Fuji Electric

*Innovating Energy Technology*

# FRENIC-HVAC Solar

## Solar (PV) Pumping Inverter

*Solar powered water pumping system technology for irrigation and community drinking water supplies*

Fuji Electric Asia Pacific Pte. Ltd.

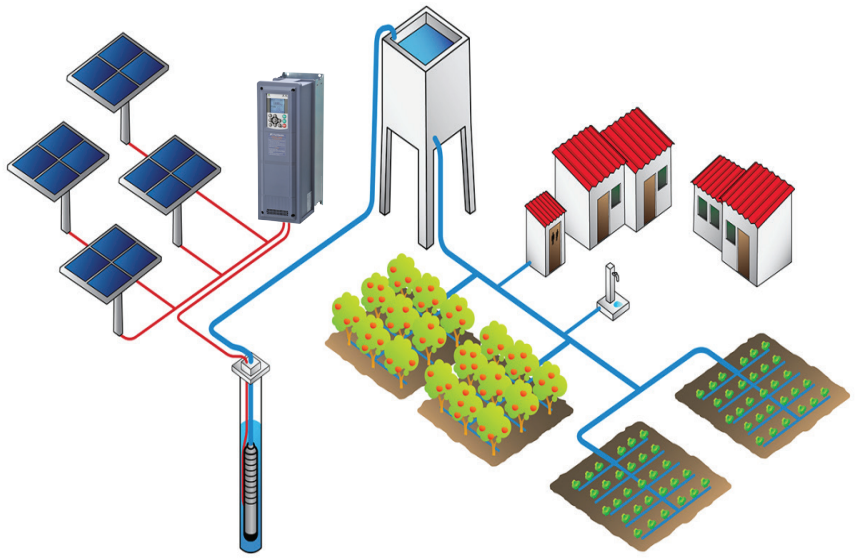
# FRENIC-HVAC Solar

## Achieves great effective on solar pumping system

A reliable and clean water supply is an essential need but a large number of people currently lack this basic provision. Solar water pumps is a socially and environmentally attractive technology to supply water. Especially if the need for water is in remote locations which are beyond the reach of power lines, solar power is often the economically preferred technology for community water supplies and irrigation.

Solar water pumping is based on photovoltaic (PV) technology that converts solar energy into electrical energy to run a AC motor based water pump.

The Fuji Electric's FRENIC-HVAC Solar inverter series are specifically designed to accept DC power directly from the solar modules and are optimized for operating under less-than-ideal sun conditions. Where conventional AC-powered pumps require a stable voltage and frequency to operate, solar pumps can operate over a wide range of voltage and available current. The Fuji Electric's FRENIC-HVAC Solar series develop a new simple way for effective solar pumping application.



FRENIC-HVAC Solar
*inverter benefits*

Compared to diesel generator pumps, the FRENIC-HVAC Solar inverter is environmentally friendly, with a long lifetime and low maintenance costs. It is independent of the grid and produces no pollution or noise. Typical applications are irrigation, community water supply for domestic use.

The FRENIC-HVAC Solar inverter has many solar-specific and pump control functions, such as true-maximum power point tracking (True-MPPT) and dry run protection.

The true maximum power point tracking (True-MPPT) ensures you to get the best output power possible from your solar panel and it maximizes the performance of your pump throughout a sunny day.

This FRENIC-HVAC Solar inverter allows you to convert any AC pump so long as you know the size (in HP/kW) to be run directly on solar energy. Making for a more robust all round system.

FEATURES:

- Designed for use in remote and harsh conditions location - IP65 high ingress protection level
- Smart modular design for simple and cost effective appalication
- True-Maximum Power Point Tracking (True-MPPT) - Fast response and good operating stability
- Dry pump detection function
- Water tank maximum level detection function
- Low power detection function
- Sleep and wake function - Automatic start and stop with solar radiation
- Protection of sudden changes of conditions (especially irradiance)
- Two sets of PID gains for fast and smooth operation
- Long life expectancy and proven in service record

Inverter has perfect running protection mechanism, such as output short-circuit protection, IGBT over-current protection, input over/under voltage protection, overload protection, module over temp protection, grounding protection and so on. RS485 communication potocol (built-in) and other option ready for more advance application.

