NetGain Motors, Inc.
800 South State Street ⁄ Suite 4 ⁄ Lockport, IL 60441 ⁄ 630-243-9100 ⁄ 630-685-4054 (FAX)

USER MANUAL

TOUCH DISPLAY KIT

FOR USE WITH **HYPER-DRIVE INVERTERS**

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TABLE OF CONTENTS

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TOUCH CANBUS DISPLAY CAPABILITIES

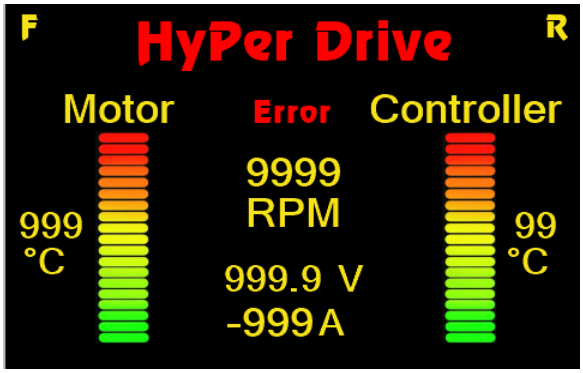
The Touch Display Kit is an easy to install/configure CANBus Display. It provides all major HyPer Motor & HyPer-Drive Inverter information on one screen. A secondary screen, which can be accessed by tapping the touchscreen, displays less vital system information. The display fits nicely behind a dash with or without the optional faceplate. The included driver box and harness kit is plug & play - Just provide 12V, connect CAN-H/CAN-L to the inverter's K1 plug, and copy the CAN Network information to your Clone file. The following information is displayed:

Screen 1

- NetGain Motors welcome screen on startup.
- This screen will appear for ~3 seconds on startup.

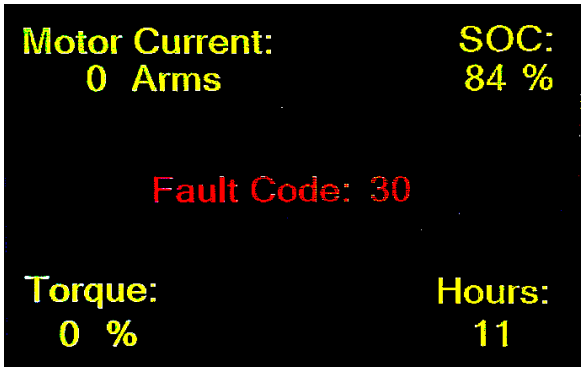
Screen 2

- Active Motor Direction (F or R)
- Motor Speed (RPM)
- Motor Temperature
- Inverter Temperature
- DC Pack Voltage
- DC Pack Current
- Active Fault Indicated by “Error”



Screen 3

- Motor Current (Arms)
- Torque Request (%)
- SoC (%)
- Operating Hours
- Fault Code of highest priority (when Error is active on Screen 2)



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WARNING AND CAUTION

SAFETY INFORMATION

This is not an all-inclusive list. Use common sense and act responsibly, electric motor controllers and motors are extremely powerful and could cause death, dismemberment or other serious injury if misused or not safely handled!

Wear protective safety equipment such as safety shoes, safety glasses and gloves when working with motors and controllers.

Remove all metal jewelry and metal objects from hands, wrist, fingers, etc. before working on any electric motor or controller.

Insulate any tools that are used in proximity to connection points that have any voltage potential to prevent shorts if the tool is accidentally dropped onto the terminals/connections.

Use caution when operating any controller or motor. If you're not sure what you're doing, or do not feel comfortable with the situation, find a knowledgeable person to advise you.

Make certain the motor and controller are disconnected from any power source before servicing. If any doubt exists of the voltage that might be present, measure with proper metering devices that are in good functional condition, and rated for the voltages that could exist.

Verify and re-verify proper wiring connections.

Take extreme caution around series-connected batteries to avoid placing hands across live connections. It is generally good practice to avoid the use of both hands when working around high voltage circuits. This reduces the risk of an accidental short across the chest cavity.

If working on an electric vehicle, make certain the vehicle is positioned securely with the drive wheels safely clear of the floor and blocked up so that the drive wheels cannot make contact with the floor under any circumstances. Block the non-drive wheels if they remain in contact with the floor so that the vehicle cannot roll in either direction.

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Motors and controllers must only be connected to a power source by knowledgeable and experienced personnel.

Running a motor without a load could result in harm to people or the motor. Absence of a load is considered misuse and could prove dangerous to anyone in the vicinity and void the motor warranty. When applying any power to motor, motor frame must be securely fastened in place as the toque will cause the motor to jump.

Portions of the motor or controller may become HOT and proper precautions must be taken.

Motors and controllers should never be operated beyond the limits established by the manufacturer.

Motors and controllers must not be modified in any manner; doing so will void warranty and could prove extremely dangerous.

Motors are heavy and are likely to become damaged if dropped, or cause damage to anything they fall upon (including people and body parts). Use extreme caution when working with motors!

Motors contain moving parts that could cause severe injury if the proper precautions are not taken. Never touch an operating motor.

Do not defeat any safety circuits or safety devices.

Under no circumstances should you push in any contactor of an electric vehicle while the drive wheels are in contact with the floor. Pushing in a contactor when the drive wheels are in contact with the floor can cause serious property damage, personal injury or death.

DISCLAIMER:

NetGain Motors, Inc. has no control of third-party installation procedure or the use of this display system. Accordingly NetGain Motors, Inc. assumes no liability for vehicle functionality or safety during or after third party installation of the motor and controller. It is the responsibility of the vehicle designer and component installer to test and qualify their application and ensure proper safety and functionality. NetGain Motors, Inc assumes no responsibility for this product in any use.

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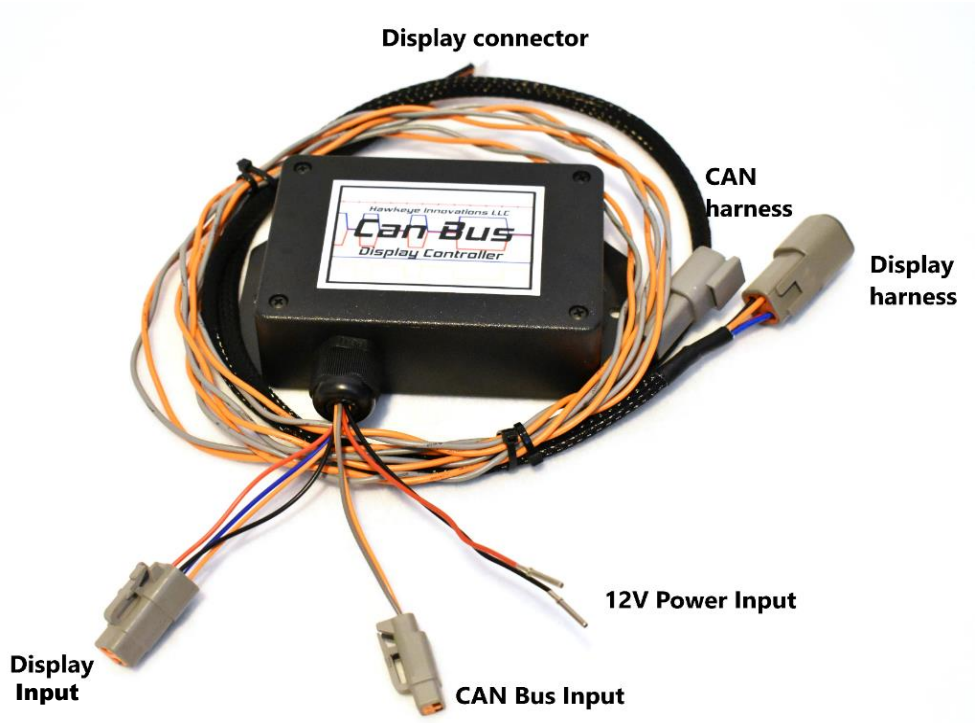
WIRING



CAN HARNESS

2 POSITION DEUTSCH CONNECTOR

PIN #	NAME	COLOR
1	CAN High (CAN-H)	Orange
2	CAN Low (CAN-L)	Gray

NOTE: Connecting external power or ground to CAN wires will damage the Display Controller, or other devices on your CAN network. Direct short circuits (other than two 120ohm resistors) between CAN-H and CAN-L may also damage CAN devices.

1. Without any power present on your 12V system or CAN bus network, connect the included CAN harness (gray and orange twisted pair) to CAN High and CAN Low of your existing CAN Bus.
    a. If your CAN Bus only consists of two nodes (Touch Display and X1 Inverter): Connect CAN-H to K1-13 and CAN-L to K1-2. A CAN Bus also requires two 120ohm terminating resistors between CAN-H and CAN-L, one at each end of the bus. One 120ohm resistor can be spliced between CAN-H and CAN-L near the 2P CAN Bus Input plug.

