192-300307
17.04.2023

GVI

Mobile Inverter

Application Note GVI Motor Rotation direction

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Non-warranty clause

We checked the contents of this publication for compliance with the associated hardware and software. We can, however, not exclude discrepancies and do therefore not accept any liability for the exact compliance. The information in this publication is regularly checked, necessary corrections will be part of the subsequent publications.

English Master created.

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1 Introduction

1.1 About this document

1.1.1 Definitions

In this documentation the product Global Vehicle Inverter is referred to as "The motor controller" or GVI.

GVI is a family of motor controllers for use in systems with 24-650 DC (nominal) supply and power levels from 4,4 to 398 kVA. GVI frame sizes C, D, E are referred to as Low Voltage (LV) devices, frame sizes G and H are considered as High Voltage (HV) Devices. The GVI is suitable for most electric vehicle applications.

1.1.2 Terms and abbreviations

GVI	AC mobile inverter
LV	Low Voltage (24 – 96V)
HV	High Voltage (350 – 650V)
Application	A customer specific use of Parker hardware and software
CAN	Controller Area Network
Drive	Motor controller
NMT	Network management
OEM	Original equipment manufacturer
VMC	Vehicle master controller

1.1.3 This revision

This revision replaces all previous revisions of this document. Parker has made every effort to ensure that this document is complete and accurate at the time of printing. In accordance with our policy of continuous product improvement, all data in this document is subject to change or correction without prior notice.

1.1.4 Scope

The motor controller is a software configurable device. In a CAN (Controller Area Network) based system, the motor controller setup and operation can be managed by a vehicle master controller communicating over the CAN Bus.

The configuration of the drive can only be done with the CANopen protocol, which is implemented in the Parker GVI configuration tool.

Realtime command and feedback signals can be realized with the CANopen protocol (with 11 bit identifier) or the J1939 (with 29 bit identifier) and is called the *communication interface*, which is described in the document *192-300306Nx - GVI CAN Message Database* (exel format).

This document presents the general description for implementing a CANopen or J1939 communication interface between an IQAN master and a GVI inverter by means of an *External*

Function, which basically is a translation of the *192-300306Nx - GVI CAN Message Database* into IQAN format.

Before continuing with the configuration, ensure the Start-up and Commissioning section from the hardware manual (see chapter 1.1.5) has been completed and is fully understood. It is also helpful to have the Object Dictionary, the list of all parameters and variables the motor controller has available via the CAN bus, when reading through this manual.

1.1.5 Related documents

For more information about the inverter, see the following related documents.

Reference number	Document	Description
1	GVI Object Dictionary	The document is available from Parker as an HTML file
2	Product Manual for GVI-C D E	Parker EMDE Reference 192-300300Nx
3	Product Manual for GVI-G-H	Parker EMDE Reference 192-300302Nx
4	GVI CAN Message Database	Parker EMDE Reference 192-300301Nx

