Application Note for Using the Operator Station HE500TIU050 / 10X / 11X / 20X / 3XX with the Kasuga KVFH Series Inverter

1.0. Protocol File Name

HE500TIU050 = KASUGA_R?.0xx
HE500TIU1xx = KASUGA _R?.1xx
HE500TIU2xx = KASUGA _R?.2xx
HE500TIU3xx = KASUGA _R?.3xx
(The "?" = the TIU firmware revision)

2.0. Configuring the Operator Station

To verify the Automated Equipment type the Operator Station is setup for, watch the screen of the Operator Station on power up. The first screen message details the setup of the Operator Station. To configure the Operator Station for particular Automated Equipment, select the Automated Equipment in the Communication Settings from the Configure menu in ***CBREEZE*** software. Select the appropriate Manufacturer and the appropriate Remote Equipment Model. Then from the File menu select Update Protocol, the appropriate file name will appear in the file name field. The programmer may need to point to the correct folder name/location. If further information is required see the manual or ***CBREEZE*** help on update/change protocol.

3.0. Protocol Revisions

Version 1.00 Supports master only operation to the slave Inverter.

Communications to the Inverter is only possible if the Inverter CPU Version is V1.03 or greater.

4.0. Serial Port Configuration

The Serial Port settings of 9600 baud, eight data bits and even parity with no handshaking and RS422/485 Four Wire Master are default in the terminal.
If a RS232 link model is used RS232 comms mode must be selected. Baud Rate, Parity and Inverter number are selectable through parameters F800, F801 and F802 respectively from the inverter front panel.
Note the VF-S7e inverter is only capable of 1200 baud.
Inverter (Node) numbers are required even with a one to one link.
Read and writes are supported to the RAM and EEPROM. Use EEPROM Parameters only when data has to remain when the inverter is powered down as the lifetime of the EEPROM is only 10,000 Write Cycles.

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

5.0. Operation By Communications

When enabled operation by communication takes priority over all other methods. Although the command mode parameter (CMOD) assigns priority to the panel or the terminal block, and the frequency mode parameter (FMOD) assigns priority to the panel, speed potentiometer, or terminal block, communications can take priority over these settings.

To give communications the highest priority for commands, bit 15 of communication number FA00 must be set to 1. Bit 14 of FA00 must be set to 1 to give priority to the frequency setting by communication. Once either of these bits is set, they remain in effect until they are turned off by writing 0's to them, disconnecting the inverter from the power, resetting the inverter after a trip, or doing a reset to factory setting (tYP). While bit 15 is set, the command mode parameter (CMOD) is ignored.

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

6.0. Parameter Specification

Parameters are grouped into several blocks of Basic, Extended, Command, Frequency Monitoring and State Monitoring Parameters. The Basic Parameters are all given mnemonics so have numbers assigned to then in order to use them in a TIU configuration. See below for details.

Basic Parameters (Group No. 00)

Title	Mnemonic	Function
0000	AU1	Automatic acceleration and deceleration time
0001	AU2	Automatic Torque Boost
0002	AU3	Automatic Environment Setting (valid by font panel setting only)
0003	CMOD	Command Mode Selection
0004	FMOD	Frequency Mode Selection
0005	FMSL	FM Terminal Function Selection
0006	FM	Connected Meter Adjustment
0007	tYP	Standard Setting Mode Selection
0008	Fr	Forward/Reverse Selection (panel)
0009	ACC	Acceleration Time #1 (s)
0010	DEC	Deceleration Time #1 (s)
0011	FH	Maximum Frequency
0012	UL	Upper limit frequency
0013	LL	Lower limit Frquency
0014	NL	Basic Frequency
0015	Pt	V/F Pattern
0016	Vb	Voltage Boost
0017	OLM	OL selection
0018	Sr1	Preset Speed 1
0019	Sr2	Preset Speed 2
0020	Sr3	Preset Speed 3
0021	Sr4	Preset Speed 4
0022	Sr5	Preset Speed 5
0023	Sr6	Preset Speed 6
0024	Sr7	Preset Speed 7

Extended Parameters (Input/Output Group No. 01)

Title	Function	VF-S7	VF-S7e
F100 – F113	See TOSVERT Manual for details	*	*
F114	Input Terminal selection #4	*	
F115	Input Terminal selection #5	*	
F130	Output Terminal selection #1	*	*
F131	Output Terminal selection #2	*	

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

Extended Parameters (Frequency Group No. 02)

