Using The TIU Terminal Range With a Hitachi L100 & SJ100 Inverter.

Protocol Revisions

Version 1.00 Supports master only operation to the slave inverter comms module.

Communication to the Inverter is via the PLC Port on the TIU terminal and RJ45 connector on the Invereter.
The baud rate is fixed at 4800 baud and the character format is fixed at eight data bits, even parity and one stop bit.
The connection is RS 485 communications. See attached drawing.

Correct Firmware

The TIU terminal will only communicate with the Drive if it has the appropriate firmware installed. This will be displayed on the front screen of the terminal during “power up”.

If new firmware needs installing the appropriate file for the terminal type is required i.e.
For a L100

Tiu050 = HL100_ R?.0xx
Tiu1xx = HL100 _R?.1xx
Tiu2xx = HL100 _R?.2xx
? = The TIU firmware revision.

For a SJ100

Tiu050 = HSJ100_ R?.0xx
Tiu1xx = HSJ100 _R?.1xx
Tiu2xx = HSJ100 _R?.2xx
? = The TIU firmware revision.

To install the correct firmware into the TIU terminal carries out the following procedure: -
Select “Configure” / “Terminal type” to select the TIU type and initialise all relevant parameters.
Select “Configure” / “Communication Settings” and then select the “Manufacturer” and “Model” being used and also check that Communication Mode, Baud Rates and Network details are all correct.

After all settings are confirmed as correct, select File / Update protocol. If the above has been completed the computer should have selected the correct file to download. Accepting this option will automatically initiate the protocol download to the TIU.

Operation By Communications

In order for the Inverter output frequency to be set by the TIU two parameters in the Inverter need setting. This must be performed using the keypad on the front of the Inverter.

Set A01 to 02 Digital Operator Control for Speed Command Control
Set A02 to 02 Digital Operator Control for Run Command Control.

Press Stop/Reset
Select A – using the Up and Down keys.
Press Func

Select A 01 with the Up and Down Keys
Press Func

Change value to 02 with the Up and Down Keys
Press STR
Select A 02 with the Up and Down Keys
Press Func
Change value to 02 with the Up and Down Keys
Press STR

Node Addresses

Node addresses are not used in this implementation of the communications protocol and can therefore be ignored.

Parameter Range

The various parameters that can be accessed by the Tiu are shown in the table below.

Parameter No.	Setting Range	Magnification[1]	Description	Read/Write
0	0.00 to 360.00 Hz	* 100	Output Frequency setting (by TIU) (F01, A20)	Read/Write
1	0 to 255		Trip Counter	Read/Write
2	0 to FFFFFF (hex)	2^16ms/dig	Accumulated time Trip 1	Read Only
3	0 to FF (hex)		Cause of Trip[2] 1	Read Only
4	0.00 to 360.00 Hz	* 100	Output Frequency at Trip 1	Read Only
5	0.00 to 655.35 %	* 100	Output Current at Trip1	Read Only
6	0 to 5000	0.1V/dig (200V) 0.2V/dig (400V)	DC bus voltage at Trip 1	Read Only
7	0 to FFFFFF (hex)	2^16ms/dig	Accumulated time Trip 2	Read Only
8	0 to FF (hex)		Cause of Trip[2] 2	Read Only
9	0.00 to 360.00 Hz	* 100	Output Frequency at Trip 2	Read Only
10	0.00 to 655.35 %	* 100	Output Current at Trip2	Read Only
11	0 to 5000	0.1V/dig (200V) 0.2V/dig (400V)	DC bus voltage at Trip 2	Read Only
12	0 to FFFFFF (hex)	2^16ms/dig	Accumulated time Trip 3	Read Only
13	0 to FF (hex)		Cause of Trip[2] 3	Read Only
14	0.00 to 360.00 Hz	* 100	Output Frequency at Trip 3	Read Only
15	0.00 to 655.35 %	* 100	Output Current at Trip 3	Read Only
16	0 to 5000	0.1V/dig (200V) 0.2V/dig (400V)	DC bus voltage at Trip 3	Read Only
17	0.00 to 360.00	* 100	Output Freq at Present (d01)	Read Only
18	0.0 to 6553.5 A	* 10	Output Current monitor [A] (d02)	Read Only

