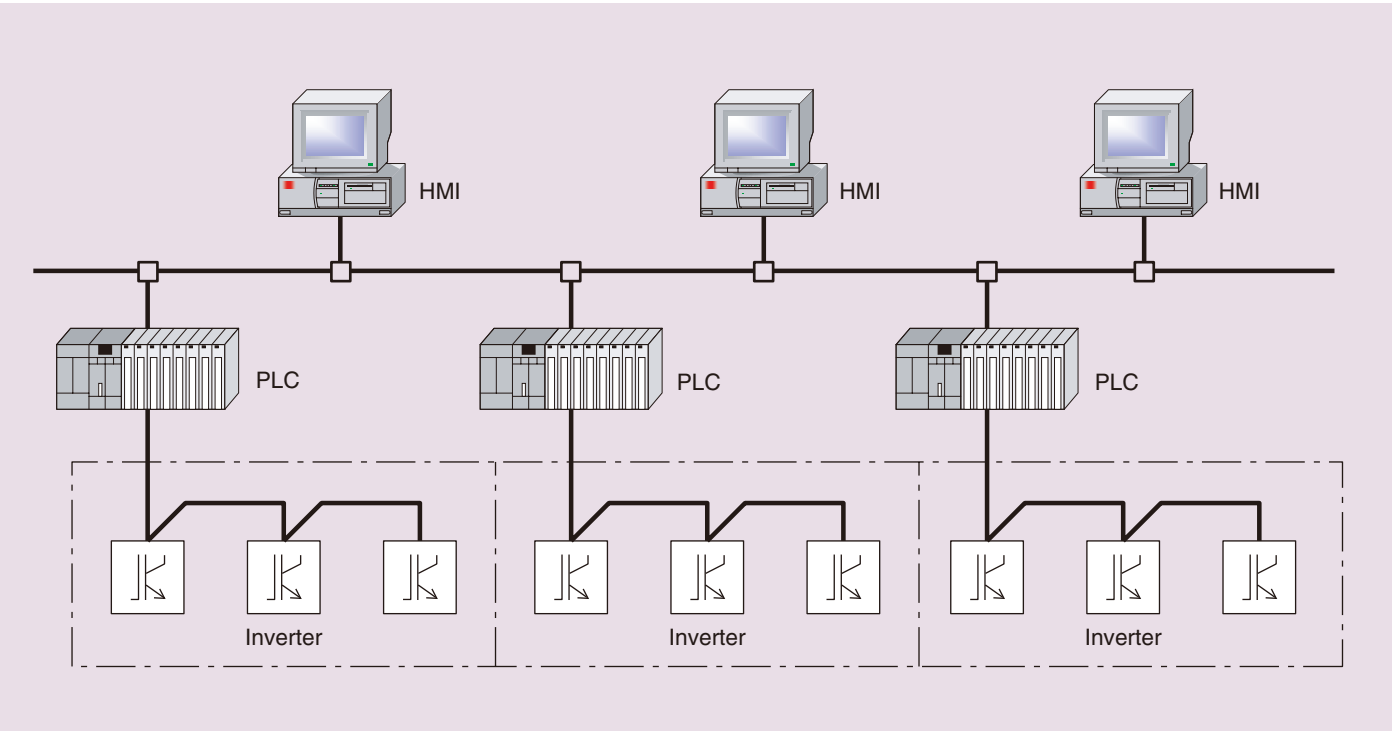
Large capacity type (450, 600, 900kVA)



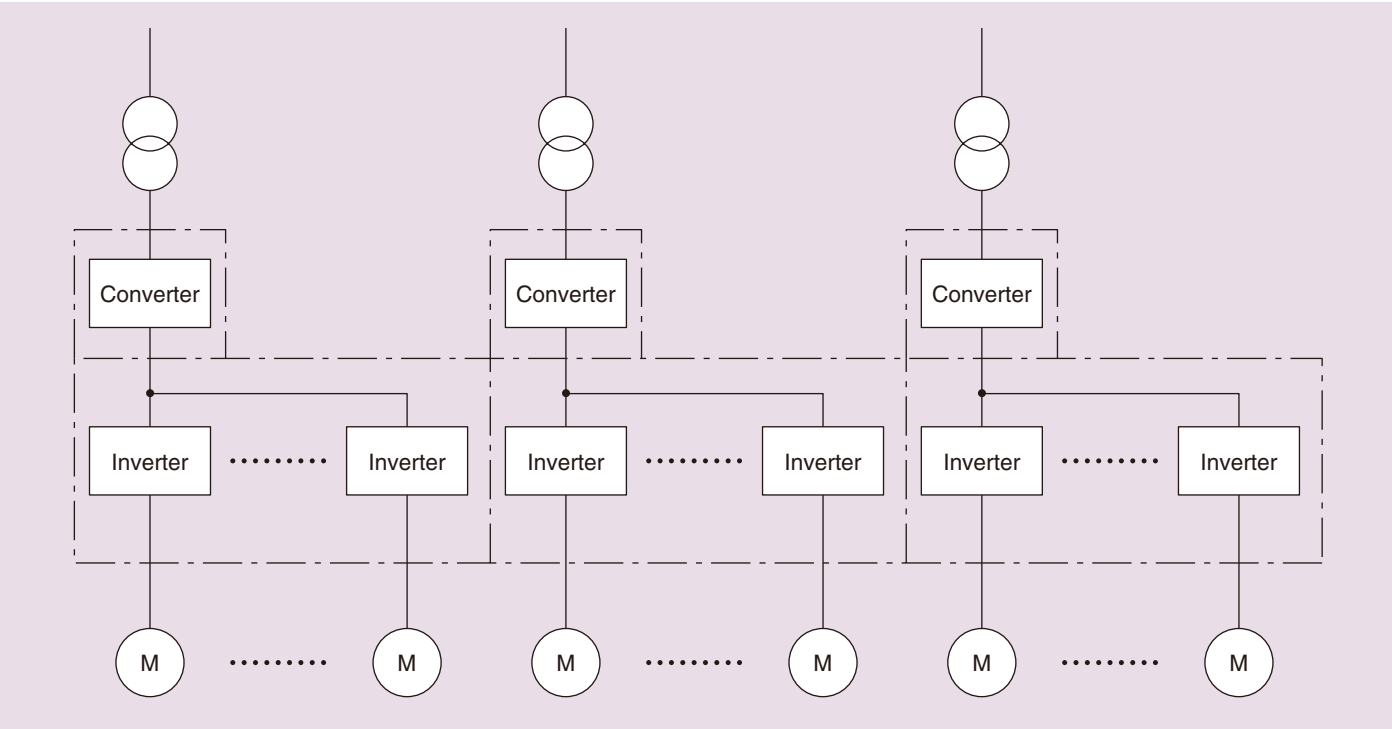
Example of system configuration and single-line diagram

