The RS-485 user manual for B800 series communication

RS-232 communication inbuilt inside the main board of B800 series frequency inverter, we can effect RS-485 communication through fitting communication board externally.

When we want to use RS-485 communication board, it is necessary for you to connect externally the insulated 9VDC-12VDC. There are indications on the polarity plug. Please reference it. When you put the polarity plug on the opposition, RS-485 is not able to work, but the RS-485 communication card can not be damaged.

There are four connection wire place, indicate “1”,”2”,”3”,”4” separately, which they stand for “B phase”, ”A phase”, ”B phase”, “A phase”. The action of “1” & “3” , “2” & “4” is same as well.

B800 communications protocol

- The communications protocol ASCII based, operating at 9600 bps. Each transmitted byte consists of a Start bit (1), 8 Data bits (LSB first) and a Stop bit (0).
- Each B800 acts as a slave unit any will only transmit data in response to a request from the Host / master.
- Up to 63 drive addresses are permitted.
- Global telegrams are permitted allowing simultaneous data transfer to multiple drives
- When data is received by an B800, it will be actioned immediately.
- All transmitted bytes other than the START and STOP flags, including all commands and the data checksum are sent as ASCII codes. For example, a RUN command ('R' = 0x52 (hex)) is sent as two consecutive ASCII codes ie 0x35, 0x32. Further examples will be shown in the following section.
- Any non-ASCII byte received other than the START / STOP flags will terminate the data reception and a new sequence must be started.

Communications protocol details

Master (Host controller) transmit data packet format:

All transmissions originating from a Host controller must have the following format:

FG1 [DA] [CMD] ([DATA]) [CS] FG2

Where FG1 = Start Flag 0x7E, flags start of data transmission

DA = Drive Address * valid addresses { 1 … 63 }

CMD = Master Command	'R'	(0x52)	Run command
	'S'	(0x53)	Stop command
***see note below*	'A'	(0x41)	Motor current request
***see note below*	'Z'	(0x5A)	Speed request in Hz
***see note below*	'M'	(0x4D)	Speed request in RPM
	'T'	(0x54)	Drive Status request
	'V'	(0x56)	Software version request

Keypad mode only (F-12 = 1)	'P'	(0x50)	Set new speed in Hz
Keypad mode only (F-12 = 1)	'I'	(0x49)	Increase speed on ramp
Keypad mode only (F-12 = 1)	'L'	(0x4C)	Reduce speed on ramp

DATA = transmitted data	data will depend on command send
CS = data checksum	calculated at the time of transmission and is the logical NOT of the byte result of the byte addition of all transmitted ASCII bytes excluding the START and STOP flags and the checksum itself. i.e. ~ (DA + CMD + ([DATA]))
FG2 = Stop flag	0x7F, flags end of data transmission

* *For communication with the B800 from a Host controller, add the value **128** to the drive address.*

Examples:

1. Send Run Command to Drive number 01 from intelligent host (F-12 = 1 or 2):

The required data transmission will be

0x7E, 0x38, 0x31, 0x35, 0x32, 0x32, 0x46 0x7F

Start	Drive number	Command	Checksum	Stop
Flag	(128 + 01)		(0x2F)	Flag

2. *Send new target speed of 40.0Hz from intelligent host to drive 05 in keypad mode:*

The required data transmission will be

0x7E, 0x38, 0x35, 0x35, 0x30, 0x30, 0x39, 0x36, 0x30, 0x35, 0x45 0x7F

Start	Drive number	Command	Target Speed (40.0Hz)	Checksum	Stop
Flag	(128 + 05)	('P')	(2400 = 0x0960 sent)	(0x5E)	Flag

Note that the transmitted speed in Hertz is always 60x the speed required. Therefore 40Hz is transmitted as 40.0 x 60 = 2400. The high byte is transmitted first. A word (16-bit) value is **always** transmitted.

Checksum = logical NOT $\sum$ (0x38, 0x35, 0x35, 0x30, 0x30, 0x39, 0x36, 0x30) = 0x5E

Note that the checksum is the least significant byte of the result.

Global commands (to multiple B800s)

Some applications require particular commands to be sent simultaneously to multiple B800s. An example of this would be a RUN command or a STOP command.

Global commands are sent by using the ASCII code for 'G' (0x47) as the drive address.
All B800s receiving a command following this drive address will carry out this command.

There is no reply from the B800s to a global command.