## User friendly keypad

- 19 language supported
- Regulator is indicated by enlarging LCD
  - Present value (PV)
  - Setting value (SV)
  - Output current
  - Output voltage
  - Power consumption


Multi function Keypad with LCD display: Enhanced HMI functionality
User can check the real time info and historical info via the LCD display located on the front board

## Standard Specification

3-phase, 400V series (0.75 to 22kW)

| Item | | Specifications | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | FRN □□□AR1K-4DSL | 0.75 | 1.5 | 2.2 | 4.0 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| Nominal applied motor (Rated output) [kW] | | 0.75 | 1.5 | 2.2 | 3.7/4.0 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| Output Rating | Rated capacity [kVA] | 1.9 | 3.1 | 4.1 | 6.8 | 10 | 14 | 18 | 24 | 29 | 34 |
| | Rated voltage [V] | Three-phase, 380 to 480 V (with AVR function) | | | | | | | | | |
| | Rated current [A] | 2.5 | 4.1 | 5.5 | 9.0 | 13.5 | 18.5 | 24.5 | 32 | 39 | 45 |
| | Overload capability | 110% - 1 min | | | | | | | | | |
| | Rated frequency [Hz] | 50, 60Hz | | | | | | | | | |
| Input Rating | Main Circuit Voltage [Vdc] | 440 Vdc to 760 Vdc (Minimum 310Vdc) | | | | | | | | | |
| | Rated Current (50Hz) [Adc] | 2.0 | 3.7 | 5.3 | 9.1 | 12.7 | 17.1 | 25.4 | 34.2 | 42.3 | 50.4 |
| Ingress Protection | | * IP65 | | | | | | | | | |
| Ambient Temperature [℃] | | -10℃ to 40℃ (over 50℃, current derating is necessary) | | | | | | | | | |
| Cooling method | | Fan Cooling | | | | | | | | | |
| Weight/Mass [kg] | | 10 | 10 | 10 | 10 | 10 | 10 | 18 | 18 | 18 | 18 |

* No direct sun light

## How to read the model number

FRENIC-HVAC Solar

FRN 0.75 AR1 K - 4D SL

- FRN: Series name: FRN
- 0.75: Standard applicable motor capacity (kW)
- AR1: Applied for: AR1:HVAC
- K: Protection structure: K: IP65
- 4D: Input DC supply: 4D: 440Vdc to 760Vdc (400V class motor)
- SL: SL: Solar Pump Application

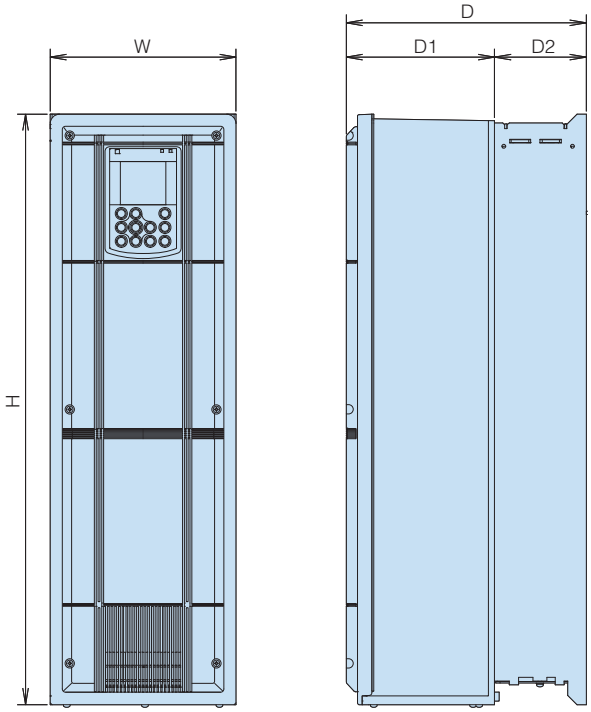
## Model variation

| Destination | Nominal applied motor | Type | Outside dimensions (mm) | | | | | | Mounting dimensions (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Dwg.no. | W | H | D | D1 | D2 | Dwg.no. | W1 | W2 | H1 | H2 | H3 | M | N |
| 3-phase 400V | 0.75 | FRN0.75AR1K-4DSL | A | 150 | 465 | 262 | 162 | 100 | B | 115 | 17.5 | 451 | 7 | - | 2xφ8 | 8 |
| | 1.5 | FRN1.5AR1K-4DSL | | | | | | | | | | | | | | |
| | 2.2 | FRN2.2AR1K-4DSL | | | | | | | | | | | | | | |
| | 3.7 | FRN3.7AR1K-4DSL | | | | | | | | | | | | | | |
| | 5.5 | FRN5.5AR1K-4DSL | | | | | | | | | | | | | | |
| | 7.5 | FRN7.5AR1K-4DSL | | | | | | | | | | | | | | |
| | 11 | FRN11AR1K-4DSL | | 203 | 585 | 262 | 162 | 100 | | 158 | 22.5 | 571 | 7 | | | |
| | 15 | FRN15AR1K-4DSL | | | | | | | | | | | | | | |
| | 18.5 | FRN18.5AR1K-4DSL | | | | | | | | | | | | | | |
| | 22 | FRN22AR1K-4DSL | | | | | | | | | | | | | | |