VM5/FM5

System configuration



Single-line diagram



Inverter application and dimensions

VM5/FM5

Inverter unit types, rated currents, dimensions and masses

| Inverter capacity [kVA] | Type | Rated output current [A] | Approx. capacity of usable motor (*1) [kW] | Max. unit dimensions W×D×H [mm] | Outline | Approx. mass [kg] | Control power supply capacity [VA] (when steady) | Max. No. of units/panel |
|-------------------------|----------------------------------|--------------------------|--|---------------------------------|---------|-------------------|--|-------------------------|
| 10 | RKPB100□-4VM5□ RKPB100□-4FM5□ | 14.4 | 5.5 | 656×551×140 | ① | 20 | 60 | 12 |
| 15 | RKPB150□-4VM5□ RKPB150□-4FM5□ | 21.7 | 7.5 | 656×551×140 | ① | 20 | 60 | 12 |
| 25 | RKPB250□-4VM5□ RKPB250□-4FM5□ | 36.1 | 15 | 656×551×140 | ① | 25 | 60 | 12 |
| 38 | RKPB380□-4VM5□ RKPB380□-4FM5□ | 54.8 | 22 | 656×551×210 | ① | 30 | 65 | 8 |
| 50 | RKPB500□-4VM5□ RKPB500□-4FM5□ | 72.2 | 30 | 656×551×210 | ① | 35 | 65 | 8 |
| 75 | RKPB750□-4VM5□ RKPB750□-4FM5□ | 108 | 45 | 656×551×210 | ① | 40 | 65 | 8 |
| 100 | RKPB101□-4VM5□ RKPB101□-4FM5□ | 144 | 55 | 656×551×420 | ① | 60 | 80 | 4 |
| 150 | RKPB151□-4VM5□ RKPB151□-4FM5□ | 217 | 90 | 656×551×420 | ① | 70 | 80 | 4 |
| 225 | RKPB221□-4VM5□ RKPB221□-4FM5□ | 325 | 132 | 656×551×840 | ① | 110 | 80 | 2 |
| 300 | RKPB301□-4VM5□ RKPB301□-4FM5□ | 433 | 160 | 656×551×840 | ① | 120 | 80 | 2 |
| Panel frame for above | — | — | — | 900×650×2605 (800) | ② | 350 | 50Hz : 750 60Hz : 850 | — |

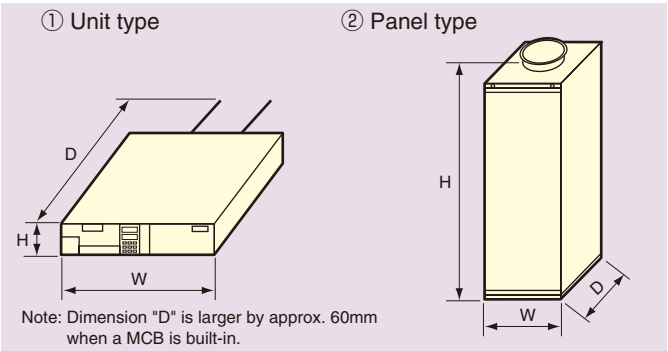
Panel type

| Inverter capacity [kVA] | Type | Rated output current [A] | Approx. capacity of usable motor (*1) [kW] | Panel dimensions W×D×H [mm] | Outline | Approx. mass [kg] | Control power supply capacity [VA] (when steady) | Remarks |
|-------------------------|----------------------------------|--------------------------|--|-----------------------------|---------|-------------------|--|----------------------------|
| 450 | RKPB451□-4VM5□ RKPB451□-4FM5□ | 650 | 270 | 800×650×2605 | ② | 700 | 50Hz : 880 60Hz : 980 | |
| 600 | RKPB601□-4VM5□ RKPB601□-4FM5□ | 866 | 360 | 800×650×2605 | ② | 700 | 50Hz : 880 60Hz : 980 | |
| 900 | RKPB901□-4VM5□ RKPB901□-4FM5□ | 1299 | 540 | 800×650×2695 | ② | 750 | 50Hz : 1270 60Hz : 1410 | |
| 1200 (VM5 only) | RKPB122□-4VM5□ | 2×866 | 720 | 1600×650×2605 | ②×2 | 1400 | 50Hz : 1760 60Hz : 1960 | Output reactor unnecessary |
| 1800 (VM5 only) | RKPB182□-4VM5□ | 2×1299 | 1080 | 1600×650×2695 | ②×2 | 1500 | 50Hz : 2540 60Hz : 2820 | Output reactor unnecessary |
| 2700 (VM5 only) | RKPB272□-4VM5□ | 3×1299 | 1440 | 2400×650×2695 | ②×3 | 2250 | 50Hz : 3810 60Hz : 4230 | Output reactor unnecessary |
| 3600 (VM5 only) | RKPB362□-4VM5□ | 4×1299 | 1800 | 3200×650×2695 | ②×4 | 3000 | 50Hz : 5080 60Hz : 5640 | Output reactor unnecessary |
| 4500 (VM5 only) | RKPB452□-4VM5□ | 5×1299 | 2160 | 4000×650×2695 | ②×5 | 3750 | 50Hz : 6350 60Hz : 7050 | Output reactor unnecessary |
| 5400 (VM5 only) | RKPB542□-4VM5□ | 6×1299 | 3240 | 4800×650×2695 | ②×6 | 4500 | 50Hz : 7620 60Hz : 8460 | Output reactor unnecessary |

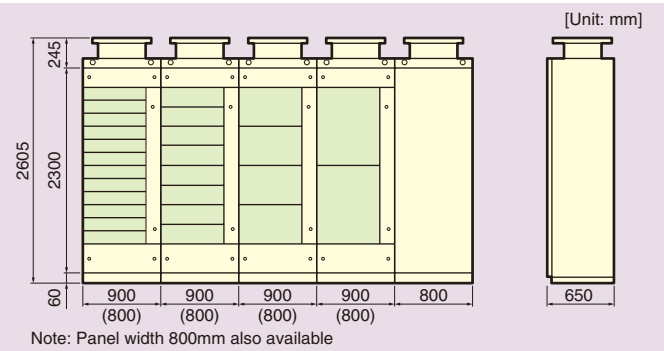
Note: The dimensions, masses and control power supply capacities shown are for standard specifications.