Title	Function	VF-S7	VF-S7e
F200	Frequency priority Selection	*	
F201 – F204	See TOSVERT Manual for details	*	*
F210 – F213	See TOSVERT Manual for details	*	
F240 – F242	See TOSVERT Manual for details	*	*
F250 – F252	See TOSVERT Manual for details	*	*
F260 – F261	See TOSVERT Manual for details	*	*
F270 – F275	See TOSVERT Manual for details	*	*
F280 – F286	See TOSVERT Manual for details	*	*
F287 – F294	See TOSVERT Manual for details	*	

Extended Parameters (Drive Mode Group No. 03)

Title	Function	VF-S7	VF-S7e
F300 – F303	See TOSVERT Manual for details	*	*
F304	See TOSVERT Manual for details	*	
F305 – F307	See TOSVERT Manual for details	*	*

Extended Parameters (Torque Performance Group No. 04)

Title	Function	VF-S7	VF-S7e
F400 – F405	See TOSVERT Manual for details	*	
F406 – F407	See TOSVERT Manual for details		*

Extended Parameters (Acceleration/Deceleration Times Group No. 05)

Title	Function	VF-S7	VF-S7e
F500 – F505	See TOSVERT Manual for details	*	*

Extended Parameters (Protection Group No. 06)

Title	Function	VF-S7	VF-S7e
F600 – F604	See TOSVERT Manual for details	*	*
F605	Open Phase Detection Parameter	*	

Extended Parameters (Panel Group No. 07)

Title	Function	VF-S7	VF-S7e
F700 – F702	See TOSVERT Manual for details	*	*

Extended Parameters (Communications Group No. 08)

Title	Function	VF-S7	VF-S7e
F800	Communication Speed (0 = 1200, 1 = 2400, 2 = 4800, **3 = 9600**)	*	
F801	Parity (0 = None, **1 = Even**, 2 = Odd)	*	*
F802	Inverter Number (**0** – 31)	*	*
F803	Communication Error Trip Time	*	*

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

Command Parameters (Group No. FA)

Group is RAM only do not use EEPROM Parameters

Title	Function	VF-S7	VF-S7e
FA00	Communication command	*	*
FA01	Communication Frequency Command	*	*
FA02	Panel Frequency Command	*	*

FA00 Communication Command Bit Structure

Bit	Operation	0	1
15	Communication Command valid (FA00)	Invalid	Valid
14	Frequency Command valid (FA01)	Invalid	Valid
13	Reset Trip	OFF	Reset
12	Emergency Stop	OFF	E-Stop
11	Free Run Command	OFF	Free Run
10	Run / Stop	Stop	Run
9	Forward / Reverse	Forward	Reverse
8	Jog Operation	OFF	Jog
7	DC Braking	OFF	DC Braking
6	Acceleration / Deceleration 1 / 2 Selection	Acc/Dec 1	Acc/ Dec 2
5	Reserved	-	-
4	Reserved	-	-
3	Preset Speed 4 (VF-S7 only)	OFF	ON
2	Preset Speed 3	OFF	ON
1	Preset Speed 2	OFF	ON
0	Preset Speed 1	OFF	ON

Command Parameters (Group No. FD)

Group is READ only.

Title	Function	VF-S7	VF-S7e
FD00	Current Output Frequency	*	*

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

Command Parameters (Group No. FE)

Group is READ only.

Title	Function	VF-S7	VF-S7e
FE00	Output Frequency (saves Trip Frequency)	*	*
FE01	Status (saves trip status)	*	*
FE02	Current Frequency Command	*	*
FE03	Output current Display	*	*
FE04	Bus Voltage	*	*
FE05	Output Voltage	*	*
FE06	Input Terminal Data	*	*
FE07	Output Terminal Data	*	*
FE08	CPU Version	*	*
FE09	EEPROM Version	*	*
FE10	Past Trip 1	*	*
FE11	Past Trip 2	*	*
FE12	Past Trip 3	*	*
FE13	Past Trip 4	*	*
FE10	Cumulative Run time	*	*

FE01 Inverter Status Bit Structure

Bit	Operation	0	1
15	Reserved	Invalid	Valid
14	Reserved	Invalid	Valid
13	Reserved	OFF	Reset
12	Reserved	OFF	E-Stop
11	Reserved	OFF	Free Run
10	Run / Stop status	Stop	Run
9	Forward / Reverse status	Forward	Reverse
8	Jog Operation status	-	Joggging
7	DC Braking status	-	DC Braking
6	Acceleration / Deceleration 1 / 2 Status	Acc/Dec 1	Acc/ Dec 2
5	Reserved	-	-
4	Reserved	-	-
3	Reserved	OFF	ON
2	Reserved	OFF	ON
1	Reserved	OFF	ON
0	Reserved	OFF	ON

Running status bit is “Running” during DC Braking.