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b. The X1 Inverter contains an internal 120ohm resistor that can be tied between CAN-H and CAN-L by simply inserting a jumper wire between positions K1-3 and K1-14. Please see the following instructions for adding and removing pins (part#770854-1) from the K1 Harness plug (Part#776164-1) - AMPSEAL Connector Instructions by TE Connectivity: https://www.youtube.com/watch?v=uXTkm_XV2OY

2. Take care that your CANBus Harness and Display Harness do not run near any high voltage/high current power cables.

DISPLAY HARNESS

3. Insert 4P Display input into 4P Display Harness receptacle.
4. Insert 2P CAN Bus input into 2P CAN Harness Receptacle.
5. A CR1220 battery terminal is installed on the back of the display, **DO NOT** insert a battery.

12V POWER INPUT

POWER SUPPLY WIRES

PIN #	NAME	COLOR
1	+12V (5A Fuse)	Red
2	-12V	Black

6. From a 12V battery, Supply +/-12V to the display 12V power input wires. Do not use the HyPer-Drive's internal 12V supply, as current draw exceeds this rating. Most applications are wired for Display power on with ignition. Each of the power supply wires are pre-crimped with a Deutsch DTM (size 20) contact (socket). You may install your own Deutsch connector around these sockets, or remove the sockets and terminate the wires to the 12V supply with the method of your choosing. A 5A fuse is recommended on the Display Controller's power input.

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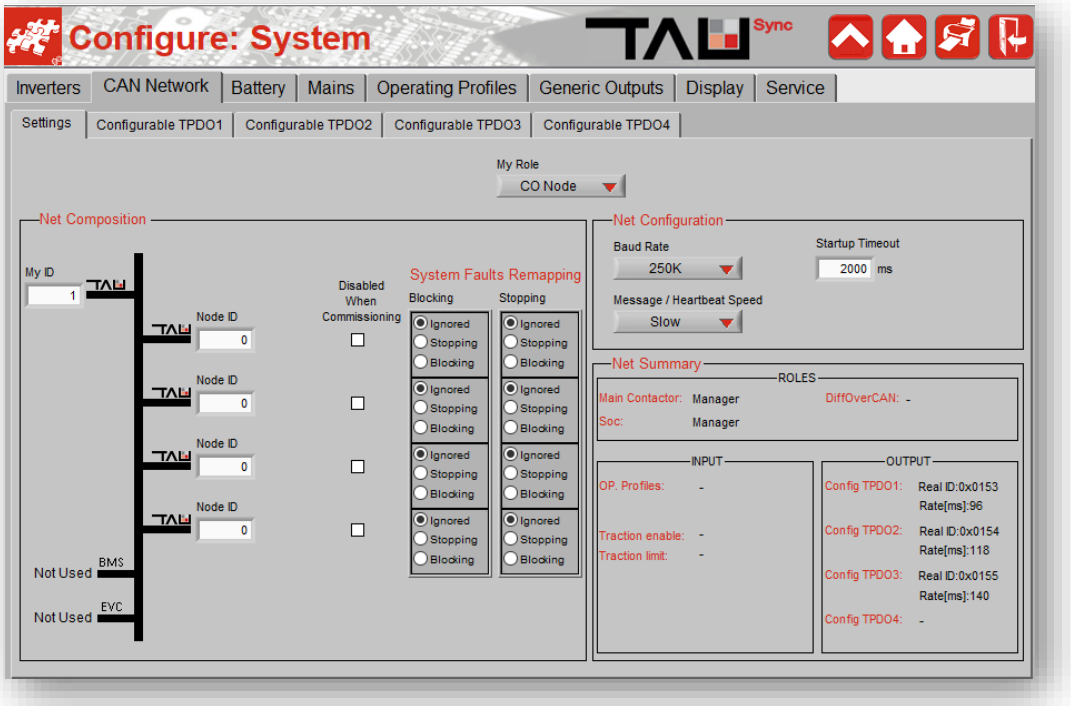
SMARTVIEW SOFTWARE - CAN NETWORK CONFIGURATION

After the display is properly wired to the HyPer-Drive's CAN-H & CAN-L, the CAN Network can be configured in *SmartView DLR* software under **Configure – System - Settings**.

CONFIGURE – SYSTEM – CAN NETWORK – SETTINGS

1. ***My ID:*** 1
2. ***My Role:*** *CO Node*
3. ***Baud Rate:*** *250K*
4. ***Message / Heartbeat Speed:*** *Slow*
5. ***SAVE***



CONIGURE – SYSTEM – CAN NETWORK – TPDO1, TPDO2, TPDO3

After **CAN Network Settings** are configured, you will enter **TPDO1**, **TPDO2**, & **TPDO3** and configure these tabs to match the corresponding data shown below. A separate list of parameters will appear for "**byte**" and "**word**" (2 bytes) data sizes . Be sure to click "Save" before clicking to the next TPDO tab.

WORD FORMAT: All words are sent in Little-endian format which reverses the order and stores the least significant byte at the lower memory address with the most significant byte being stored at the highest memory address.

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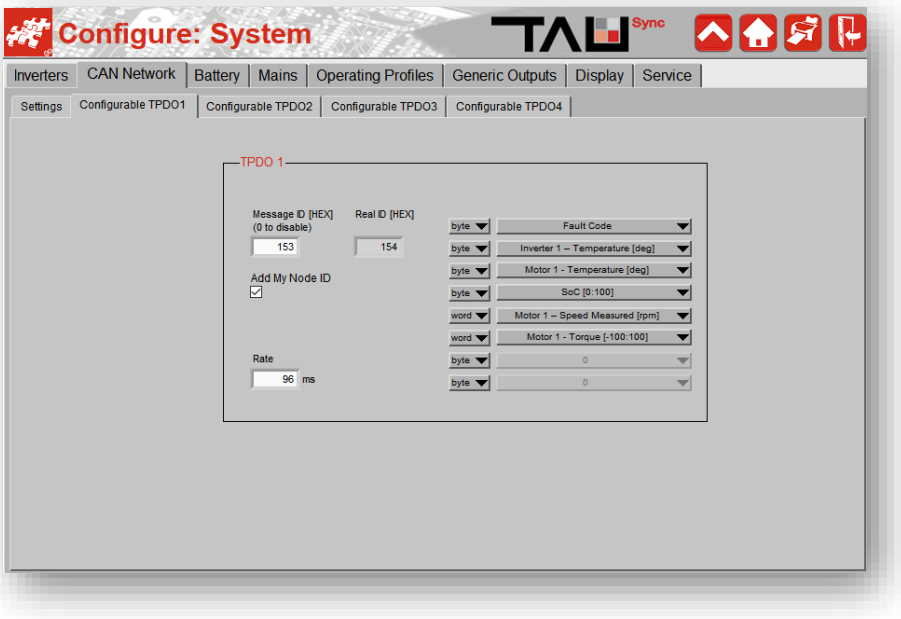
CONFIGURABLE TPDO1

***Message ID [HEX]**: 153*		***Real TPDO ID [HEX] = 0x154***				**Rate:** *96ms*	
Byte 0	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
Fault Code	Inverter 1 – Temperature [deg]	Motor 1 – Temperature [deg]	SoC [0:100]	Motor 1 – Speed Measured [rpm]		Motor 1 – Torque [-100:100]	



CONFIGURABLE TPDO2

***Message ID [HEX]**: 154*		***Real TPDO ID [HEX] = 0x155***				**Rate:** *118ms*	
Byte 0	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
DC Bus – Current [dA]		DC Bus – Voltage [dV]		Motor 1 – Current [dArms]		System - Flags	