(*1): At rated current

Inverter unit



Inverter panel



Common converter specifications and dimensions

VM5/FM5

- When regeneration function is generally unnecessary: Diode converter
- When the regenerative side capacity is smaller than that on the drive side: Combination of diode converter and PWM regenerative converter
- When regenerative capacity equivalent to that on the drive side is necessary: PWM converter (thyristor converter also available)

Specifications

Diode converter

| Rated output current [A] | Rated capacity [kW] (at a rated value of 635V DC / 621V DC) | Without an initial charging circuit | | | With an initial charging circuit | | | Control power supply capacity [VA] (when steady) |
|--------------------------|---|-------------------------------------|-------------------|------|----------------------------------|-------------------|------|--|
| | | Panel dimensions W×D×H [mm] | Approx. mass [kg] | Fig. | Panel dimensions W×D×H [mm] | Approx. mass [kg] | Fig. | |
| 225 | 143 / 140 | 800×650×2605 | 550 | 1 | 800×650×2605 | 600 | 1 | 2260 |
| 600 | 381 / 373 | 800×650×2605 | 650 | 1 | 800×650×2605 | 700 | 1 | 2260 |
| 1200 | 762 / 745 | 1100×650×2605 | 800 | 1 | 1700×650×2605 | 1100 | 2 | 2260 |
| 1800 | 1143 / 1118 | 1100×650×2605 | 850 | 1 | 1700×650×2605 | 1150 | 2 | 3390 |
| 2750 | 1746 / 1708 | 1100×1300×2605 | 1100 | 1 | 1100×1300×2605 | 1150 | 1 | 3520 |
| 4950 | 3143 / 3074 | 1900×1300×2605 | 1600 | 2 | 1900×1300×2605 | 1600 | 2 | 4650 |

Note: The dimensions, mass and control power supply capacity are based on standard specifications.

Thyristor converter

| Rated output current [A] | Rated capacity [kW] (at 600V AC input / 620V DC output) | Panel dimensions W×D×H [mm] | Approx. mass [kg] | Fig. |
|--------------------------|---|-----------------------------|-------------------|------|
| 2400 | 1440 | 1400×650×2605 | 1100 | 2 |

PWM converter

| Rated capacity [kW] at 400V AC input | Rated capacity [kW] at 440V AC input | Panel dimensions W×D×H [mm] | Approx. mass [kg] | Control power supply capacity [VA] (when steady) | | Fig. |
|--------------------------------------|--------------------------------------|-----------------------------|-------------------|--|-------------|------|
| 30 | 35 | 800×650×2605 | 430 | 50Hz : 865 | 60Hz : 965 | 1 |
| 40 | 45 | 800×650×2605 | 430 | 50Hz : 865 | 60Hz : 965 | 1 |
| 60 | 65 | 800×650×2605 | 430 | 50Hz : 865 | 60Hz : 965 | 1 |
| 80 | 90 | 800×650×2605 | 430 | 50Hz : 880 | 60Hz : 980 | 1 |
| 125 | 135 | 800×650×2605 | 430 | 50Hz : 880 | 60Hz : 980 | 1 |
| 190 | 205 | 800×650×2605 | 450 | 50Hz : 880 | 60Hz : 980 | 1 |
| 250 | 275 | 800×650×2605 | 500 | 50Hz : 880 | 60Hz : 980 | 1 |
| 380 | 415 | 1600×650×2605 | 850 | 50Hz : 880 | 60Hz : 980 | 2 |
| 505 | 555 | 1600×650×2605 | 900 | 50Hz : 880 | 60Hz : 980 | 2 |
| 760 | 835 | 1600×650×2695 | 950 | 50Hz : 1270 | 60Hz : 1410 | 2 |
| 1010 (2 multiplex) | 1110 (2 multiplex) | 2400×650×2605 | 1400 | 50Hz : 1760 | 60Hz : 1960 | 3 |
| 1520 (2 multiplex) | 1620 (2 multiplex) | 2400×650×2695 | 1500 | 50Hz : 2540 | 60Hz : 2820 | 3 |

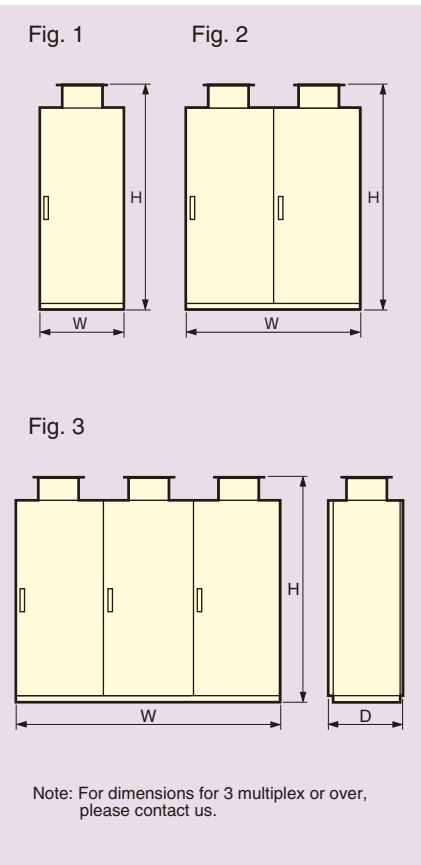
Note: The dimensions, mass and control power supply capacity are based on standard specifications.