For further details of the above parameters refer to the TOSVERT manual.

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

6.1. Connections

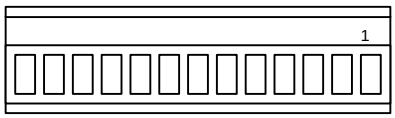
The TIU can be connected to the Toshiba TOSVERT VF-S7 Series Inverter via the RS232C Communications Module or via the RS485 Communications Module. Alternatively the TIU can be directly connected on a TTL link to the Inverter. This link should be used for communications over a short distance eg 1 Metre. If communications is intermittent the lead should be shortened. It may also be necessary to use twisted pair cable where each signal line is twisted with an individual 0V. In order to use this link RS422 4 wire Master mode should be selected in the TIU Configurator and termination switches 1, 2 and 3 on the TIU should be off.

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

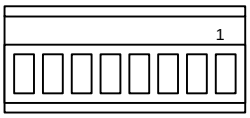
7.0. Connection details to Kasuga KVFH Series Inverter

13-Pin Screw Terminal Block



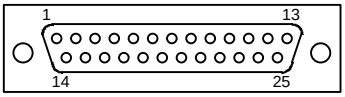
TIU100, TIU110

8-Pin Screw Terminal



TIU050, 101, 102, 103, 111, 112, 113, 201, 202, 203

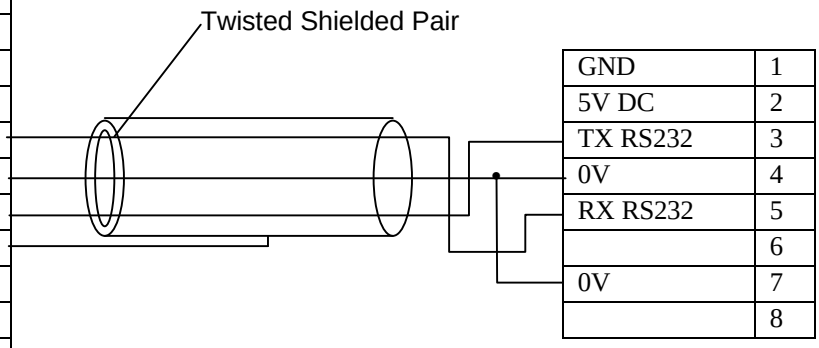
25-Pin D-Type Male



TIU300, 301, 302, 303, 304, 310, 311, 312, 313, 314, 320, 321, 322, 323, 324

RS232 Connection

TIU Type Signal Name	13-Pin	8-Pin	25-Pin
+5V	1		
TX 485/422+	2	1	12
TX 485/422-	3	2	13
RX 485/422+	4	3	24
RX 485/422-	5	4	25
TX RS232	6	5	2
Signal GND	7	6	7
RX RS232	8	7	3
Frame Gnd	13	8	1
RTS RS232	-	-	4
CTS RS232	-	-	5
RTS 485/422+	-	-	14
RTS 485/422-	-	-	17
CTS 485/422-	-	-	18
CTS 485/422+	-	-	19



Do not connect to unlisted pins.

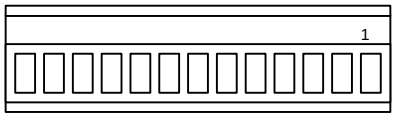
Recommended cable : Beldon 9503, twisted multipair, screened.
Connect the screens together at the shield / Earth pin of the PLC

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

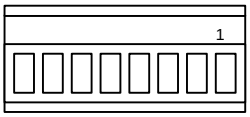
7.1. Connection details to Kasuga KVFH Series Inverter