19	0.0 to 200.0	* 10	Output Current monitor [%]	Read Only
20	0 to 2		Rotating Direction monitor (d03) 0 = STOP 1 = Forward 2 = Reverse	Read Only
21	0.00 to 9999.00	* 100	Feedback data of PID control monitor (d04)	Read / Write
22	0 – 00011111 (binary)	Bits	Condition of intelligent input terminal monitor (d05)	Read Only
23	0 – 00000111 (binary)	Bits	Condition of intelligent output terminal monitor (d06)	Read Only
24	0.00 to 35640.00	* 100	Scale conversion data of output frequency monitor (d07)	Read Only
25	0.00 to 360.00	* 100	Output Frequency Setting by using volume pot. Of Inverter (F01)	Read Only
26	0.00 to 360.00	* 100	Output Frequency Setting from outside of Inverter (F01)	Read Only
27	0.00 to 360.00	* 100	Output Frequency Setting from digital setting (F01) (TIU)	Read Only
28	2, 4, or 8		2 = Forward 4 = Reverse 8 = Stop	Write Only (Will always read 0)

[1] The magnification specifies how the data is actually stored eg. Output Frequency is 0.00 to 360.00Hz with a magnification of 100. This means the data is stored as 0 to 36000.
[2] See the table below to determine the meaning of the trip codes.

Trip Code Data
Trip code data comprises of 8 bits as shown below.

Trip Code (binary)	Cause of Trip	Trip Code (binary)	Cause of Trip
00000000	Over Current	00100000	Overload
00000001	Over Current	00100001	USP Error
00000010	Over Current	00100010	PTC Error
00000011	Over Voltage	00100011	
00000100	Under Voltage	00100100	
00000101	Overload	00100101	External Trip
00000110	EEPROM Error	00100110	
00000111		00100111	
00001000	CPU Error	00101000	CPU Error
00001001		00101001	CPU Error
00001010	Thermal Error	00101010	CPU Error
00001011		00101011	CPU Error
00001100		00101100	CPU Error
00001101	Ground Fault	00101101	CPU Error
00001110	CPU Error	00101110	CPU Error
00001111	Over Supply Voltage	00101111	CPU Error
00010000		00110000	CPU Error
00010001		00110001	CPU Error
00010010		00110010	CPU Error
00010011		00110011	
00010100		00110100	CPU Error
00010101		00110101	
00010110		00110110	
00010111		00110111	
00011000		00111000	
00011001		00111001	EEPROM Error
00011010		00111010	Over Current
00011011		00111011	Over Current
00011100		00111100	Over Current
00011101		00111101	Over Current
00011110		00111110	Over Current
00011111	Under Voltage	00111111	Under Voltage

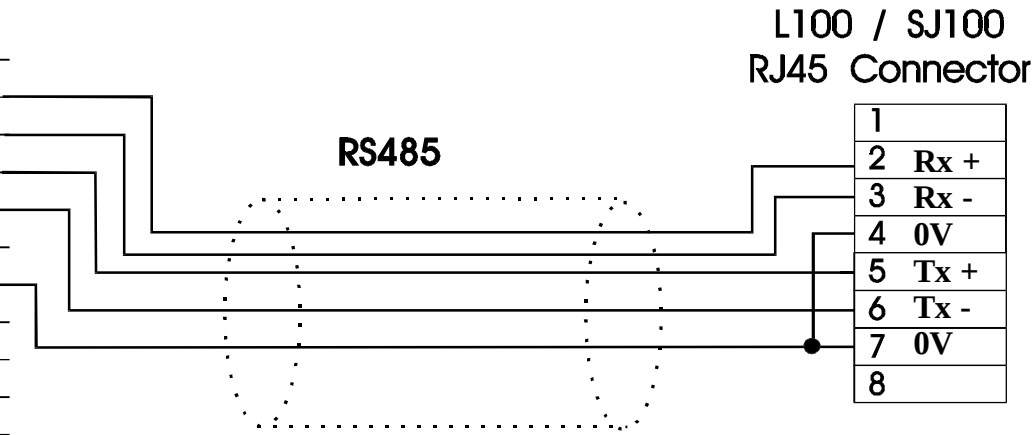
The top two bits of this code are modified depending on the condition at the time of the trip. See below