PWM regenerative converter

| Peak regenerative amount [kW] | Panel dimensions W×D×H [mm] | Approx. mass [kg] | Control power supply capacity [VA] (when steady) | | Fig. |
|-------------------------------|-----------------------------|-------------------|--|-------------|------|
| 110 | 800×650×2605 | 430 | 50Hz : 880 | 60Hz : 980 | 1 |
| 165 | 800×650×2605 | 430 | 50Hz : 880 | 60Hz : 980 | 1 |
| 250 | 800×650×2605 | 450 | 50Hz : 880 | 60Hz : 980 | 1 |
| 330 | 800×650×2605 | 500 | 50Hz : 880 | 60Hz : 980 | 1 |
| 500 | 1600×650×2605 | 850 | 50Hz : 880 | 60Hz : 980 | 2 |
| 660 | 1600×650×2605 | 900 | 50Hz : 880 | 60Hz : 980 | 2 |
| 1320 (2 multiplex) | 1600×650×2695 | 950 | 50Hz : 1270 | 60Hz : 1410 | 2 |
| 1980 (3 multiplex) | 2400×650×2605 | 1400 | 50Hz : 1760 | 60Hz : 1960 | 3 |

Note: The dimensions, mass and control power supply capacity are based on standard specifications.

Dimensions



Common specifications

| Environment | Installation location | Indoors, Free from corrosive gas, inflammable gas, dust, or explosive gas |
|---------------------|-------------------------|---|
| | Ambient temp. | 0 to +40°C |
| | Ambient humidity | 20 to 90% RH (no condensation) |
| | Cooling method | Forced air-cooled system |
| | Altitude | Up to 1000m |
| | Vibration | 4.9m/s² or lower (at 10 to 50Hz) |
| | Storage (ambient temp.) | -5 to +40°C |
| Applicable standard | | JEC-2410 (JIS, JEM, etc.) |

Dimensions and mass of DC/AC reactors and regenerative transformer

VM5/FM5

Specifications

Diode converter

| Rated output current [A] | Separate DC reactor | | Approx. mass [kg] | Fig. |
|--------------------------|---------------------|-----------------------|-------------------|------|
| | Standard type (*1) | Dimensions W×D×H [mm] | | |
| 600 | RKJP1DLK-0094A | Contact us | Contact us | 1 |
| 1200 | RKJP1DLK-0094B | | | |
| 1800 | RKJP1DLK-0094C | 615×850×1015 | 270 | 1 |
| 2750 | RKJP1DLK-0094E | 615×1000×1115 | 375 | 1 |
| 4950 | RKJP1DLK-0094H | 800×1100×1310 | 550 | 1 |

(*1): The DCL type is for reference. The selected type depends on particular specifications.

PWM converter

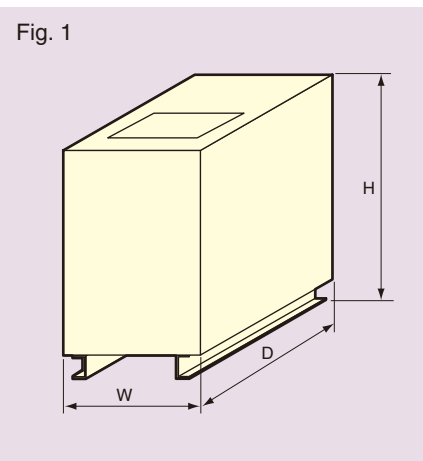
| Rated capacity [kW] at 400V AC input | Separate AC reactor | | Approx. mass [kg] | Fig. |
|--------------------------------------|---------------------|-------------------------------|-------------------|------|
| | Standard type (*2) | Approx. dimensions W×D×H [mm] | | |
| 30 | RKJP1ALK-0083R or S | Contact us | Contact us | 2 |
| 40 | RKJP1ALK-0083T or U | | | |
| 60 | RKJP1ALK-0083V or W | | | |
| 80 | RKJP1ALK-0083A or H | | | |
| 125 | RKJP1ALK-0083B or J | 665×665×1065 | 340 | 2 |
| 190 | RKJP1ALK-0083C or K | | | |
| 256 | RKJP1ALK-0083D or L | 665×665×1065 | 370 | 2 |
| 380 | RKJP1ALK-0083F or N | 750×700×1005 | 420 | 2 |
| 500 | RKJP1ALK-0083G or P | 915×765×1065 | 510 | 2 |
| 760 | RKJP1ALK-0083X or Y | 900×900×1380 | 840 | 2 |
| 1000 (2 multiplex) | RKJP1ALK-0083G,P×2 | 915×765×1065×2 | 510×2 | 2 |
| 1520 (2 multiplex) | RKJP1ALK-0083X,Y×2 | 900×900×1380×2 | 840×2 | 2 |

(*2): Type depends on the particular source frequency and whether the leads are present or not (/F).

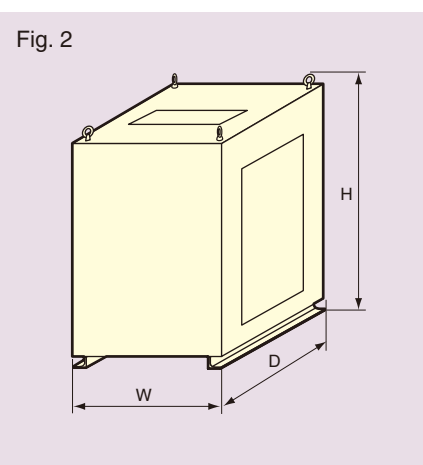
PWM regenerative converter

| Peak regenerative amount [kW] | Separate regenerative transformer | | Approx. mass [kg] | Fig. |
|-------------------------------|-----------------------------------|-------------------------------|-------------------|------|
| | Standard type | Approx. dimensions W×D×H [mm] | | |
| 110 | RKJP1TRK-0065GP | Contact us | Contact us | 3 |
| 165 | RKJP1TRK-0065HP | | | |
| 250 | RKJP1TRK-0065IP | 800×800×1165 | 450 | 3 |
| 330 | RKJP1TRK-0065JP | 800×800×1165 | 525 | 3 |
| 500 | RKJP1TRK-0065KP | 900×900×1375 | 685 | 3 |
| 660 | RKJP1TRK-0065LP | 900×900×1375 | 830 | 3 |
| 1320 (2 multiplex) | RKJP1TRK-0065LP×2 | 900×900×1375×2 | 830×2 | 3 |
| 1980 (3 multiplex) | RKJP1TRK-0065LP×3 | 900×900×1375×3 | 830×3 | 3 |