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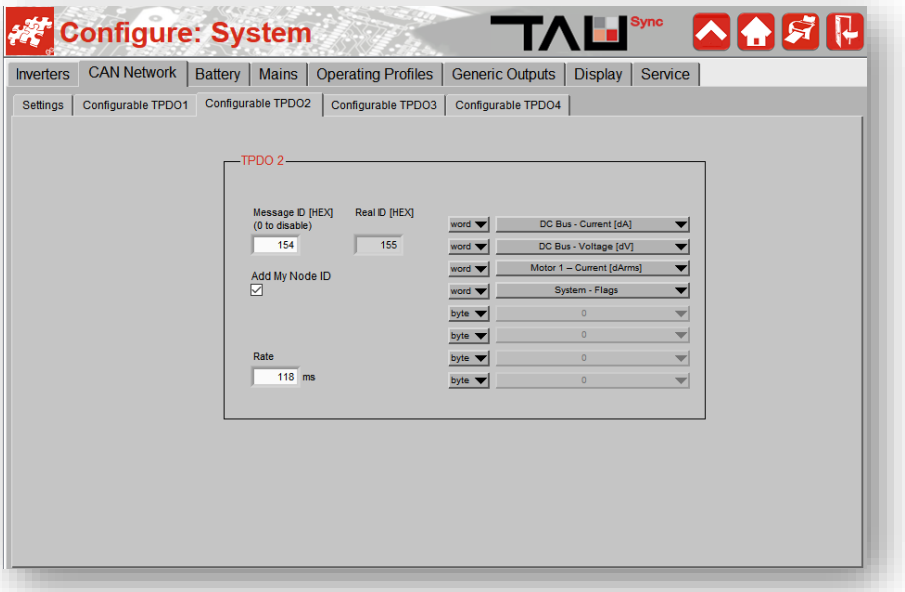
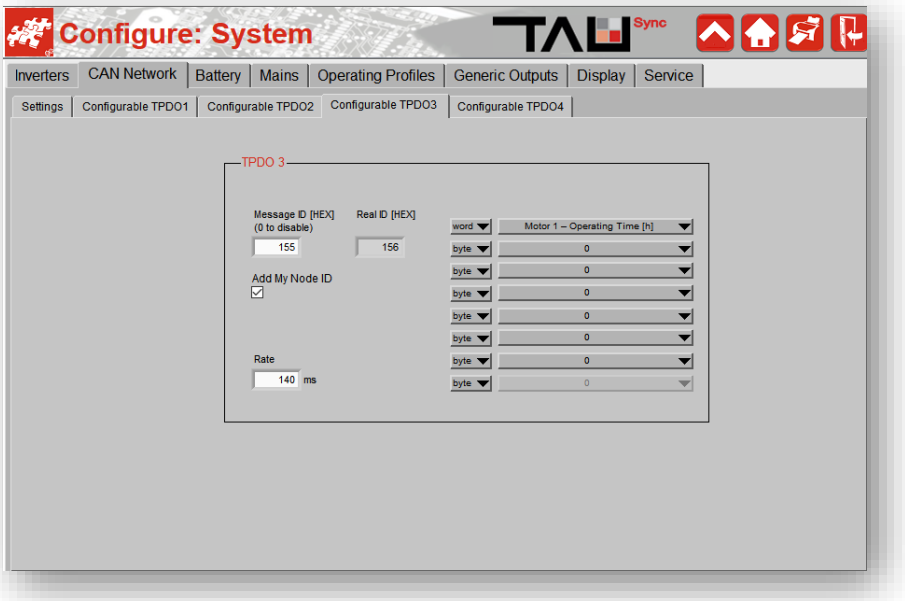


CONFIGURABLE TPDO3

***Message ID [HEX]**: 155*		***Real TPDO ID [HEX] = 0x156***			**Rate:** *140ms*		
Byte 0	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
Motor 1 – Operating Time [h]		0	0	0	0	0	0



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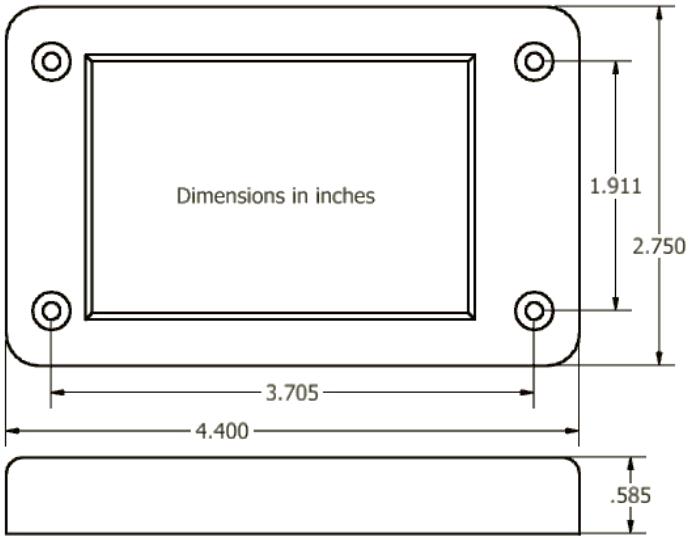
OPTIONAL FACEPLATE

FACEPLATE DRAWING

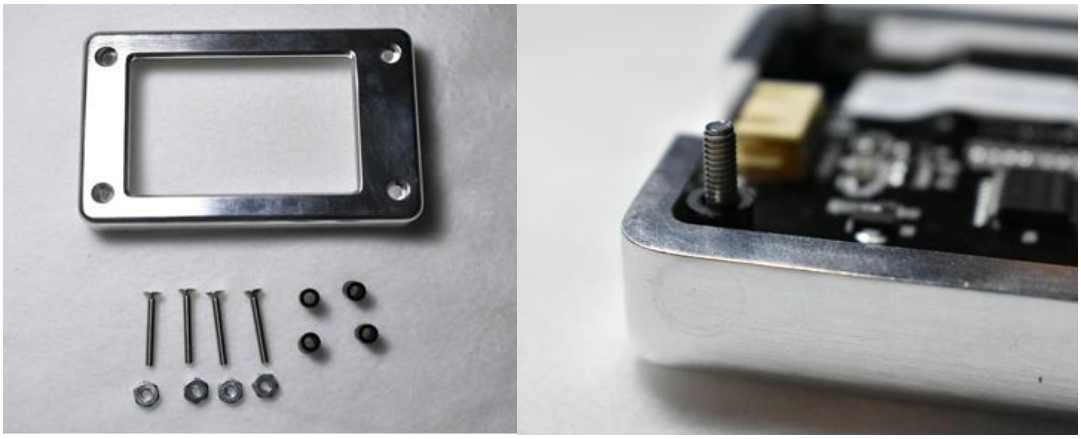


FACEPLATE INSTALLATION

The optional Display Faceplate will include mounting bolts (#5-40 countersunk), nuts, and plastic spacers as shown in Figure below.

1. Insert display module into the rear side of faceplate (screen facing front side).
2. Insert bolts through the front side of the faceplate. Place spacers on the rear end of each bolt. This will allow you to mount the assembly flush to another surface.
3. Fasten nuts onto the bolts, ensuring not to exceed 10 Nm torque.

NOTE: DO NOT overtighten the bolts otherwise it will damage the display. Lightly tighten only.



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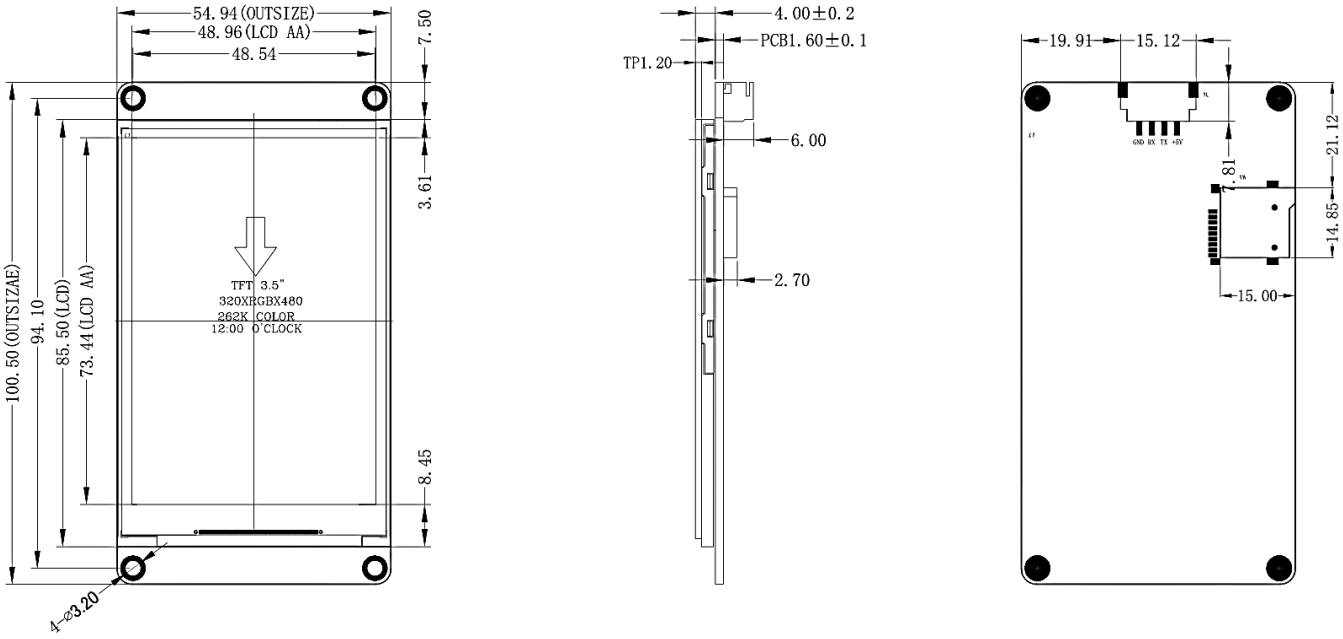
TOUCH DISPLAY SPECIFICATIONS

Working Environment & Reliability Parameter

	Test Conditions	Min	Typical	Max	Unit
Working Temperature	5V, Humidity 60%	-20	25	70	°C
Storage Temperature		-30	25	85	°C
Working Humidity	25°C	10%	60%	90%	RH