Status Code (bits 7 and 6)	Conditions
00	at the others
01	at Acceleration
10	at Deceleration
11	at Constant Speed

Connecting The TIU to a Hitachi L100/ SJ100 Inverter

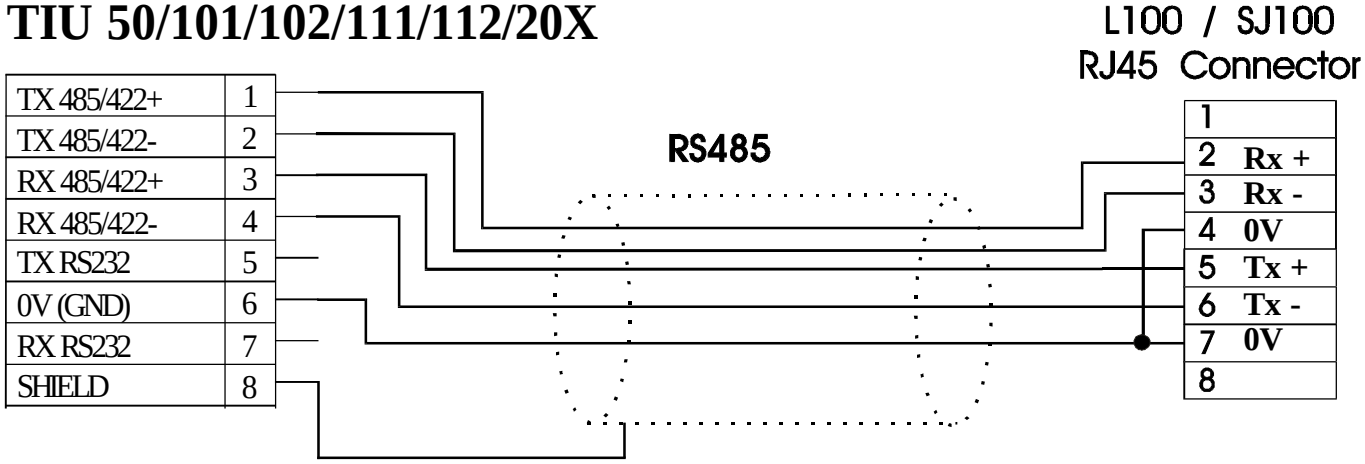
TIU 100/110

+5V	1
TX 485/422+	2
TX 485/422-	3
RX 485/422+	4
RX 485/422-	5
TX RS232	6
0V (GND)	7
RX RS232	8
TX 20mA +	9
TX 20mA-	10
RX 20mA+	11
RX 20mA-	12
EARTH	13



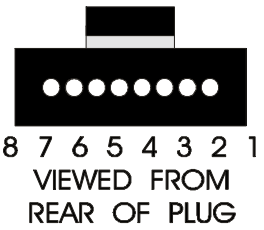
TIU 50/101/102/111/112/20X

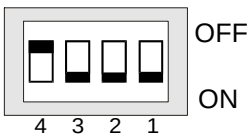
TX 485/422+	1
TX 485/422-	2
RX 485/422+	3
RX 485/422-	4
TX RS232	5
0V (GND)	6
RX RS232	7
SHIELD	8



Configuration Bank		
Switch	**ON**	**OFF**
1	Pull-up	No Pull-up
2	120 termination	No termination
3	Pull-down	No Pull-down
4	Reserved for future use	

NOTE: Switch 1 and 3 must be used together.





SW1