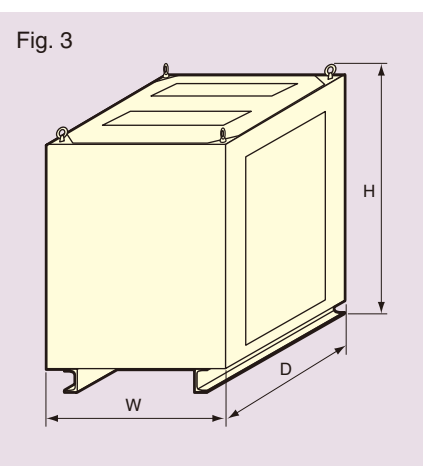
Separate DC reactor



Separate AC reactor



Separate regenerative transformer



Recommended cable for inverter and converter

VM5/FM5

Inverter

(*): furnished

| Inverter capacity [KVA] | Rated current [A] | Overload current [A] (1min) | Position | Main circuit (inverter ⇔ motor) | | | | Control |
|----------------------------|----------------------|-----------------------------------|------------|---------------------------------|-------|------------|----------|---------------------|
| | | | | Connectable cable | | | Terminal | Inverter relay unit |
| | | | | | | | | |
| No./each phase | Phase | Size [mm²] | Screw size | Screw size | | | | |
| 10 | 14.4 | 21.7 | ⑤ | 1 | Three | 3.5 to 8 | M5 (*) | M3.5 (*) |
| 15 | 21.7 | 32.5 | | | | | | |
| 25 | 36.1 | 54.1 | | | | | | |
| 38 | 54.8 | 82.3 | | | | 3.5 to 38 | M8 (*) | |
| 50 | 72.2 | 108.3 | | | | | | |
| 75 | 109 | 163 | | | | | | |
| 100 | 144 | 217 | | | | 3.5 to 100 | M10 (*) | |
| 150 | 217 | 325 | | | | | | |
| 225 | 325 | 487 | | | | | | |
| 300 | 433 | 650 | | | | 80 to 325 | M16 (*) | |
| 450 | 650 | 974 | | | | | | |
| 600 | 866 | 1299 | | | | | | |
| 900 | 1299 | 1949 | 2 | Three | | | | |
| | | | 4 | Three | | | | |

Diode converter

(*): furnished

| Converter rated output current [A] | Rated current [A] | Overload current [A] (1min) | Position | Main circuit (incoming ⇔ converter) | | | | |
|------------------------------------|-------------------|-----------------------------|----------|-------------------------------------|--------|------------|------------|------------|
| | | | | Connectable cable | | | Terminal | |
| | | | | No./each phase | Phase | Size [mm²] | Shape | Screw size |
| 225 | 183 | 275 | ① | 1 | Three | 80 to 325 | Copper bar | M16 (*) |
| | 225 | 337 | | 2 | Single | | | |
| 600 | 490 | 735 | ② | 2 | Three | | | |
| | 600 | 900 | | 2 | Single | | | |
| 1200 | 980 | 1470 | ① | 3 | Three | | | |
| | 1200 | 1800 | | 4 | Single | | | |
| | 1471 | 2207 | ② | 5 | Three | | | |
| | 1800 | 2700 | | 6 | Single | | | |
| 2750 | 2247 | 3371 | ① | 8 | Three | | | |
| | 2750 | 4125 | | 10 | Single | | | |
| 4950 | 4044 | 6066 | ② | 16 | Three | | | |
| | 4950 | 7425 | | 20 | Single | | | |

PWM regenerative converter

(*): furnished

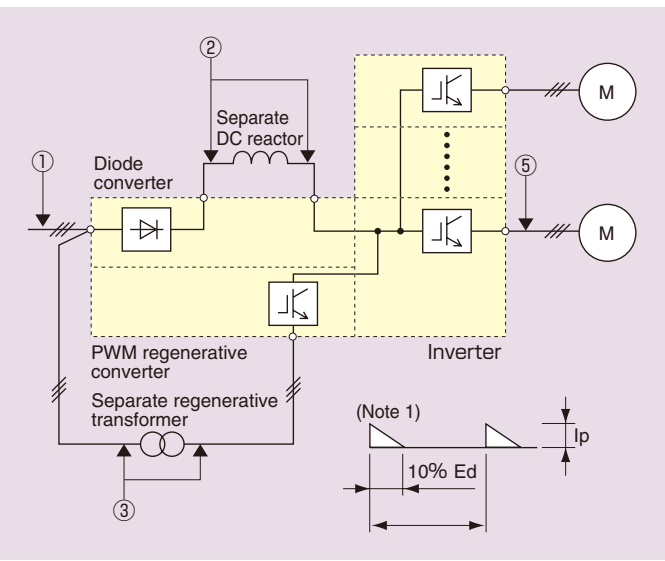
| Converter capacity [kW] | Max. current Ip (Note 1) [A] | Position | Main circuit | | | Control | |
|-------------------------|------------------------------|----------|-------------------|-------|------------|----------------|---|
| | | | Connectable cable | | Terminal | Terminal block | |
| | | | No./each phase | Phase | Size [mm²] | Screw size | Screw size |
| 110 | 217 | ③ | 1 | Three | 3.5 to 100 | M10 (*) | M3 (*) |
| 165 | 325 | | | | 80 to 325 | M16 (*) | M3 (*) except on terminal block for panel inside sequence circuit |
| 250 | 487 | | | | | | |
| 330 | 650 | | | | | | |
| 500 | 974 | | | | | | |
| 660 | 1299 | 2 | Three | | | | |
| n×660 | n×1299 | | | | | | |