	Data	Description
Color	64K 65536 colors	16 bit 565, 5R-6G-5B
Layout size		
	100.5(L)×54.94(W)×5.45(H)	
Active Area (A.A.)	85.50mm(L)×54.94mm(W)	
Visual Area (V.A.)	73.44mm(L)×48.96mm(W)	
Resolution	480×320 pixel	Also can be set as 320×480
Touch type	Resistive	
Touches	> 1 million	
Backlight	LED	
Backlight lifetime (Average)	>30,000 Hours	
Brightness	180 nit	0% to 100%, the interval of adjustment is 1%
Weight	48.2g	

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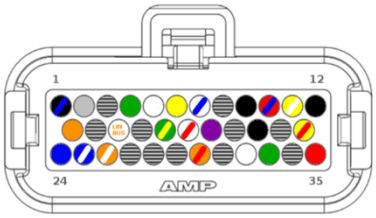
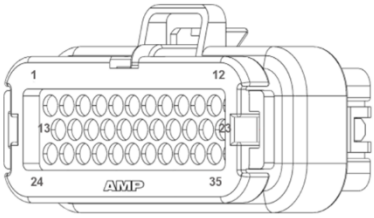
STANDARD K1 WIRE HARNESS - PINOUT

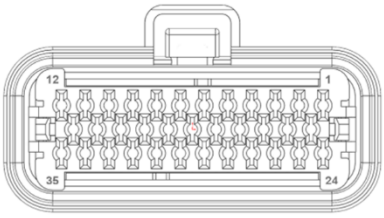
Figure 1 - Standard K1 Pinout Order Assignment

Ampseal 35 Pin Connector (K1 Plug):



(Wire End)

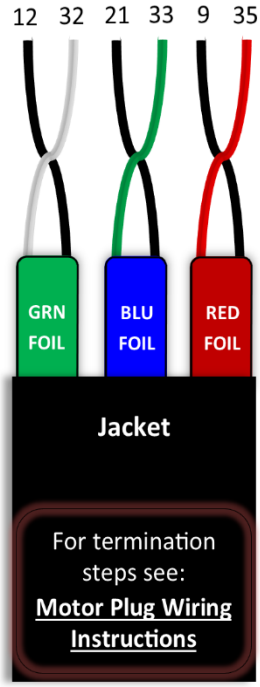




(Receptacle End)

Length	#	Function	Gauge	Color
11 ft	1	I/O Ground	18 AWG	BLK/BLU
11 ft	2	CAN Low	20 AWG	GRY
11 ft	4	Interlock	18 AWG	GRN
11 ft	5	Forward Switch	18 AWG	WHT
11 ft	6	Reverse Switch	18 AWG	YLW
11 ft	7	Clutch Switch	18 AWG	WHT/BLU
8 ft	9	Encoder Ground	20 AWG	BLK Under RED
11 ft	10	12V +	18 AWG	RED/BLU
11 ft	11	Throttle Wiper 1	18 AWG	YLW/WHT
11 ft	12	Analog Ground	18 AWG	BLK
8 ft	12	Thermistor Ground	20 AWG	BLK under GRN
11 ft	13	CAN High	20 AWG	ORG
11 ft	17	Throttle Wiper 2	18 AWG	GRN/YLW
11 ft	18	Profile 2 switch	18 AWG	WHT/RED
11 ft	19	Profile 3 Switch	18 AWG	PURP
8 ft	21	Encoder SIN1	20 AWG	BLK under BLU
11 ft	23	Brake Pot Wiper	18 AWG	YLW/RED
11 ft	24	Key Switch In	18 AWG	BLU
11 ft	25	Coil Return +	18 AWG	BLU/WHT
11 ft	26	Driver Out -	18 AWG	ORG/WHT
11 ft	30	Deceleration Lights	18 AWG	ORG/RED
8 ft	32	Motor Thermistor	20 AWG	WHT under GRN
8 ft	33	Encoder COS1	20 AWG	GRN under BLU
11 ft	35	5 Volt +	18 AWG	RED
8 ft	35	Encoder 5 Volt +	20 AWG	RED under RED

Motor Plug Multipair Cable



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IMPORTANT NOTE ON MOTOR CALIBRATION!

Your inverter's clone file must be calibrated to your motor before use. Please follow the Pre-Startup steps in your Inverter's User Manual to commission the spin sensor before attempting to spin the motor. When you commission a spin sensor, you are calibrating the existing controller program or "clone" file for the individual motor it is controlling. This calibration is only stored within the clone file**. If your clone file is being modified, you must adhere to one of the following options:**

1. Modify the clone file that has already been commissioned to the motor by saving it from SmartView and re-loading it post-modification.

2. Commission the spin sensor again after installing a different clone file.

3. Copy all parameters from the commissioned clone file's ***Spin Sensor*** tab into the un-commissioned clone you are installing.

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TROUBLESHOOTING - DIAGNOSTIC CODES

The inverter may indicate Fault Codes ranging from al no.1 to al no.107. All inverter's have a physical LED or "Status" light near the B- and B+ terminals. When "Status" is Green, the inverter is Ready with no active faults. Any fault condition will illuminate the Red Status LED. If the system shuts down for an unknown reason, verify the color of your Status LED. If Status LED is off, the logic board does not have power.

If the controller is in a fault condition, the Diagnostic Code can be retrieved through your Compact Display, CANBUS Communication, or through any version of the TAU SmartView Software. A list of each code and its level is provided below. **For further information on these codes, please refer to the corresponding Fault # in the Fault Code List for troubleshooting steps.** This list is also available in TAU SmartView's Help section. While viewing active faults in SmartView's *Diagnose* block, click the in the lower right corner of the application to bring up the Help file's fault list.

- **Level:** Working conditions are indicated by different alarm levels, classified as follows, depending on their effects on the system:

FAULT LEVELS			
LEVEL	PRIORITY	ACTION	ICON
Blocking	1 (HIGHEST)	• **Main Contactor:** Opened • **Motors:** Disabled • **Outputs:** Disabled	
Stopping	2	• **Main Contactor:** Closed • **Motors:** Stopped • **Outputs:** Enabled	
Limiting	3	• **Main Contactor:** Closed • **Motors:** Limited • **Outputs:** Enabled	
Warning	4 (LOWEST)	• **Main Contactor:** Closed • **Motors:** Enabled • **Outputs:** Enabled	
Ready	No Faults	• **Main Contactor:** Closed • **Motors:** Enabled • **Outputs:** Enabled	

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FAULT CODE LIST

#`	FAULT	DESCRIPTION	LEVEL
1	**Over Voltage**	**Symptom:** Key-Switch Voltage or Capacitors Voltage is above the maximum level allowed for the Controller. This value is obtained by hardware comparator and is not configurable. **Possible causes:** 1. Bad Battery wiring. 2. Battery resistance too high while regenerating. 3. Battery disconnected while regenerating. **Troubleshooting:** 1. Check if there's an incorrect wiring to Battery positive or negative terminals. 2. This alarm can be caused by the presence of regeneration currents; when your vehicle/application is on release or reverse braking rate, the Motors work as generators so Battery Voltage can exceed Over Voltage Limit. In that case, the Battery condition should be verified (if the battery is new, you need to do some charge-discharge cycles before reaching the rating declared by the manufacturer). If the Battery has a high internal resistance and it is not possible to change it, the solution may be to reduce the Braking and Reverse Rate. 3. Replace the Controller.	Blocking
2	**Under Voltage**	**Symptom:** Key-Switch Voltage or Capacitors Voltage is below the minimum level allowed for the Controller. This value is obtained by a hardware comparator and it's not configurable. **Possible causes:** 1. Bad Battery wiring. 2. Battery seriously damaged or exhausted. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. Blown key-switch fuse. 6. External load drains power from Battery. **Test:** 1. Check for incorrect wiring to HV Battery. Commonly caused by loose/corroded terminals in the High Voltage circuit. 2. Verify condition of main fuse by measuring resistance across the fuse. 3. Verify Battery conditions: if the electrolyte inside is partially exhausted, an Under Voltage fault can sometimes be detected from the Controller; even in case of low Battery charge (<10%), high Acceleration Rate (i.e.	Blocking