Table 1 References

2 Standard Motor Rotation Direction

2.1 High voltage GVI-GVM

Power connection denomination

Drive

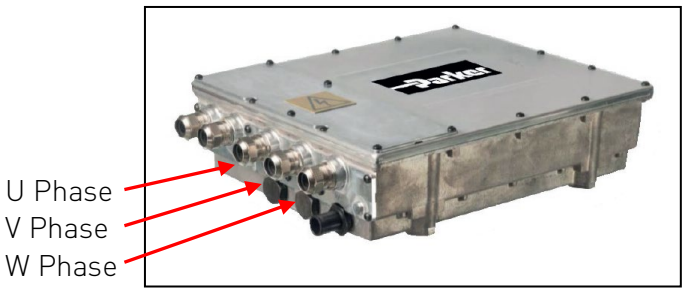

Figure 1: High voltage Power connection

Motor

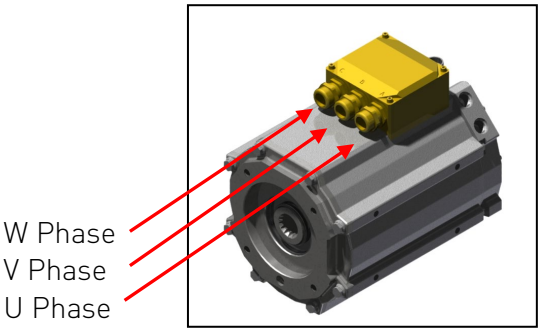

Figure 2: GVM Power connection

Feedback connection denomination

Drive

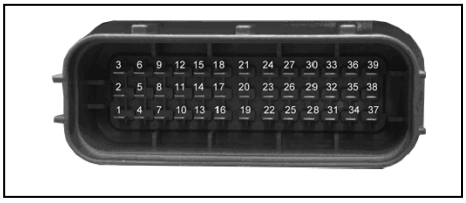

Figure 3: High voltage I/O connection

Motor

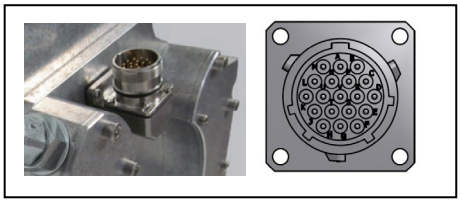

Figure 4: GVM Resolver connection

Pin 6: Resolver Excitation +
Pin 7: Resolver Cos+
Pin 8: Resolver Cos
Pin 9: Resolver Excitation -
Pin 10: Resolver Sin+
Pin 11: Resolver Sin-

Pin A: Resolver Sin-
Pin B: Resolver Sin+
Pin E: Resolver Cos-
Pin F: Resolver Cos+
Pin J: Resolver Excitation +
Pin K: Resolver Excitation –