PWM converter

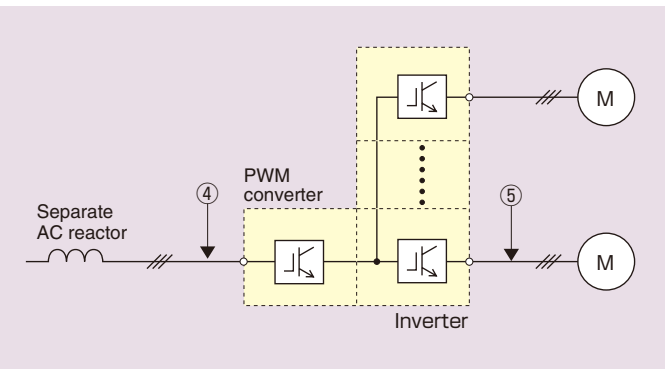
(*): furnished

| Converter capacity [kW] | | Rated current | Overload current | Position | Main circuit (incoming ⇔ converter) | | | | Control | | |
|-------------------------|---------------|------------------|------------------|------------|-------------------------------------|-------|------------|------------|------------|----------|---------|
| 400V AC input | 440V AC input | [A] (AC side) | [A] (1min) | | Connectable cable | | Terminal | | Relay unit | | |
| | | | | | No./each phase | Phase | Size [mm²] | Screw size | Screw size | | |
| 30 | 35 | 54 | 81 | | ④ | 1 | Three | 3.5 to 38 | M8 (*) | M3.5 (*) | |
| 40 | 45 | 72 | 108 | | | | | | | | |
| 60 | 65 | 108 | 162 | | | | | | | | |
| 80 | 90 | 144 | 217 | | | | | | | | |
| 125 | 135 | 217 | 325 | 3.5 to 100 | | | | M10 (*) | | | |
| 190 | 205 | 325 | 488 | | | | | | | | |
| 250 | 275 | 433 | 650 | | | | | | 80 to 325 | | M16 (*) |
| 380 | 415 | 650 | 974 | | | | | | | | |
| 505 | 555 | 866 | 1299 | | | | | | | | |
| 760 | 835 | 1299 | 1949 | | | | | | | | |

Diode converter + inverter + PWM regenerative converter



PWM converter + inverter



Data setting and monitoring (dedicated touch panel)

VM5/FM5

The touch panel equipped with a LCD displays a lot of information, and facilitates the functions of data setting, running operation and monitoring. On the bottom of the LCD, key operational guidance appears, allowing you to perform almost all operations without referring to the instruction manual.

Up and down keys

Used for changing the Data Indication Nos. and the data setting values.

Program key

Reverts to the monitor screen (default) from any screen.

Shift key (digit shift)

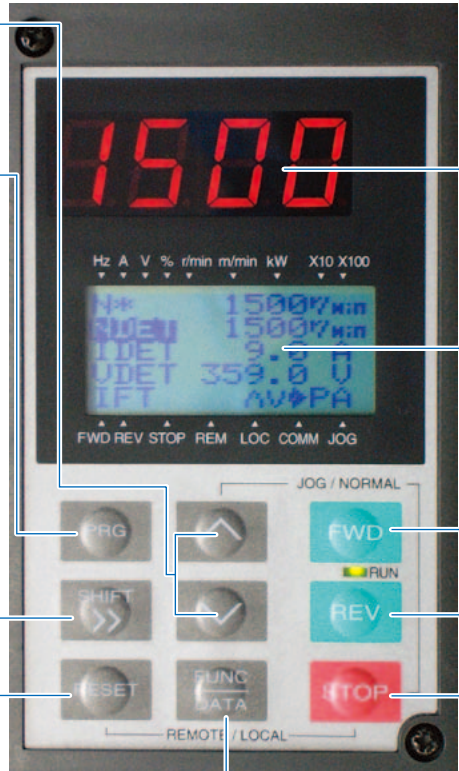
Used to move the cursor from one digit to another in order to change data.

Reset key

When normal:
Assigned to "return" and "cancel" functions.
Returns to the previous layer.
At tripping:
Releases the stop status due to tripping.

Function/data selection key

Assigned to "enter" and "OK" functions.



LED monitor (4 digits)

Displays the number of revolutions (changeable). Any of 8 different data indicated on the LCD on the monitor screen can be selected arbitrarily. At tripping: "Err" blinks automatically, alerting you to the trip.

LCD monitor

Displays various information, including operational, set and fault data over a maximum of 5 lines × 13 characters. Operational guidance appears on the bottom. On tripping, the trip data automatically appears.

Normal, reverse and stop keys

The operation can be started or stopped on the touch panel.

Example of actual screen display

The monitor screen (default screen after turning on power) continually displays all of the current running statuses: speed command, detection, output current, output voltage and key operational guidance.

Use of touch panel (the No. of items is for VM5)

| Menu | Description | No. of items |
|---------|--|----------------------------|
| Initial | Monitor screen: Current, voltage and frequency display | Selected out of 2 pictures |
| M01 | Parameter setting reference and change | About 200 |
| M02 | Di/Do bit on/off status reference | 7 pictures |
| M03 | Ai/Ao voltage reference | 2 pictures |
| M04 | Inverter internal data display | About 90 |
| M05 | Transmission, sent/received data reference | About 60 |
| M06 | Inverter start, stop operation | 1 picture |
| M07 | Inverter startup condition on/off reference | 2 pictures |
| M08 | Latest fault code (simultaneous occurrence) reference | Up to 20 |
| M09 | Error history reference | Latest 40 |
| M10 | Inverter inside data reference on trip | About 20 |
| M11 | Present time setting, operating time reference, parameter setting control, liquid crystal concentration adjustment, etc. | About 10 pictures |

Introduction of some functions

●M09: Error history

Displays a chronological record of the past 40 faults with the causes and the time and date of occurrence, thereby allowing you to trace back errors.

●M10: Trip data display

Displays internal data sampling values and bit data on/off, allowing you to know the fault circumstances.

●M11: Save of parameter settings, load, and comparison

Inverter parameter settings can be saved in batch form into nonvolatile memory using the touch panel. They are retained when the power is turned off. The saved data can also be loaded to the inverter. Current inverter settings and values saved on the touch panel can be compared with each other.