Example:

1. Send a Run Command to all B800s from intelligent host (F-12 = 1 or 2):

The required data transmission will be

0x7E,	0x34, 0x37,	0x35, 0x32,	0x32, 0x44	0x7F
Start Flag	Global drive Address ('G') = 0x47	Command ('R')	Checksum (0x2D)	Stop Flag

Slave (B800) reply data packet format:

Whenever a valid data packet is received by the B800, the response will have a format defined by the following information.

Note that if a valid data packet is received with an incorrect (different) drive address, the B800 will ignore the data and no response at all will be generated.

All responses to valid commands will be the lower case equivalent to the command received. For example, if a 'R' command is received by the B800, it will respond with an 'r' reply.

Format of the B800 response:

FG1 [DA] [REPLY] ([DATA]) [CS] FG2

Where	FG1 = Start Flag	0x7E, flags start of data transmission
	DA = Drive Address	returns its own Drive address

REPLY = Slave reply	'r'	(0x72)	Run command executed
	's'	(0x73)	Stop command executed
	'a'	(0x61)	Motor current
	'z'	(0x7A)	Speed request in Hz
	'm'	(0x6D)	Speed request in RPM
	't'	(0x74)	Drive Status returned
	'v'	(0x76)	Software version returned
	'p'	(0x70)	New speed in Hz loaded
Keypad mode only (F-12 = 1)	'i'	(0x69)	Increase speed actioned
	'l'	(0x6C)	Reduce speed actioned
	'e'	(0x65)	Error – command not executed (error code gives reason why)

DATA = requested data	data will depend on the command received
CS = data checksum	calculated at the time of transmission and is the logical NOT of the byte result of the byte addition of all transmitted ASCII bytes excluding the START and STOP flags and the checksum itself. i.e. ~(DA + REPLY + ([DATA]))
FG2 = Stop flag	0x7F, flags end of data transmission

Examples:

1. Run Command to Drive number 01 carried out (F-12 = 1 or 2):

The resulting reply data transmission will be

0x7E,	0x30, 0x31,	0x37, 0x32,	0x33, 0x35	0x7F
Start Flag	Drive number	Reply ('r')	Checksum	Stop Flag

2. *New target speed of 40.0Hz set in drive 05:*

The resulting reply data transmission will be

0x7E,	0x30, 0x35,	0x37, 0x30,	0x33, 0x33,	0x7F
Start Flag	Drive number	Reply ('p')	Checksum	Stop Flag

In the event of an error occurring, the message will have the following format:

[Start Flag], [Drive Addr], ['e'], [error code], [checksum], [stop flag]

The error code will have one of the following values:

0x02	Drive in Standby (status information)
0x91	B800 not in keypad mode
0x92	B800 speed in RPM not available (F-10 = 0)
0x93	B800 running – command cannot be carried out
0x94	B800 stopped – command cannot be carried out
0x95	Invalid data – incorrect checksum
0x97	Invalid command – command not recognized
0x98	B800 parameters locked – command cannot be carried out
0x99	B800 hardware enable not present
0x9A	B800 tripped

Further examples:

1. Start all drives:

0x7E,	0x34, 0x37,	0x35, 0x32,	0x32, 0x44	0x7F
Start Flag	Global drive Address ('G') = 0x47	Command ('R')	Checksum (0x2D)	Stop Flag

(Global drive address commands are received by all slaves)

2. Reverse direction of all drives (F-12 = 2):

0x7E,	0x34, 0x37,	0x35, 0x32,	0x32, 0x44	0x7F
Start Flag	Global drive Address ('G') = 0x47	Command ('R')	Checksum (0x2D)	Stop Flag

(Sending a run command to an already running drive reverses direction if F-12 = 2)

3. Stop all drives:

0x7E,	0x34, 0x37,	0x35, 0x33,	0x32, 0x43	0x7F
Start Flag	Global drive Address ('G') = 0x47	Command ('S')	Checksum (0x2C)	Stop Flag

(All drives action the command if drive address is global ("G"))

4. Send new speed of 40.0Hz to drive number 5:

0x7E,	0x38, 0x35,	0x35, 0x30,	0x30, 0x39, 0x36, 0x30,	0x35, 0x45	0x7F
Start Flag	Drive number (128 + 05)	Command ('P')	Target Speed (40.0Hz) (2400 = 0x0960 sent)	Checksum (0x5E)	Stop Flag

(Note that transmitted value is 60 x speeds in Hz ie 60x 40.0 = 2400)