Minimum connection diagram

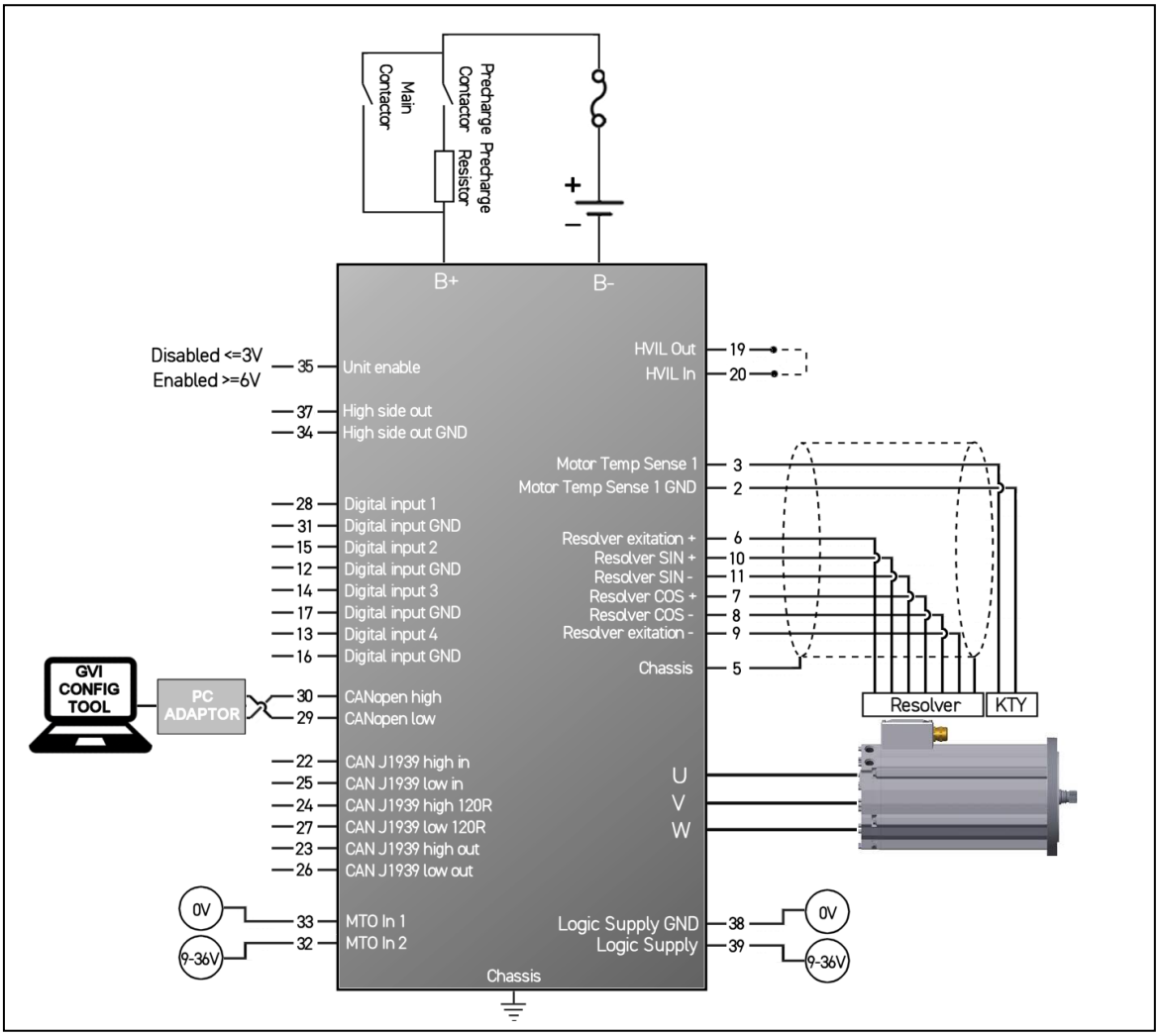

Figure 5: Minimum connection diagram

Implementing the minimum connection diagram and using default drive firmware configuration will give a CLOCKWISE shaft rotation (view shaft end in front of you) for a POSITIVE speed command.

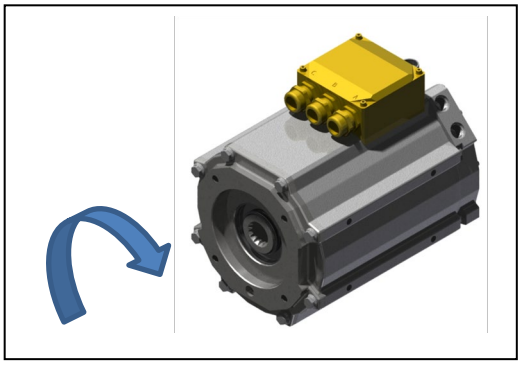

Figure 6: Clockwise direction

2.2 Low voltage GVI-GVM

Power connection denomination

Drive

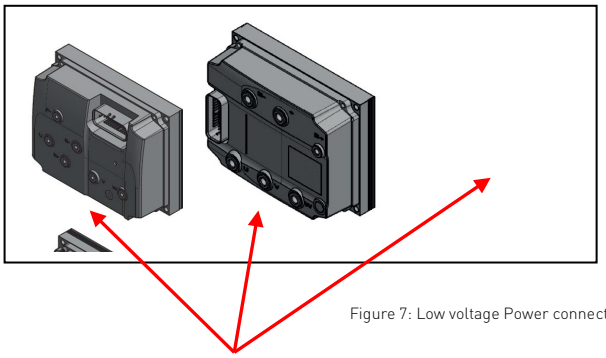

Figure 7: Low voltage Power connection

U/V/W are indicated on the drive

Motor

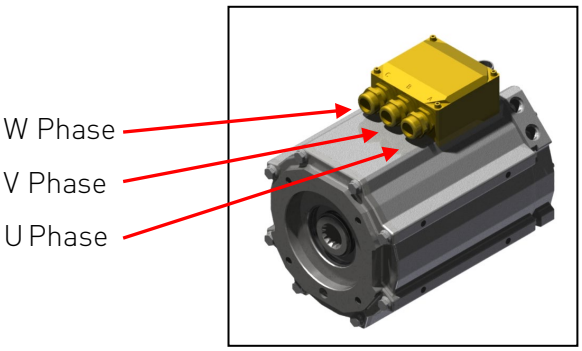

Figure 8: GVM Power connection

Feedback connection denomination

Drive

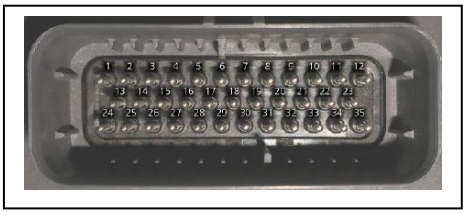

Figure 9: Low voltage I/O connection

Pin 7: Encoder 1A (VA)