Maintenance tool (option)

VM5/FM5

■ PC loader (FLOAD for Windows)

Although maintenance and adjustment can be performed from the touch panel mounted on the panel face, an optional PC loader is available as a maintenance/adjustment tool. The PC loader installed in a notebook PC, has better operability and visibility than the touch panel. The trace-back data is useful for locating any fault trip.

●Main functions of FLOAD for Windows

●Trace-back data

Upon fault occurrence, the cause as well as the waveform data and bit on/off statuses of the speed, current and other major items are registered. You can proceed to analysis of error circumstances, quick action and recovery. Details of up to 2 of the latest error occurrences can be retained.

●Control parameter setting, change, display and storage

Control parameter settings can be saved with arbitrary filenames and comments and changed on a PC. Thus, the inverter control parameters can be controlled on a PC.

●Running status display

Current inverter running statuses can be viewed at a glance thanks to the block diagram, actual value and internal data indications.

●Fault cause display

Up to 2 faults with up to 20 causes each are indicated together with the time and date of occurrence.

●Test run operation

The loader facilitates easy start and stop of the inverter while its statuses are displayed on the "running status indication screen".

●Multi-window display

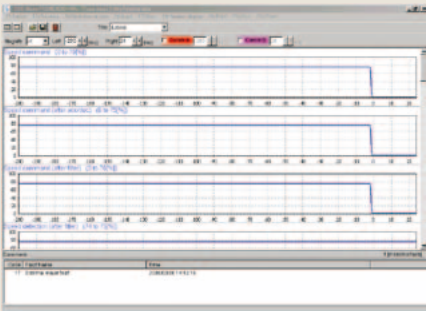
Several window indications can be displayed on a single screen, thereby allowing you to simultaneously monitor multiple information sources.

■ External AO card (type: RGGW1AAU-0070D)

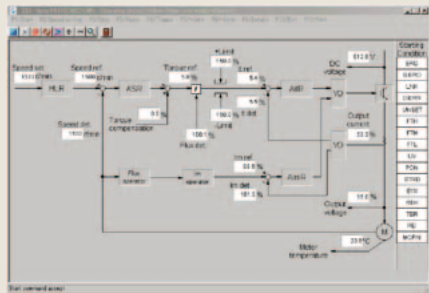
Inverter internal data (signal selection out of about 60 data) can be outputted by 4 channels in $\pm 10V$ of analog voltage. They are isolated from the inverter.

■ Special lifter (type: FC33022)

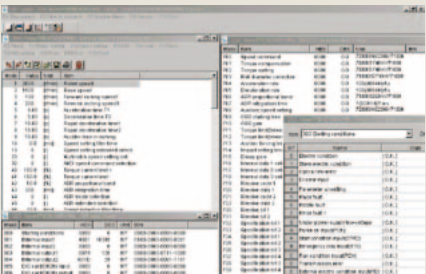
The inverter can be replaced by a small number of persons. The inverter, as well as the converter, in each capacity can be handled upon changing the load bucket.



Trace-back data (inverter waveform at fault) window



Running status window



Multi-window display



plusFSITE (*1) (Field Web adapter)

This adapter enables users to carry out remote monitoring of inverters promptly and easily with their own personal computers without using a dedicated system.

Main features

- Web server function
Inverters can be monitored from the browser of a personal computer. (Display screen can be changed if requested.)
- Mail sending function
Actions can be reported periodically from inverters. Upon fault occurrence, mail, including trace-back data, is transmitted.
- Applicable to the FRENIC4000VM5/FM5 and other Fuji Electric products.

(*1): plusFSITE: Fuji Supervising Interface Terminal for various Equipment



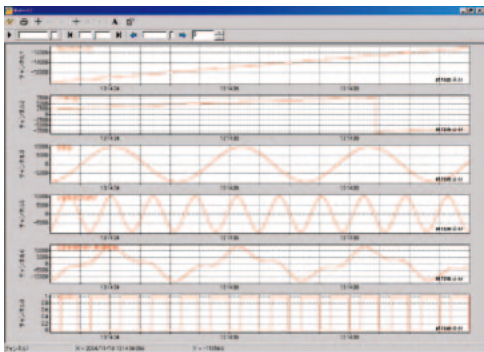
f(s)NISDAS (*2)

The inverter monitoring can be centralized at high speed.