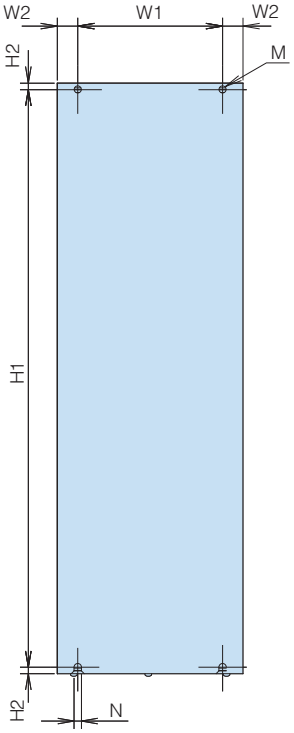
## Outline drawing

■ Body

A




B




## Recommended cable size

| Destination | Nominal applied motor | Type | Recommended cable Size [mm² ] | | | |
|---|---|---|---|---|---|---|
| | | | Main circuit | | | Control terminal |
| | | | (*1) Negative [N( - )] terminal | (*1) INV Ground [G] ⏚ | (*1) INV output [U, V, W] terminal | |
| 3-phase 400V | 0.75 | FRN0.75AR1K-4DSL | 2.5 | 10 | 2.5 | 0.75 |
| | 1.5 | FRN1.5AR1K-4DSL | | | | |
| | 2.2 | FRN2.2AR1K-4DSL | | | | |
| | 3.7 | FRN3.7AR1K-4DSL | | | | |
| | 5.5 | FRN5.5AR1K-4DSL | | | | |
| | 7.5 | FRN7.5AR1K-4DSL | | | | |
| | 11 | FRN11AR1K-4DSL | 4 | | 4 | |
| | 15 | FRN15AR1K-4DSL | 6 | | 6 | |
| | 18.5 | FRN18.5AR1K-4DSL | 10 | | 10 | |
| | 22 | FRN22AR1K-4DSL | | | | |

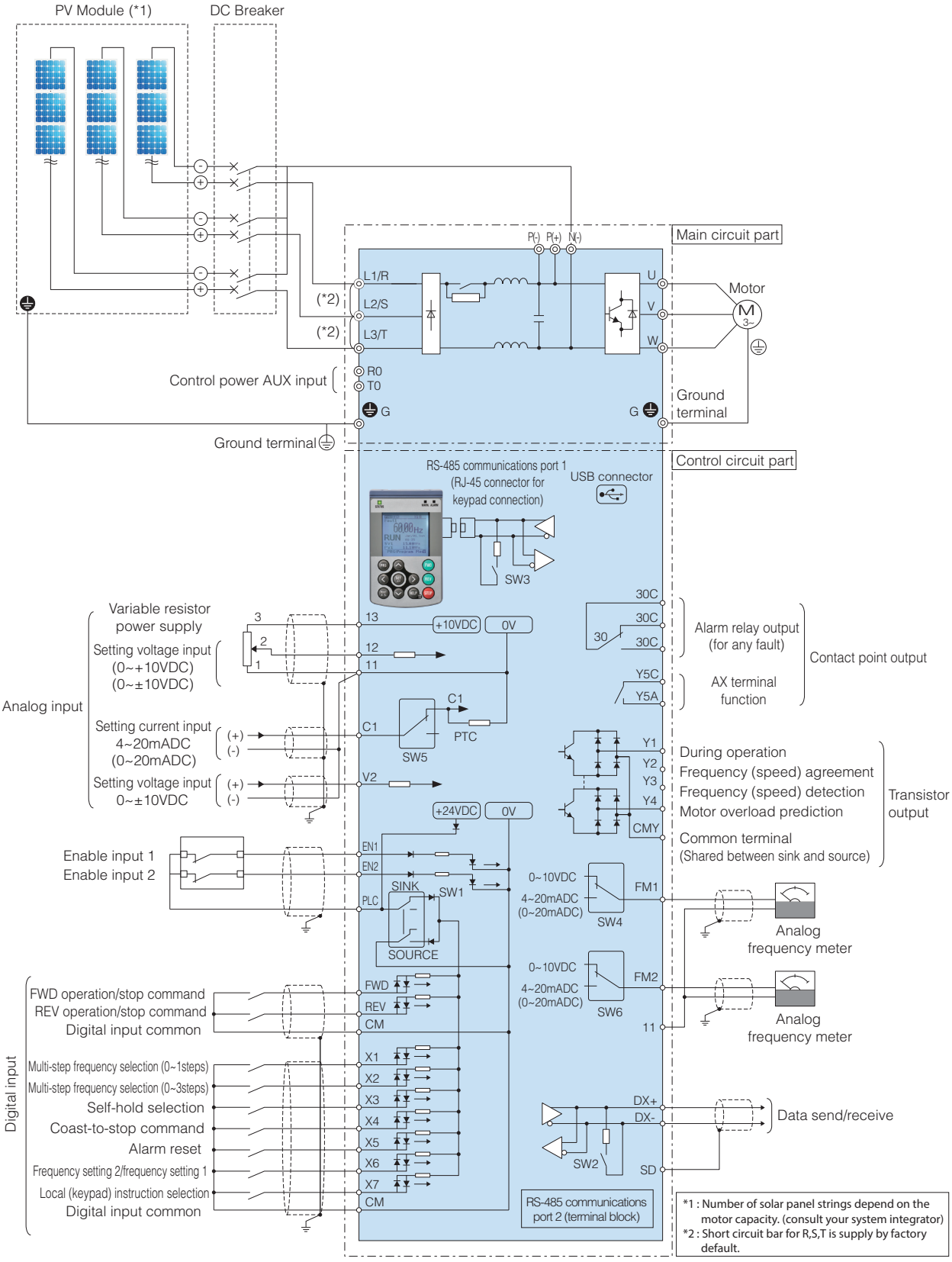
(*1) Cable specification - 70℃ PVC wire. At 40℃ Ambient temperature.