Pin 8: Encoder 1B (VB)

Pin 31: Encoder Supply Gnd

Pin 32: Encoder Supply 2 (Vdd)

Motor

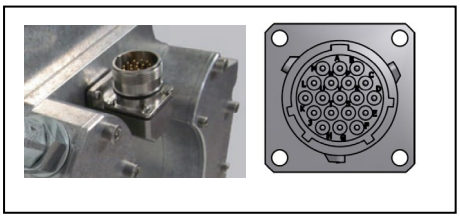

Figure 10: GVM Encoder connection

Pin A: Encoder VA (1A)

Pin E: Encoder VB (1B)

Pin J: Encoder Vdd (Supply 2)

Pin F: Encoder Gnd

Minimum connection diagram

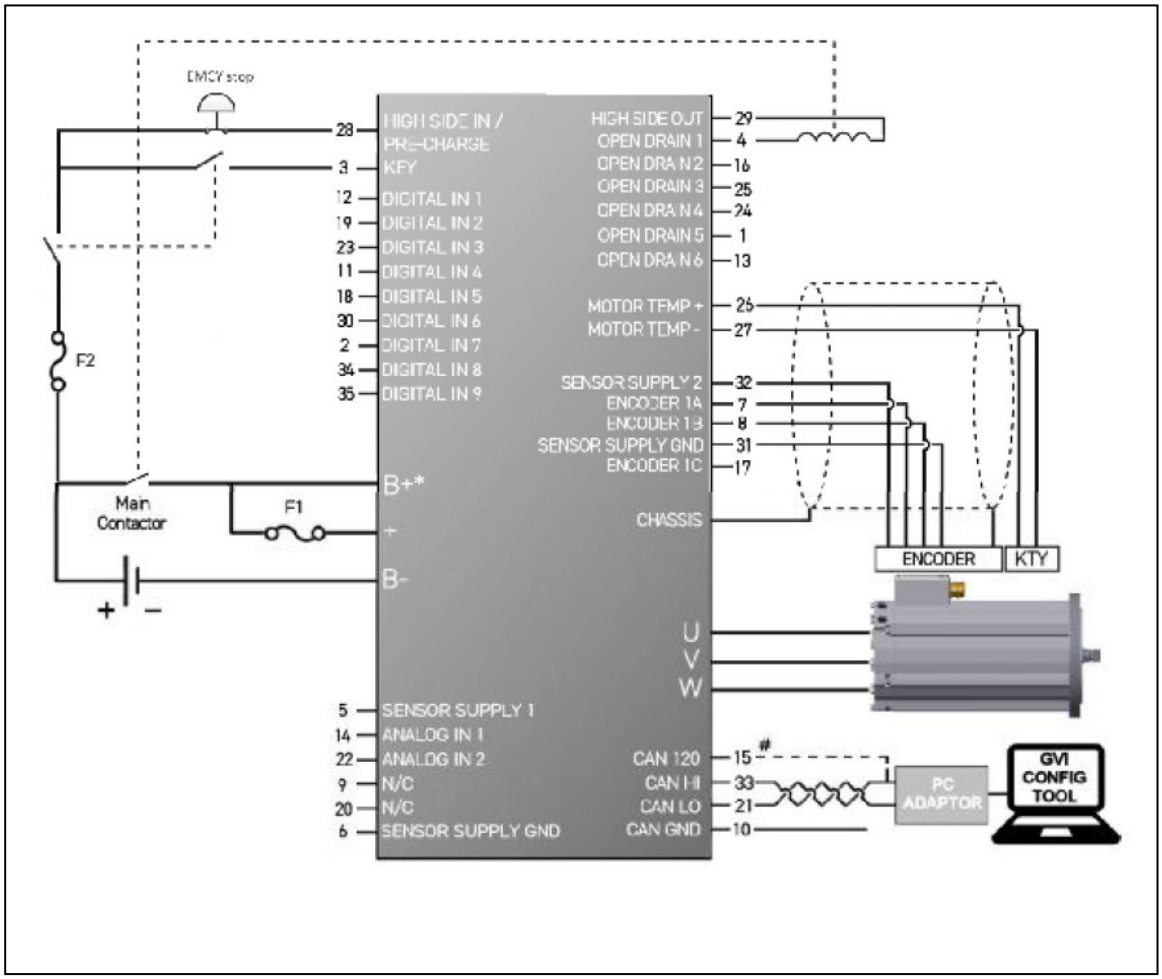

Figure 11: Minimum connection diagram

Implementing the minimum connection diagram and using default drive firmware configuration will give a CLOCKWISE shaft rotation (view shaft end in front of you) for a POSITIVE speed command.