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		both pump and drive motors working in full load conditions) could cause Battery Voltage to exceed Under Voltage Limit. 4. Replace the Controller.	
3	User Over Voltage	**Symptom:** Key-Switch Voltage is above the maximum level defined by the user via related parameter. **Possible causes:** 1. Battery resistance too high while regenerating. 2. Battery disconnected while regenerating. 3. Too low Over Voltage Limit defined by the user. **Test:** 1. Check if there's an incorrect wiring to Battery positive or negative terminals. 2. This alarm can be caused by the presence of regeneration currents; when your vehicle/application is on release or reverse braking ramp, the motors work as generators so Battery Voltage can exceed User Over Voltage Limit. In a case like that, the Battery condition should be verified (if the Battery is new you need to do some charge-discharge cycles before reaching the rating declared by the manufacturer). If the Battery has a high internal resistance and it is not possible to change it, the solution may be to reduce the Braking and Reverse Rate. 3. Verify the User Over Voltage Limit . 4. Replace the Controller.	Blocking
4	User Under Voltage	**Symptom:** Key-Switch Voltage is below the minimum level defined by the user via related parameter. **Possible causes:** 1. Battery seriously damaged or exhausted. 2. Battery resistance too high. 3. Battery disconnected while driving. 4. Blown key-switch fuse. 5. External load drains power from Battery 6. Too high voltage level defined by the user. **Test:** 1. Check if there's an incorrect wiring to Battery, or corroded positive or negative terminals. 2. Verify Battery conditions: if the electrolyte inside is partially exhausted, an User Under Voltage fault can sometimes be detected from the Controller; even in case of low battery charge (<10%), high Acceleration Rate (i.e. both pump and drive motors working in full load conditions) could cause Battery Voltage to exceed User Under Voltage Limit. 3. Verify the User Under Voltage Limit. 4. Replace the Controller.	Blocking

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5	**Inverter 1 Over Current**	**Symptom:** Inverter 1 phase current exceeded its current limit. This is not a configurable parameter. **Possible causes:** 1. External or internal short-circuit between U1, V1 or W1 phases. Can be caused by internal water damage. 2. Wrong Motor 1 Parameter/s. 3. Wrong Motor 1 Current Limit Map. 4. Inverter 1 power module damaged. **Test:** 1. Check if there's an incorrect wiring to Motor 1 phases. 2. Verify Motor Parameters. 3. Verify Motor Current Limit Map. 4. Replace the Controller.	Blocking
6	**Inverter 2 Over Current**	**Symptom:** Inverter 2 phase current exceeded its current limit. This is not a configurable parameter. **Possible causes:** 1. External or internal short-circuit between U2, V2 or W2 AC motor's phases. 2. Wrong Motor 2 Parameter/s. 3. Wrong Motor 2 Current Limit Map. 4. Inverter 2 power module damaged. **Test:** 1. Check if there's an incorrect wiring to motor 2 phases. 2. Verify Motor Parameters. 3. Verify Motor Current Limit Map. 4. Replace the Controller.	Blocking
7	**Not Assigned**	-	-
8	**Inverter 1 Over Temperature**	**Symptom:** Inverter 1 power module temperature is above +100°C. **Possible causes:** 1. Operation in high temp environment. 2. Operation with high load. 3. Wrong installation of the controller heat sink. 4. Wrong working of controller cooling system. **Test:** 1. Verify if your environment temperature is within the working range. 2. Verify if your Controller is correctly sized for your load requests.	Blocking

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		3. The alarm might be caused by an ineffective heating dissipation; verify the thermal coupling between the aluminum plate of Controller and your system ballast (or the correct functioning of the fan if a fin-tinned heatsink is used and if the heatsink is clean). The presence of the correct amount of thermal grease in the coupling is essential to ensure a correct heat exchange. 4. If the measured Inverter 1 temperature is slightly different from the effective Inverter 1 temperature, replace the Controller.	
9	**Inverter 2 Over Temperature**	Inverter 2 power module temperature is above +100°C. See AL8	Blocking
10	**Inverter 1 High Temperature**	**Symptom:** Inverter 1 power module temperature is above +80°C. **Possible causes:** 1. Operation in high temp environment. 2. Operation with high load. 3. Wrong Installation of the Controller heat sink. 4. Wrong working of Controller cooling system. **Test:** 1. Verify if your environment temperature is within the working range. 2. Verify if your Controller is correctly sized for your load requests. 3. The alarm might be caused by an ineffective heating dissipation; verify the thermal coupling between the aluminum plate of Controller and your system ballast (or the correct functioning of the fan if a fin-tinned heatsink is used and if the heatsink is clean). The presence of the correct amount of thermal grease in the coupling is essential to ensure a correct heat exchange. 4. If the measured Inverter 1 temperature is slightly different from the effective Inverter 1 temperature, replace the Controller.	Limiting
11	**Inverter 2 High Temperature**	Inverter 2 power module temperature is above +80°C. See AL10	Limiting
12	**Inverter 1 Under Temperature**	**Symptom:** Inverter 1 power module temperature is below -40°C. **Possible causes:** Operation in low temp environment. **Test:** 1. Verify your environment temperature and bring the Inverter 1 temperature in the allowed working range. 2. Replace the Controller.	Blocking
13	**Inverter 2 Under Temperature**	Inverter 2 power module temperature is below -40°C. See AL12	Blocking

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14	**Inverter 1 Current Sensor Fault**	**Symptom:** Current sensor of Inverter 1 measures an invalid offset at key on. **Possible causes:** 1. Leakage current due to Motor 1 stator short-circuit. 2. Controller's sensor faulty. **Test:** 1. Disconnect the Motor 1 from your Controller and cycle Key-Switch. If this fault no longer occurs it was due to a leakage current. 2. Replace the Controller.	Blocking
15	**Inverter 2 Current Sensor Fault**	Current sensor of Inverter 2 measures an invalid offset at key on. See AL14	Blocking
16	**Not Assigned**	-	-
17	**Inverter 1 Temp Sensor Fault**	**Symptom:** Difference between Inverter 1 and microprocessor temperature greater than 70°C. **Possible causes:** Inverter 1 internal temperature sensor is not connected or short-circuited. **Test:** If the Controller detects such a fault, replace it.	Stopping
18	**Inverter 2 Temp Sensor Fault**	Difference between Inverter 2 and microprocessor temperature greater than 70°C. See AL17	Stopping
19	**Motor 1 Over Temperature**	**Symptom:** Motor 1 temperature is above the Motor 1 Over Temperature defined by the Motor Protection setting. Or, Motor Thermistor is disconnected. **Possible causes:** 1. Motor 1 temperature is too high. 2. Wrong Motor 1 thermal probe type or input. 3. Motor 1 thermal probe is not connected or its input is short-circuited. **Test:** Presence of fault with **hot motor**: 1. Verify the Over Temperature parameter set. 2. If the temperature value seems correct, verify that the Motor stator case is clean. 3. Choose a lower duty cycle for your operations. Presence of fault with **cold motor**: 1. Verify the Thermal Probe Type set. 2. With a handheld multimeter you have to measure the impedance between the two wires of the thermal probe (perform the measurement at standard ambient temperature). If the measure is different from the	Stopping

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		standard impedance shown in the thermal probe datasheet, you need to replace it. 3. Disconnect the thermal probe and check wiring insulation between signal and ground wire. 4. Replace the Controller.	
20	**Motor 2 Over Temperature**	Motor 2 temperature is above the Motor 2 Over Temperature defined by the user via related parameter. See AL19	Stopping
21	**Motor 1 High Temperature**	**Symptom:** Motor 1 temperature is above the motor Start Cutback Temperature defined by the Motor Protection Map. **Possible causes:** 1. Motor 1 temperature is too high. 2. Wrong Motor 1 thermal probe type or input. 3. Motor 1 thermal probe not connected or short-circuited input. **Test:** Presence of fault with **hot motor**: 1. Verify the Starting Cutback parameter set. 2. If the temperature value seems correct, verify if the Motor stator case are clean. 3. Choose a lower duty cycle for your operations. Presence of fault with **cold motor**: 1. Verify the Thermal Probe Type set. 2. With a handheld multimeter you have to measure the impedance between the two wires of the thermal probe (perform the measurement at standard ambient temperature). If the measure is different from the standard impedance shown in the thermal probe datasheet, you need to replace it. 3. Disconnect the thermal probe and check wiring insulation between signal and ground wire. 4. Replace the Controller.	Limiting
22	**Motor 2 High Temperature**	Motor 2 temperature is above the motor Start Cutback Temperature defined by the user via related parameter. See AL21	Limiting
23	**Motor 1 Temp Sensor Fault**	**Symptom:** Motor 1 temperature sensor value is out of permitted range. **Possible causes:** Motor 1 temperature sensor reads a not permitted value. **Test:** 1. With a handheld multimeter you have to measure the impedance between the two wires of the thermal probe (execute the measure at standard ambient temperature). If the measure is different from the	Limiting

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		standard impedance shown in the thermal probe datasheet, you need to replace it. 2. Disconnect the thermal probe and check wiring insulation between signal and ground wires	
24	**Motor 2 Temp Sensor Fault**	Motor 2 temperature sensor value is out of permitted range. See AL23	Limiting
25	**High Voltage**	**Symptom:** DC Bus Capacitor Voltage is above the Controller Starting Cutback Voltage defined by the user via related parameter. This fault can be expected if battery is at high SoC, it is an alert that regen current is limited due to high battery voltage. **Possible causes of unexpected occurrence:** 1. Battery resistance too high while regenerating. 2. Battery disconnected while regenerating. 3. Too low Starting Cutback Voltage Limit defined by the Battery Protection Map. **Test:** 1. Check if there's an incorrect wiring to Battery positive or negative terminals. 2. This alarm can be caused by the presence of regeneration currents; when your vehicle/application is on release or reverse braking ramp, the motors work as generators so Battery Voltage can exceed User Over Voltage Limit. In a case like that, the Battery condition should be verified (if the Battery is new you need to do some charge-discharge cycles before reaching the rating declared by the manufacturer). If the Battery has a high internal resistance and it is not possible to change it, the solution may be to reduce the Braking and Reverse Rate. 3. Verify the Controller Starting Cutback Voltage . 4. Replace the Controller.	Limiting
26	**Low Voltage**	**Symptom:** DC Bus Capacitor Voltage is below the Controller Starting Cutback Voltage defined by the Battery Protection Map. This fault can be expected if battery is at low SoC, it is an alert that drive current is limited due to low battery voltage. **Possible causes of unexpected occurrence:** 1. Bad Battery wiring. 2. Battery seriously damaged or exhausted. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. Blown Main fuse or key-switch fuse.	Limiting

