

## 1.1 Features

The functions listed below can be implemented using RS-485 communications.

- The keypad can be mounted on the easy-to-access front of control panel with an extension cable (option).
- The function code data of the inverter can be edited and the operation status of the inverter can be monitored by connecting it to a personal computer on which inverter support software runs (see the "Inverter Support Software FRENIC Loader Instruction Manual").
- The inverter can be controlled as a subordinate device (slave) by connecting it to an upper level device (host (master)) such as a PLC or personal computer.

As the communication protocols for controlling inverter, the Modbus RTU widely used by a variety of appliances, and the Fuji general-purpose inverter protocol common to Fuji's inverters are available.

### **Modbus RTU protocol**

The Modbus RTU protocol is a set of communications specifications defined to connect Modicon's PLCs (Programmable Logic Controllers) in a network. A network is established between PLCs or between a PLC and another slave unit(s) (inverter(s), etc.). The main functions include:

- supporting both a query-response format and a broadcast format for messages.
- enabling the host unit as the master to transmit queries to each inverter as a slave, and each slave to send back responses to the queries to the master.
- supporting two modes, RTU mode and ASCII mode, as transmission mode for the standard Modbus Protocol. FRENIC-Mini/Eco/Multi supports the RTU mode only, which provides a high transmission density.
- performing an error check through a CRC (cyclic redundancy check) to ensure accurate data transmission.

### **Fuji general-purpose inverter protocol**

This protocol is commonly used for all models of Fuji's general-purpose inverters. The main functions include:

- enabling, as a common protocol, operation of all models of Fuji's general-purpose inverters with the same host program (function codes cannot be generally edited because specifications are different among models).
- adopting fixed-length transmission frames as standard frames to facilitate developing communication control programs for hosts.
- reducing the communications time in response to operation commands and frequency setting which are required quick response by using optional transmission frames.



Since the protocol switches to the keypad dedicated protocol automatically by connecting the keypad, it is not necessary to set up the communications-related functions.

- Although the personal computer loader uses a dedicated protocol for loader commands, part of the communications conditions must be set. (For further information, see the "Inverter Support Software FRENIC Loader Instruction Manual.")
- With regard to a FRENIC-Mini that uses inverter ROM 0399 or earlier version, part of the RTU protocol functions are restricted. Contact us for these restrictions. Confirm the ROM version according to the menu "5\_14" described in "3.2.2 [5] Reading Maintenance Information" under Chapter 3 of the FRENIC-Mini Instruction Manual.

## 1.2 List of Functions

The functions listed below become available by operating the appropriate function codes from the host controller.

The chapters that follow describe these functions in detail.

Table 1.2 List of RS-485 communications functions

Function	Description	Related function code
Operation	The functions equivalent to the terminal functions shown below can be executed through communications: -Forward operation command "FWD" and reverse operation command "REV" -Digital input commands ([FWD], [REV], [X1] - [X5] terminals) ([X4] and [X5] are not supported by FRENIC-Mini.) -Alarm reset command ("RST")	S codes (dedicated to communications)
Frequency setting	Either of the following two setting methods can be selected: -Set up as "±20000/maximum frequency." -Frequency (adjustable unit: 0.01 Hz) without polarity	
PID command	-Set up as "±20000/100%."	
Operation monitor	The items below can be monitored: -Frequency command -Actual values (frequency, current, voltage, etc.) -Operation status, information on general-purpose output terminals, etc.	M codes
Maintenance monitor	The items below can be monitored: -Cumulative operation time, DC link voltage -Information to determine the service life of parts to be periodically replaced (main circuit capacitor, PC board capacitor, cooling fan) -Model codes, capacity codes, ROM version, etc.	W codes X codes Z codes
Alarm monitor	The items below can be monitored: -Monitoring alarm history (last four alarms) -Monitoring information when an alarm occurs (last four alarms) Operation information (output/set frequencies, current, voltage, etc.) Operation status, information on general-purpose output terminals Maintenance information (cumulative operation time, DC link voltage, heat sink temperature, etc.)	(dedicated to communications)
Function code	All types of function code data can be monitored and changed.	All function codes other than above