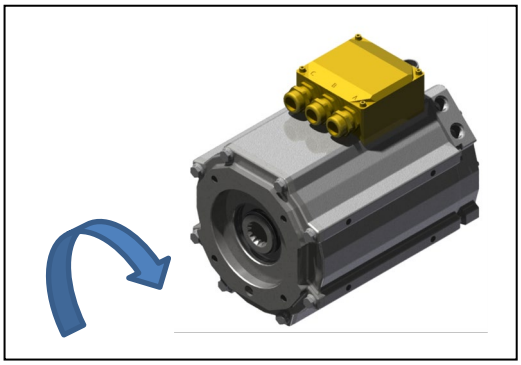

Figure 12: Clockwise direction

3 Inverted motor rotation direction

If, for your application, it's not possible to send negative command for rotation in counterclockwise direction, never swap power phases nor encoder signal.

It exists a parameter in ApplicationSetupWord 0x2020:10(b3) in drive setting to change Motor Rotation direction.

Pay attention: Using this parameter will give a CCW (Counterclockwise) rotation shaft (view shaft in front of you). See figure 15 for signal feedback/command/setting.

Parameter: 0x2020:10 bit 3 (Inverted Rotation Direction) => if this bit is set to 1 (enable), for a positive command, the motor rotation is counterclockwise.

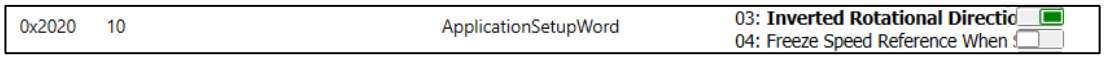

Figure 13: ApplicationSetupWord

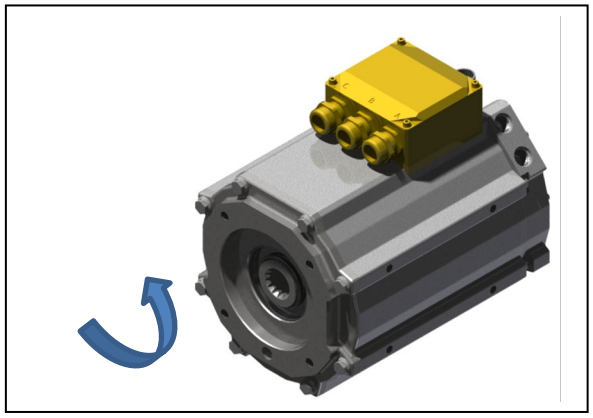

Figure 14: Counterclockwise direction

ApplicationSetupWord 0x2020:10 bit3 (Inverted Rotational Direction) = 0						
Control	Speed mode		Torque mode		Current mode	
Command signal	Pos	Neg	Pos	Neg	Pos	Neg
Dir of rotation	CW	CCW	CW	CCW	CW	CCW
Speed feedback	Pos	Neg	Pos	Neg	Pos	Neg
Torque feedback	Pos	Neg	Pos	Neg	Pos	Neg
Motor current feedback	Pos	Neg	Pos	Neg	Pos	Neg

ApplicationSetupWord 0x2020:10 bit3 (Inverted Rotational Direction) = 1						
Control	Speed mode		Torque mode		Current mode	
Command signal	Pos	Neg	Pos	Neg	Pos	Neg
Dir of rotation	CCW	CW	CCW	CW	CCW	CW
Speed feedback	Pos	Neg	Pos	Neg	Pos	Neg
Torque feedback	Neg	Pos	Neg	Pos	Neg	Pos
Motor current feedback	Neg	Pos	Neg	Pos	Neg	Pos

Figure 15: Signal feedback