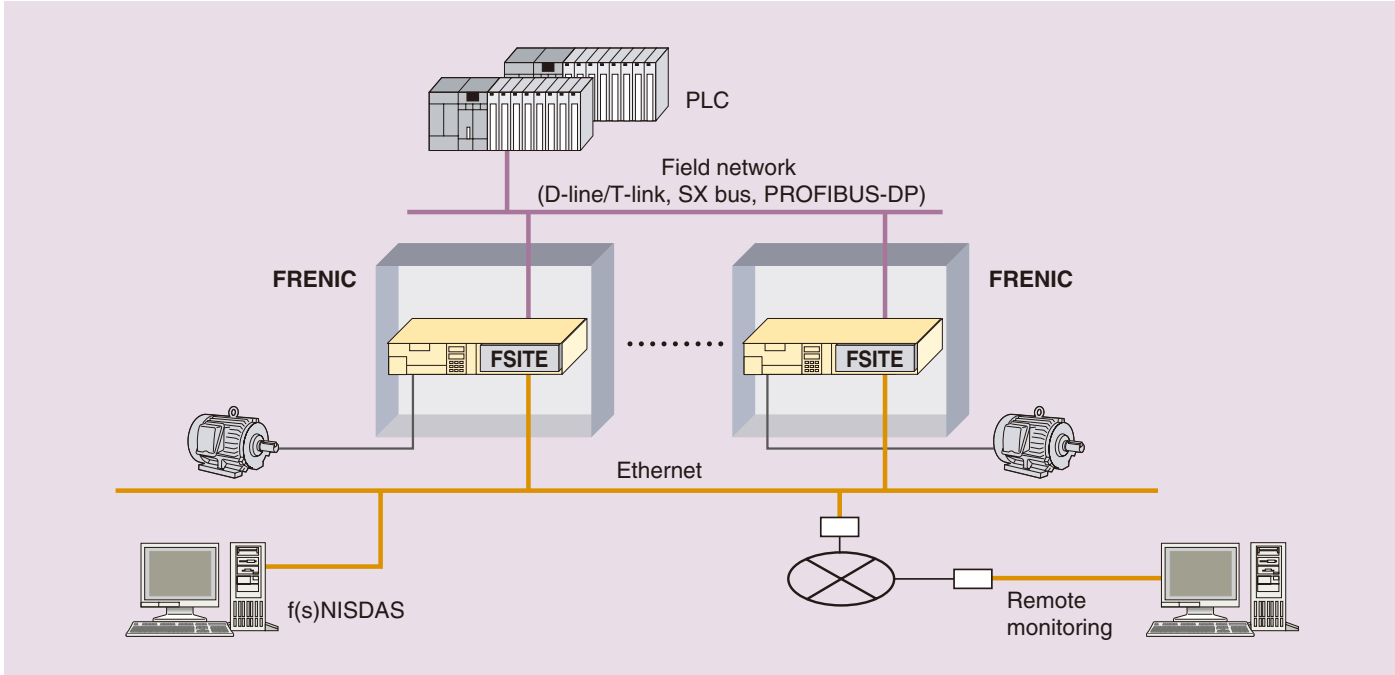
Main features

- Real time monitoring
Inverter data can be sampled every 10ms (for up to 32 inverters simultaneously).
- Trace-back data acquisition
Trace-back data stored in the inverter can be acquired.
- PLC internal data acquisition
Fuji general-purpose PLC (MICREX-SX) internal data can be acquired.

(*2): f(s)NISDAS: Using open-Network & I.T., based on SX, Diagnosis and Analysis System



Example of system configuration



| Application | Series | Features | Output voltage [V] | Capacity range [kVA] | | | |
|---------------------------------------|------------------|--|----------------------------|----------------------|---------------|-----------------------|-------|
| | | | | 10 | 100 | 1000 | 10000 |
| For plant | FRENIC 4000VM5 | Vector controlled inverter for plants • High-performance vector control system for quick response, high-accuracy and wide range speed control. • The DC-link system allows highly efficient plant operation. | 400 | | | | 5400 |
| | FRENIC 4000FM5 | V/f controlled inverter for plants • Frequency of fan, pump and group-driven motors can be controlled accurately. • The DC-link system allows highly efficient plant operation. | 400 | | | 900 | |
| | FRENIC 4400VM5 | Large-capacity vector controlled inverter • The capacity of FRENIC4000 series units has been increased due to 3-level control. | 800 | | | 6000 | |
| | FRENIC 4400FM5 | Large-capacity V/f controlled inverter • The capacity of FRENIC4000 series units has been increased due to 3-level control. | 800 | | | 2000 | |
| | FRENIC 4700VM5 | Medium-voltage large-capacity vector controlled inverter • The capacity of FRENIC4000 series units has been increased thanks to the series-connected device and 3-level control. | 3440 | | | 7800 | |
| | FRENIC 4800VM5 | Medium-voltage, water-cooling, large-capacity and vector controlled inverter • The capacity of FRENIC4000 series units has been increased due to 3-level control. • Downsizing achieved by adopting a water-cooling system | 3100 | | | | 24000 |
| | LEONIC-M700 | Thyristor converter for plants • Large-capacity thyristor converter for various types of control | 220 DC 440 DC 750 DC | | | | |
| | LEONIC-M Compact | Unit-type DC motor controller • Compact thyristor controller equipment intended for update from analog controller also | 220 DC 440 DC | | 75kW 150kW | | |
| For general industry (medium-voltage) | FRENIC 4600FM5 | Medium-voltage direct-output inverter • 3.3/6.6kV IGBT inverter • Variable speed operation of medium-voltage motors saves energy. • Circuit configuration and control are well designed for power supplies and motors. | 3300 6600 | | | 3750 7500 | |
| | FRENIC 4600FM5e | Medium-voltage direct-output inverter (for fans and pumps) • Compact • Variable speed operation of medium-voltage motors saves energy. • Circuit configuration and control are well designed for power supplies and motors. | 3300 6600 10000 | | | 5200 10500 5300 | |
| For general industry (low-voltage) | FRENIC 5000VG7S | High-performance vector controlled inverter | 200 400 | | 90kW 800kW | | |
| | FRENIC-MEGA | High-performance V/f controlled inverter | 200 400 | | 90kW 630kW | | |
| | FRENIC-ECO | V/f controlled inverter for fans and pumps | 200 | | 110kW | | |
| | | | 400 | | 560kW | | |

Ordering information

When placing an order or making an inquiry, please state the following.

| | | | | | |
|---|---------------|-------------------------|-------------|-----------------|--|
| Application of inverter | | | | Remarks: | |
| Load machine specifications | | | | | |
| Name: | | | | | |
| Load torque characteristics: <input type="checkbox"/> Square-law speed <input type="checkbox"/> Constant torque <input type="checkbox"/> Constant output | | | | | |
| Moment of load inertia after conversion into motor shaft (J): kg · m ² | | | | | |
| Overload: % | | | | | |
| Input specifications | | | | | |
| Rated voltage: V ± % | | Rated frequency: Hz ± % | | | |
| Control power source: -phase, -wire, V, Hz | | | | | |
| Driven motor | | | | | |
| Motor specifications: <input type="checkbox"/> Squirrel-cage rotor <input type="checkbox"/> () , <input type="checkbox"/> Existing <input type="checkbox"/> New installation | | | | | |
| Rating | Output: kW | No. of poles: | Voltage: kV | | |
| | Frequency: Hz | Speed: r/min | Current: A | | |
| Speed control | | | | | |
| Control range: r/min to r/min | | | | | |
| Rotational/frequency setting method | | | | | |
| Ambient conditions | | | | | |
| Installation location: Indoor | Humidity: %RH | Temperature: °C | Altitude: m | | |
| Provision of air conditioning: | | Limit on carrying-in: | | | |

Printed on recycled paper

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Information in this catalog is subject to change without notice.

2013-11(K2013/B2003)KO/CTP3Ok Printed in Japan