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		6. External load drains power from Battery. **Test:** 1. Verify Battery conditions: check if the internal electrolyte is partially exhausted. Even in case of low Battery charge (<10%), high Acceleration Rate (i.e., both pump and drive motors working in full load conditions) could cause Battery Voltage quickly decrease. 2. Verify the Controller Starting Cutback Voltage . 3. Replace the Controller.	
27	**Microprocessor Over Temperature**	**Symptom:** Microprocessor temperature is above 125°C. **Possible causes:** 1. Operation in high temp environment. 2. Operation with high load. 3. Wrong installation of the controller heat sink. 4. Wrong working of controller cooling system. 5. Microprocessor faulty. 6. Microprocessor temperature sensor faulty. **Test:** 1. Verify if your environment temperature is within the working range. 2. Verify if your Controller is correctly sized for your load requests. 3. The alarm might be caused by an ineffective heating dissipation; verify the thermal coupling between the aluminum plate of Controller and your system ballast (or the correct functioning of the fan if a fin-tinned heatsink is used and if the heatsink is clean). The presence of the correct amount of thermal grease in the coupling is essential to ensure a correct heat exchange. 4. Replace the Controller.	Blocking
28	**+5V Supply Failure**	**Symptom:** +5V supply is outside the +5V ± 10% range. **Possible causes:** 1. External load impedance on +5V output is too low. 2. +5V output damage caused by short with external voltage source. **Test:** 1. Verify if the 5V output is in short circuit because of an incorrect encoder wiring. If so, correct the wiring. 2. Verify if the 5V output is in short circuit because the combined current of the devices applied to 5V exceeds the maximum current available indicated in the Controller User Manual. In that case, find and replace the defective device.	Blocking

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		3. If a voltage out of allowed range is present on the terminal when all the loads are removed, replace the Controller.	
29	**+12V Supply Failure**	**Symptom:** +12V supply is outside the +12V ± 10% range. **Possible causes:** 1. External load impedance on. 2. +12V output damage caused by short with external voltage source. **Test:** 1. Verify if the 12V output is in short circuit because of an incorrect wiring. If so, correct the wiring. 2. Verify if the 12V output is in short circuit because the combined current of the devices applied to 12V exceeds the maximum current available indicated in the Controller User Manual. In that case, find and replace the defective device. 3. If a voltage out of allowed range is present on the terminal when all the loads are removed, replace the Controller.	Blocking
30	**Encoder 1 Fault**	**Symptom:** Sin/Cos inputs values are above/below the fault thresholds or spin sensor offset is not right. **Possible causes:** 1. Motor 1 encoder faulty wirings 2. Motor 1 encoder failure. 3. Motor 1 speed changes too quickly. 4. Electromagnetic noise on the Motor 1 sensor bearing. 5. Spin sensor offset is wrong. **Test:** 1. Check if the encoder 1 is correctly connected to the motor 1 itself, the 5-12V supply, GND, Sine and Cosine channels. 2. Make a cross-check of encoder 1 working conditions using SmartView. In Monitor – Realtime Data- Inputs. Verify the encoder sin/cos inputs change when rotating the Motor. If not, check the connections and measure sin/cos voltages. If the encoder 1 is correctly wired and supplied, but the sin/cos don't change, replace the encoder 1. 3. Verify spin sensor mounting and do again the **spin sensor commission** procedure. 4. If the wirings and signal are correct but diagnosis is not, replace the Controller.	Blocking
31	**Encoder 2 Fault**	Sin/Cos inputs values are above/below the fault thresholds. See AL30	Blocking

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32	**Driver Output 1 Open/Short**	**Symptom:** Driver Output 1 is either opened or short-circuited. **Possible causes:** 1. Drive Output wired to an internally economized contactor. 2. Open or short-circuit of Driver Output 1 load. 3. Driver Output 1 damaged. In this case, Driver Output 2, 3, or 4 can be assigned and wired in place of Driver Output 1. **Test:** 1. Verify Part# of Main Contactor. 2. If the Controller detects such a fault after the Key-Switch on, verify the wiring of the Driver Output 1.	Blocking
33	**Driver Output 2 Open/Short**	**Symptom:** Driver Output 2 is either opened or short-circuited. **Possible causes:** 1. Incorrect Clone file. Our default clones will not trigger this fault, as Driver Output 1 is the only Driver assigned. 2. Open or short-circuit of Driver Output 2 load. 3. Driver Output 2 damaged. **Test:** 1. Download and Install NetGain Clone for your Motor & X1 Inverter. 2. If the Controller detects such a fault after the Key-Switch on, verify the wiring of the Driver Output 2.	Blocking
34	**Driver Output 3 Open/Short**	Driver Output 3 is either opened or short-circuited. See AL33	Blocking
35	**Digital Output 1 Open/Short**	**Symptom:** Digital Output 1 is either opened or short-circuited. **Possible causes:** 1. Digital Output 1 has been assigned in Clone but not wired correctly. 2. Open or short-circuit of Digital Output 1 load. 3. Digital Output 1 damaged. **Test:** 1. If the Controller detects such a fault after the Key-Switch on, verify the wiring of the Digital Output 1.	Blocking
36	**Digital Output 2 Open/Short**	Digital Output 2 is either opened or short-circuited. See AL35	Blocking
37	**EEPROM Failure**	**Symptom:** Error during read/write operation in EEPROM memory. **Possible causes:**	Blocking

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		1. Failure to read/write EEPROM memory. **Test:** 1. Load default values for EEPROM variables with SmartView, using the button "Restore Factory Settings" in Manage\Restore. 2. If this fault remains after 2 or more default restoring, replace the Controller.	
38	**EEPROM Corrupted**	**Symptom:** Memory CRC doesn't match. **Possible causes:** 1. Wrong firmware version or parameters. **Test:** 1. Load default values for EEPROM variables with SmartView, using the button "Restore Factory Settings" in Manage\Restore. 2. Load the correct firmware for your application with SmartView. 3. If this fault remains after 2 or more default restoring, replace the Controller.	Blocking
39	**Driver Output 4 Open/Short**	Driver Output 4 is either opened or short-circuited. See AL33	Blocking
40	**Precharge Circuit Fault**	**Symptom:** Pre-charge of internal line capacitors is too fast or Capacitors Voltage is fixed to zero during Precharge. **Possible causes:** 1. Open Circuit or High Resistance in HV circuit. 2. Pre-charge circuit faulty. 3. Short on capacitors between +B and -B. 4. Power module short-circuit. **Test:** 1. Check all high voltage connectors and terminations in series with B+ & B-. 2. Check if the Main Contactor is closed even if the key is off. If so, replace the main contactor. 3. With SmartView, if: a. The coil is supplied simultaneously with the switch-on of the key (not delayed of 0,5-1s). b. The measurement with a tester shows an inverter voltage slightly different from the data visualized in Monitor. c. The inverter voltage remains at low voltage after 2s from on. 4. Replace the Controller.	Blocking

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41	**Precharge Failed**	**Symptom:** Pre-charge phase fails to charge capacitors till the voltage level of key input. **Possible causes:** 1. Open Circuit or High Resistance in HV circuit. 2. External load in parallel with Inverter's capacitors. 3. Pre-charge circuit faulty. **Test:** 1. Check all high voltage connectors and terminations in series with B+ & B- 2. Verify that there's no external load in parallel with Precharge (K1-24 or B+ Precharge) & B-.	Blocking
42	**Main Contactor Welded**	**Symptom:** Before closing the line contactor, internal capacitors are loaded for short time and voltage doesn't go down. **Possible causes:** 1. Line contactor contacts are welded in closed position. 2. Motor phases are not connected. 3. An external wiring is providing voltage to capacitors. **Test:** 1. Verify the good condition of your Main Contactor. 2. Connect Motor phases. 3. Verify if none of external wiring is providing voltage to the capacitors.	Blocking
43	**Main Contactor Did Not Close**	**Symptom:** The difference between Key-Switch and capacitors voltage is too high after the contactor has been powered. **Possible causes:** 1. Main Contactor did not close after contactor's coil has been powered. 2. Main Contactor coils are not connected. Or Main Contactor is Internally Economized. 3. +B fuse is blown. 4. Open Circuit or High Resistance in HV circuit. 5. A contactor in series with inverter Main Contactor is open. **Test:** 1. Verify the Part#, condition, and the correct wiring of your Main Contactor. 2. Check the status of the +B fuse. 3. Check all high voltage connectors, contactors, and terminations in series with B+ & B-	Blocking