# Connection diagram of main circuit

## Wiring Diagram

Basic configuration diagram
(Factory shipped condition: with SINK mode input and enable input function)

In the case of 3 string PV module connection



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## FUJI ELECTRIC ASIA PACIFIC PTE LTD.
## GENERAL TERMS AND CONDITIONS OF WARRANTY

### WARRANTY LIMITATION OF LIABILITY

DEFINITIONS:
For the purpose of these General Terms and Conditions:

1.1 FUJI ELECTRIC ASIA PACIFIC PTE LTD. warrants the Inverter of its manufacture against any defects in construction arising from faulty design, materials or workmanship, for a period to be expressly stated in the contract in writing by FUJI ELECTRIC ASIA PACIFIC PTE LTD. , except that no warranty is covered by FUJI ELECTRIC ASIA PACIFIC PTE LTD. in the case of:

- when only Inverter charging resistor / rectifier circuit damaged due to improper power supply / improper connection.
- when multiple Inverter units damaged due to improper group installation.
- when improper Inverter installation in location or environment condition which stated in the recommended installation specifications.
- when Inverter found to have ingress for dust, chemical, gas etc. due to improper installation.
- when inverter operated in an inappropriate temperature that is recommended.
- Inverter not manufactured by FUJI ELECTRIC ASIA PACIFIC PTE LTD. ;
- defects arising either from materials supplied by the PURCHASER or from a design requested by the PURCHASER;
- replacement or repairs necessitated by the normal wear and tear of Inverter or by damage caused by lack of care, insufficient, inspection or maintenance or the improper storage of use of Inverter by the PURCHASER (including failure to follow any instructions on use, inspection, storage, or maintained);
- Inverter that have been repaired or modified by the PURCHASER or by third parties without the knowledge and written consent of FUJI ELECTRIC ASIA PACIFIC PTE LTD. ; and
- any defects or damage or adverse condition of the Inverter resulting from circumstances beyond the control of FUJI ELECTRIC ASIA PACIFIC PTE LTD. , or not attributable to the acts or omissions of FUJI ELECTRIC ASIA PACIFIC PTE LTD.

1.2 This warranty is limited to the repair, modification or replacement (at the option of FUJI ELECTRIC ASIA PACIFIC PTE LTD. ) of parts or units of the Inverter discovered to be defective at FUJI ELECTRIC ASIA PACIFIC PTE LTD. 's expense, inclusive of the costs of parts. The said repairing, modification or replacement during the warranty period shall in no case cause the warranty period of the Inverter to be extended unless stated.

1.3 The foregoing warranties and remedies are exclusive and in lieu of all other warranties, representations, or conditions, express or implied, either in fact or by operation of law, statutory or otherwise, including warranties or conditions of merchantability, title, non-infringement and fitness for a particular purpose. The warranties contained herein run only to PURCHASER, and are not extended to any third parties.

1.4 PURCHASER agrees and acknowledges that any warranty on any Inverter and/or equipment is limited to the warranty given by the manufacturer of that equipment and, to the maximum extent permitted by law, FUJI ELECTRIC ASIA PACIFIC PTE LTD. gives no additional warranties in relation to any equipment or any third party products sold by FUJI ELECTRIC ASIA PACIFIC PTE LTD.

Fuji Electric Asia Pacific Pte Ltd. reserves the right to make corrections in the case of any typing or errors or omissions.

**Fuji Electric Asia Pacific Pte. Ltd.**

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