13-Pin Screw Terminal Block



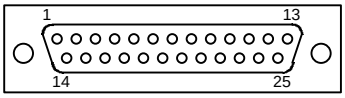
TIU100, TIU110

8-Pin Screw Terminal



TIU050, 101, 102, 103, 111, 112, 113, 201, 202, 203

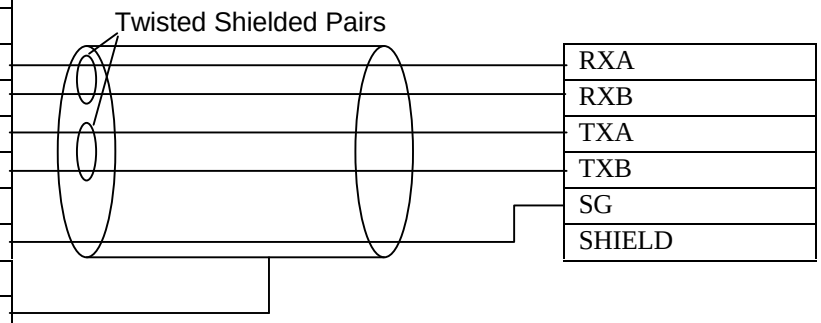
25-Pin D-Type Male



TIU300, 301, 302, 303, 304, 310, 311, 312, 313, 314, 320, 321, 322, 323, 324

TIU Type Signal Name	13-Pin	8-Pin	25-Pin
+5V	1		
TX 485/422+	2	1	12
TX 485/422-	3	2	13
RX 485/422+	4	3	24
RX 485/422-	5	4	25
TX RS232	6	5	2
Signal GND	7	6	7
RX RS232	8	7	3
Frame Gnd	13	8	1
RTS RS232	-	-	4
CTS RS232	-	-	5
RTS 485/422+	-	-	14
RTS 485/422-	-	-	17
CTS 485/422-	-	-	18
CTS 485/422+	-	-	19

RS485 Connection

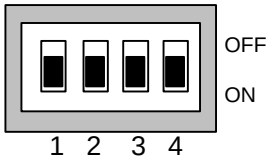


Do not connect to unlisted pins.

Recommended cable : Beldon 9503, twisted multipair, screened.
Connect the screens together at the shield / Earth pin of the PLC

Speed Settings			Termination
SW1	SW2	Baud Rate	*SW3-ON: Connecting Receiving side
OFF	OFF	1200	
ON	OFF	2400	*SW4-ON: Connecting Transmitting side
OFF	ON	4800	
ON	ON	9600	

*These switches should be ON if this is the last inverter on the link

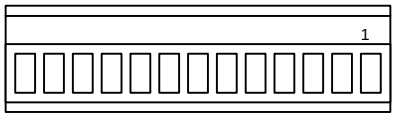


Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie

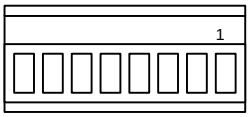
7.1. Connection details to Kasuga KVFH Series Inverter

13-Pin Screw Terminal Block



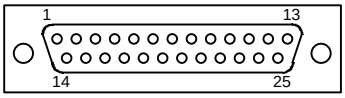
TIU100, TIU110

8-Pin Screw Terminal



TIU050, 101, 102, 103, 111, 112, 113, 201, 202, 203

25-Pin D-Type Male

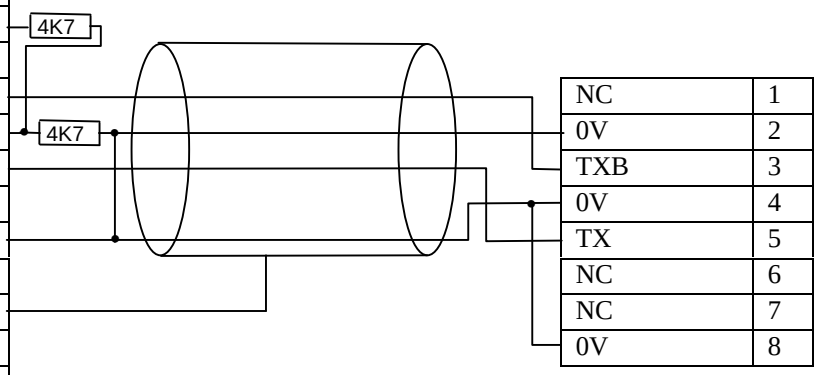


TIU300, 301, 302, 303, 304, 310, 311, 312, 313, 314, 320, 321, 322, 323, 324

TIU Type Signal Name	13-Pin	8-Pin	25-Pin
+5V	1		
TX 485/422+	2	1	12
TX 485/422-	3	2	13
RX 485/422+	4	3	24
RX 485/422-	5	4	25
TX RS232	6	5	2
Signal GND	7	6	7
RX RS232	8	7	3
Frame Gnd	13	8	1
RTS RS232	-	-	4
CTS RS232	-	-	5
RTS 485/422+	-	-	14
RTS 485/422-	-	-	17
CTS 485/422-	-	-	18
CTS 485/422+	-	-	19

TTL Connection

Kasuga Comms Port



Do not connect to unlisted pins.

Horner Electric APG
640 North Sherman Drive
Indianapolis, Indiana
Phone : (317) – 916-4274
Fax : (317) 916-4287
Website : www.heapg.com
Technical Support : techsppt@heapg.com

Horner Europe APG
Unit 1. Centerpoint, Centerpark Rd.
Cork, Ireland.
Phone : +353 (0)21 4321 266
Fax : +353 (0)21 4321 826
Website : www.horner-apg.com
Technical Support : tech.support@hornerirl.ie