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44	Interlock Disabled	**Symptom:** Interlock input is not active and line contactor is open. **Possible causes:** 1. Interlock input is not active. 2. Incorrect Clone file. **Test:** 1. Verify the status of the digital input that you want to define as your Interlock Input and the correct wiring to the Controller. 2. With SmartView, in Monitor verify proper operation of the digital input associated to the Interlock input.	Stopping
45	Static Return to Off Traction	**Symptom:** One or more traction inputs are active at the key on, after an Emergency stop or a controlled stop procedure. **Possible causes:** 1. Incorrect Clone file. Can be configured, though default clones disable "Static Return to Off for Traction". 2. Traction Throttle, Traction Inhibit or Direction Selector are active: a. At key on. b. When the Traction Enable goes down. c. After the Emergency Reverse. d. After a controlled stop procedure. **Test:** 1. Verify correct clone file is installed. 2. Verify that, at key on, the Traction Throttle is not activated. 3. Verify that, at key on, the Traction Inhibit and the Direction Selector are not active. You can do that with SmartView in Monitor.	Warning
46	Static Return to Off Hydraulic	**Symptom:** One or more Hydraulic/Pump inputs are active at the key on after a controlled stop procedure. **Possible causes:** 1. Hydraulic/Pump Throttle, Hydraulic/Pump Inhibit or Auxiliary Input are active at key on, when the Pump Enable goes down after a controlled stop procedure. **Test:** 2. Verify that, at key on, the Hydraulic/Pump Throttle is not activated. 3. Verify that, at key on, the Hydraulic/Pump Inhibit and the Auxiliary Input are not active. You can do that with SmartView in Monitor.	Warning
47	Traction Throttle Fault	**Symptom:** A fault condition of Traction Throttle is detected.	Stopping

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		Possible causes: 1. The voltage measured in the Traction Throttle circuit exceeds the calibration range values or if it doesn't, Traction Throttle voltage is within the working range when Inhibit Input isn't active. 2. Throttle Short or Open Circuit. 3. Throttle wired with reversed polarity. **Test:** 1. Verify if the potentiometer voltage is in the range of the calibration values and outside the wiper fault check that are set in SmartView OEM Version. If the potentiometer voltage is outside the correct calibration values check the wiring and the potentiometer output voltage. 2. Verify that the Inhibit Input goes high after before the first point of the Throttle Map . 3. In case of a correct wiring but incorrect output voltage, replace the potentiometer itself. 4. If the potentiometer output voltage is correct, the terminals of the connector are correctly wired to their correspondent inputs in potentiometer circuit but the measured value shown by the display is incorrect, replace the Controller.	
48	**Hydraulic Throttle Fault**	**Symptom:** A fault condition of hydraulic/pump throttle is detected. **Possible causes:** 1. The voltage measured in the Hydraulic/Pump throttle circuit exceeds the calibration range values or if it doesn't, Hydraulic/Pump throttle voltage is within the working range when Inhibit Input isn't active. **Test:** 1. Verify if the potentiometer voltage is in the range of the calibration values and outside the wiper fault check. If not, configure your throttle with SmartView. If the potentiometer voltage is outside the right calibration values check the wirings and the potentiometer output voltage. 2. Verify that the Inhibit Input goes high after before the first point of the Throttle Map . 3. In case of a correct wiring but incorrect output voltage, replace the potentiometer itself. 4. If the potentiometer output voltage is correct, the terminals of the connector are correctly wired to their correspondent inputs in potentiometer circuit but the measured value shown by the display is incorrect, replace the Controller.	Stopping

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49	**Brake Throttle Fault**	**Symptom:** A fault condition of Brake Throttle is detected. **Possible causes:** 1. The voltage measured in the Brake Throttle circuit exceeds the calibration range values or active Brake Throttle voltage is present when inhibit is open. **Test:** 1. Verify if the potentiometer voltage is in the range of the calibration values and outside the wiper fault check. If not, configure your Brake with SmartView. If the potentiometer voltage is outside the right calibration values check the wirings and the potentiometer output voltage. 2. In case of a correct wiring but incorrect output voltage, replace the potentiometer itself. 3. If the potentiometer output voltage is correct, the terminals of the connector are correctly wired to their correspondent inputs in potentiometer circuit but the measured value shown by the display is incorrect, replace the Controller.	Stopping
50	**Service Time Expired**	**Symptom:** Service timer has expired. **Possible causes:** 1. Service interval time has expired. **Test:** 1. With SmartView, reset the service timer in Monitor/Real-Time Data/Time-Distance.	Warning
51	**Low Battery State of Charge**	**Symptom:** Battery State of Charge estimated is lower than minimum value defined by the user via related parameter. **Possible causes:** 1. Wrong Battery Parameters. 2. Battery State of Charge drops below the setting parameters. **Test:** 1. Verify Battery Parameters. 2. Check the battery level indication; if its value is below the BDI Low Reset Threshold, recharge the battery and check it. 3. If the battery is recharged and its voltage is ok but the display shows a discharge value, check with the tester the battery voltage; if it is different from the value reported on COMPACT display or on SmartView in Monitor , call service to trim again the battery measure.	Limiting

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52	Wrong Parameter	**Symptom:** Parameter setting is out of the permitted range. **Possible causes:** 1. Wrong value of a parameter setting is entered. 2. Commonly seen after changes to Battery Protection/Mapping. See related pages in this manual. **Test:** 1. With SmartView in **Diagnose**: you can see which parameters are out of range. Adjust or revert them, SAVE, then cycle key switch. 2. Revert any recent parameter changes, or load original clone file and re-commission Spin Sensor.	Blocking
53	Restart Required	**Symptom:** Changed a parameter setting. This is normal to see after parameter changes are saved. **Possible causes:** 1. A parameter setting is changed and you need to restart the controller (Key off-on) for it to become effective. **Test:** 1. If the Controller detects such a fault, you only have to cycle the key switch once in order to make all of your adjustments effective. You can physically cycle the key, or click the flashing key button in the lower right corner of SmartView.	Blocking
54	Can Bus Off	**Symptom:** Bus off condition detected. **Possible causes:** 1. Short between L, H channels or H channel and GND of CAN driver. 2. Wrong cable wirings. 3. Wrong baud rate configuration of one node. **Test:** 1. Check the CAN wiring of all network nodes and the presence of two resistors of 120Ω connected to CAN H and CAN L wires, one at each end of the CAN wiring. If wired correctly, an impedance measurement at any point between CAN H and CAN L should read 60Ω. 2. Check if all network nodes are correctly powered up. 3. Verify that all network nodes have the same baud rate configuration.	Stopping
55	Can Open Circuit	**Symptom:** Messages no longer received. **Possible causes:** 1. H or/and L channel not connected.	Stopping

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		2. Wrong cable wirings. 3. All other nodes of the net not powered up. **Test:** 1. Check the CAN wiring of all the network nodes and the presence of two resistors of 120Ω connected to CAN H and CAN L wires, one at each end of the CAN wiring. If wired correctly, an impedance measurement at any point between CAN H and CAN L should read 60Ω. 2. Check if all network nodes are correctly powered up.	
56	**Can Bad Wiring or Short Circuit**	**Symptom**: Can bus synchronization phase failed or bus off condition detected. **Possible causes:** 1. Wrong cable wirings. 2. Wrong baud rate configuration of one node. 3. Short between L, H channels or H channel and GND of CAN driver. **Test:** 1. Check the CAN wiring of all network nodes and the presence of two resistors of 120Ω connected to CAN H and CAN L wires at the beginning and at the end of the CAN wiring in order to adapt the lines to a fixed impedance. If wired correctly, an impedance measurement at any point between CAN H and CAN L should read 60Ω. 2. Check if all network nodes are correctly powered up. 3. Verify with SmartView if all network nodes have the same baud rate configuration.	Blocking
62	**Net Timeout Heartbeat**	**Symptom:** At least one Heartbeat hasn't been received during the startup of the network or after the synchronization phase. **Possible causes:** 1. Temporary loss of communication. **Test:** 1. Check if all network nodes are correctly powered up, even after synchronization phase. 2. Verify to have the same Max Network Startup Time in all nodes of your network.	Stopping
63	**Net RPDO Timeout**	**Symptom:** At least one PDO hasn't been received. **Possible causes:** 1. Temporary loss of communication. **Test:**	Stopping

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		1. Check if all network nodes are correctly powered up.	
64	**Main Contactor Close Command Timeout**	**Symptom:** Pre-charge timer has expired before the master sends the power ready request. **Possible causes:** 1. 5 sec after pre-charge is ended up, the power line is not ready (for master). **Test:** 1. The Master must send the Power Ready Request within 5 seconds from the begin of Precharge Done phase otherwise this fault will happen. For detailed information read the Powering Procedure.	Blocking
65	**Blocking Request From Master**	**Symptom:** Fault Request is received from Master. **Possible causes:** Master has requested a fault condition. **Test:** If the Controller detects such a fault, check your Master configuration.	Blocking
66	**Not Assigned**	-	-
67	**Net Startup Timeout**	**Symptom:** The node hasn't been able to synchronize itself to the network. **Possible causes:** Net synchronization failure at startup. **Test: V**erify to have the same Max Network Startup Time in all nodes of your network.	Blocking
68	**Net External Failure**	**Symptom:** At least one Node has become not operational. **Possible causes:** Net synchronization lost. **Test:** Check the state of all network nodes.	Stopping
69	**Net Mains Manager Wrong Sequence**	**Symptom:** The Main Contactor Manager has executed a wrong powering procedure. **Possible causes:** A TAU Node, Helper or Follower for the Main Contactor Management, signals that the powering sequence made by the Manager is wrong. **Test:** 1. Verify that the main contactor is managed and commanded only by one Main Contactor Manager. It's highly recommended to set all the other network nodes as Helpers.	Blocking

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		2. In all network nodes control their powering roles. For detailed information read the QuickStart of CO Network.	
70	**Net Mains Manager Precharge Too Slow**	**Symptom:** DC Bus Voltage will not increase after discharging phase. **Possible causes:** A TAU Node, Helper for the Main Contactor Management, signals that the Precharge phase has been too slow. **Test:** Check the powering roles of all network nodes.	Blocking
71	**Net Mains Manager Closing Too Slow**	**Symptom:** The main contactor doesn't close. **Possible causes:** A TAU Node, Helper for the Main Contactor Management, signals that the main closing phase has been too slow. **Test:** 1. Check the cable that commands the contactor from the Main Contactor Manager Node 2. Verify that the main contactor is managed and commanded only by one Main Contactor Manager.	Blocking
72	**Net Mains Manager Powering Alarm**	**Symptom:** At least one fault has occurred on Main Contactor Manager Controller. **Possible causes:** A TAU Node, Helper or Follower for the Main Contactor Management, signals that the Main Contactor Manager has the powering state machine alarmed. **Test:** Verify the Main Contactor Manager active faults.	Blocking
73	**CO Synchro Failed**	**Symptom:** At least one node of the network could be wrong configured or switched off. **Possible causes:** Net never synchronized. **Test:** 1. Verify the wiring of all network nodes. 2. Verify the correct supply of all network nodes. 3. Verify to have the same Max Network Startup Time in all nodes of your network.	Blocking
74	**CO Synchro Lost**	**Symptom:** At least one node of the network could be wrong configured or switched off during operation. **Possible causes:** Net synchronization lost.	Stopping

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		Test: If the Controller detects such a fault that can appear only during operation, you must verify the correct supply and wiring of all network nodes.	
75	**Stopped For System Fault**	**Symptom:** Node is stopped because another node has a stopping/blocking fault condition. **Possible causes:** Node Stopped for System Fault. **Test:** 1. Solve the other node Fault condition. 2. Verify your System Faults Remapping in order to avoid undesired stopping fault conditions from the other network nodes.	Stopping
76	**Blocked for System Fault**	**Symptom:** Node is blocked because another node has a stopping/blocking fault condition. **Possible causes:** Node blocked for System Fault. **Test:** 1. Solve the other node stopping/blocking condition. 2. Verify your System Faults Remapping in order to avoid undesired blocking fault conditions from the other network nodes.	Blocking
77	**BMS Wall Charge**	**Symptom:** The TAU Node sets a blocking fault. **Possible causes:** The BMS is recharging the battery. **Test:** 1. Verify the condition that has caused this fault, signaled by your BMS. 2. If the BMS is not recharging the battery, verify the correct status of BMS PDO.	Blocking
78	**BMS Stop**	**Symptom:** The TAU Node sets a stopping fault. **Possible causes:** The BMS requires a system stop. **Test:** 1. Verify the condition that has caused this fault, signaled by your BMS. 2. If the BMS doesn't require a stop, verify the correct status of BMS PDO.	Stopping
79	**BMS Fault**	**Symptom:** The TAU Node sets a blocking fault. **Possible causes:** The BMS signals its faulty state. **Test:** 1. Verify the condition that has caused this fault, signaled by your BMS.	Blocking

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		2. If the BMS doesn't signal a faulty state, verify the correct status of BMS PDO.	
80	BMS Limiting	**Symptom:** The TAU Node limits its current to the required value from BMS. **Possible causes:** The BMS requires a current limit. **Test:** 1. Verify the condition that has caused this fault, signaled by your BMS. 2. If the BMS doesn't require a current limit, verify the correct status of BMS PDO.	Limiting
81	Steering Sensor Fault	**Symptom:** A fault condition of steering sensor is detected. **Possible causes:** Steering sensor wiring/s (analog/digital) are not connected. **Test:** 1. Verify if the potentiometer voltage is in the range of the calibration values and outside the wiper fault check. If not, with SmartView, configure your steering sensor. If the potentiometer voltage is outside the right calibration values, check the wirings and the potentiometer output voltage. 2. In case of a correct wiring but incorrect output voltage, replace the steering sensor itself. 3. If the steering sensor output voltage is correct, the terminals of the connector are correctly wired to their correspondent inputs in potentiometer circuit but the measured value in the display is incorrect, replace the Controller.	Limiting
82	CAN Protocol Run Time Error	**Symptom:** Difference between the Control Mode set by GUI and the request made by CAN. **Possible causes:** Wrong CAN Request. **Test:** If the Controller detects such a fault, check the contents of the RPDO1.	Limiting
83	Programming Required	**Symptom:** A blocking fault is voluntary forced during the programming to disconnect the power from the Controller. **Possible causes:** Firmware Programming in progress.	Blocking
84	DigInputs Overvoltage	**Symptom:** Digital Input Supply Voltage is above the maximum level allowed for the Controller. This value is obtained by a hardware comparator and it's not configurable.	Blocking

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		Possible causes: Incorrect Wiring. **Test:** If the Controller detects such a fault, check the wiring of the Digital Inputs.	
85	**Inverter Model Not Supported**	**Symptom:** Inverter model is not supported by the firmware. **Possible causes:** Inverter model is not supported. **Test:** If the Controller detects such a fault, verify the firmware version loaded and/or update the correct firmware.	Blocking
97	**Commission In Progress**	**Symptom:** Motor spin sensor commission is in progress. **Possible causes:** Spin sensor commission is in progress. **Test:** If the Controller detects such a fault, wait until the commission procedure is ended.	Warning
98	**Commission End Success**	**Symptom:** Motor Spin sensor commission is ended successfully. **Possible causes:** Spin sensor commission ends successfully. **Test:** If the Controller detects such a fault, cycle key switch.	Stopping
99	**Commission End Errors**	**Symptom:** Motor spin sensor commission is ended with errors. **Possible causes:** Spin sensor commission end with errors. **Test:** If the Controller detects such a fault, cycle key switch and repeat the commission procedure.	Stopping
100	**Internal Software Fault 1**	**Symptom:** Internal Error. **Possible causes:** Internal software error/s. **Test:** 1. If CAN Network is enabled, set “Heartbeat” speed to “Slow”. 2. Load default values for EEPROM variables with SmartView, using the button "Restore Factory Settings" in Manage\Restore. 3. If this fault is still present, contact Dealer.	Blocking
101	**Internal Software Fault 2**	Internal Error. See AL100	Warning
102	**Internal Software Fault 3**	Internal Error. See AL100	Warning

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103	**Internal Hardware Fault 1**	**Symptom:** Internal Error. **Possible causes:** Internal hardware error/s. **Test:** 1. Load default values for EEPROM variables with SmartView, using the button "Restore Factory Settings" in Manage\Restore. 2. If this fault is still present, contact Dealer.	Blocking
104	**Internal Hardware Fault 2**	Internal Error. See AL103	Blocking
105	**Internal Hardware Fault 3**	Internal Error. See AL103	Blocking
106	**Internal Hardware Fault 4**	Internal Error. See AL103	Blocking
107	**Internal Software Fault 4**	Internal Error. See AL103	Blocking

ADDITIONAL SUPPORT

Hyperlinks in the list above can be viewed by clicking the link in the Diagnose tier of TAU SmartView's Help section. If you need additional support to solve Diagnostic Codes signaled by the firmware or strange behaviors of the vehicle, please contact your Authorized Dealer.

In order to make the collection of information faster, you must provide them:

1. **Product Code** of the Controller.
2. Clone file of the Controller.
3. Screenshots of the **About** Page in the Main Menu.
4. Screenshots of the **Active Faults** Tab in DIAGNOSE
5. Screenshots of the **Faults History** Tab in DIAGNOSE
6. Screenshots of the **Time/Distance** Tab in MONITOR

