Industrial battery chargers support CANopen

The Canadian company Delta-Q provides battery chargers dedicated for on-board integration in electrical vehicles. The charging process of lead-acid and lithium battery packs is controlled and monitored via CANopen.

Figure 1: The CANopen-connectable IC650 charger is available in 24-V_{DC}, 36-V_{DC} and 48-V_{DC} versions (Source: Delta-Q Technologies)

Many OEMs (original equipment manufacturers) of golf cars, lift trucks, aerial work platforms, floor machines, utility vehicles, and scooters, are developing machines that employ lithium batteries. Safety concerns associated with lithium battery usage creates the need for a highly-integrated system using a charger with CANopen-connectivity. For example, the IC650 charger is available in 24-V_{DC}, 36-V_{DC}, and 48-V_{DC} versions and provides 650-W of constant DC (direct count) output power. The company also provides 85-V_{DC} and 120-V_{DC} models to charge batteries with up to 34 cells.

Via the CANopen network the information between the charger and other electric-drive vehicle components (e.g. main vehicle controller) is exchanged. The data is used e.g. to operate safety interlocks, to be displayed on panels, or to be collected by custom service tools. The CAN interface is galvanically isolated. CAN cable harnesses can be provided by Delta-Q, or sourced by an OEM customer.

The charger's CANopen interface complies with the CiA 419 CANopen device profile for chargers. The battery module to be charged supports the CiA 418 CANopen device profile. Both profiles were specified by CAN in Automation (CiA) and its member-companies. If a CANopen profile is implemented, the data of the device is accessible via the CANopen network in a standardized manner. The same CANopen interface can be used for all charger variants independent of the charging technique and the power range. Compliant devices may be integrated into CANopen applications from different manufacturers. Delta-Q has also added manufacturer-specific parameters to allow more control and monitoring functionality than specified in the profiles. By default, the CANopen devices use the following settings. The bit-rate is 125 kbit/s. The charger node-ID is set to 10 and the battery node-ID is set to 1. The PDO (process data object) mapping as defined in CiA 418 and CiA 419 is preset. If required, J1939 protocol can also be supported by those chargers.

In the CANopen network the BMS (battery management system) controls the charging process, and monitors individual cell voltages and temperatures. This monitoring and control prevent overcharging and ensures that the battery cells remain balanced.

Author

Olga Fischer
CAN Newsletter
pr@can-cia.org
www.can-newsletter.org

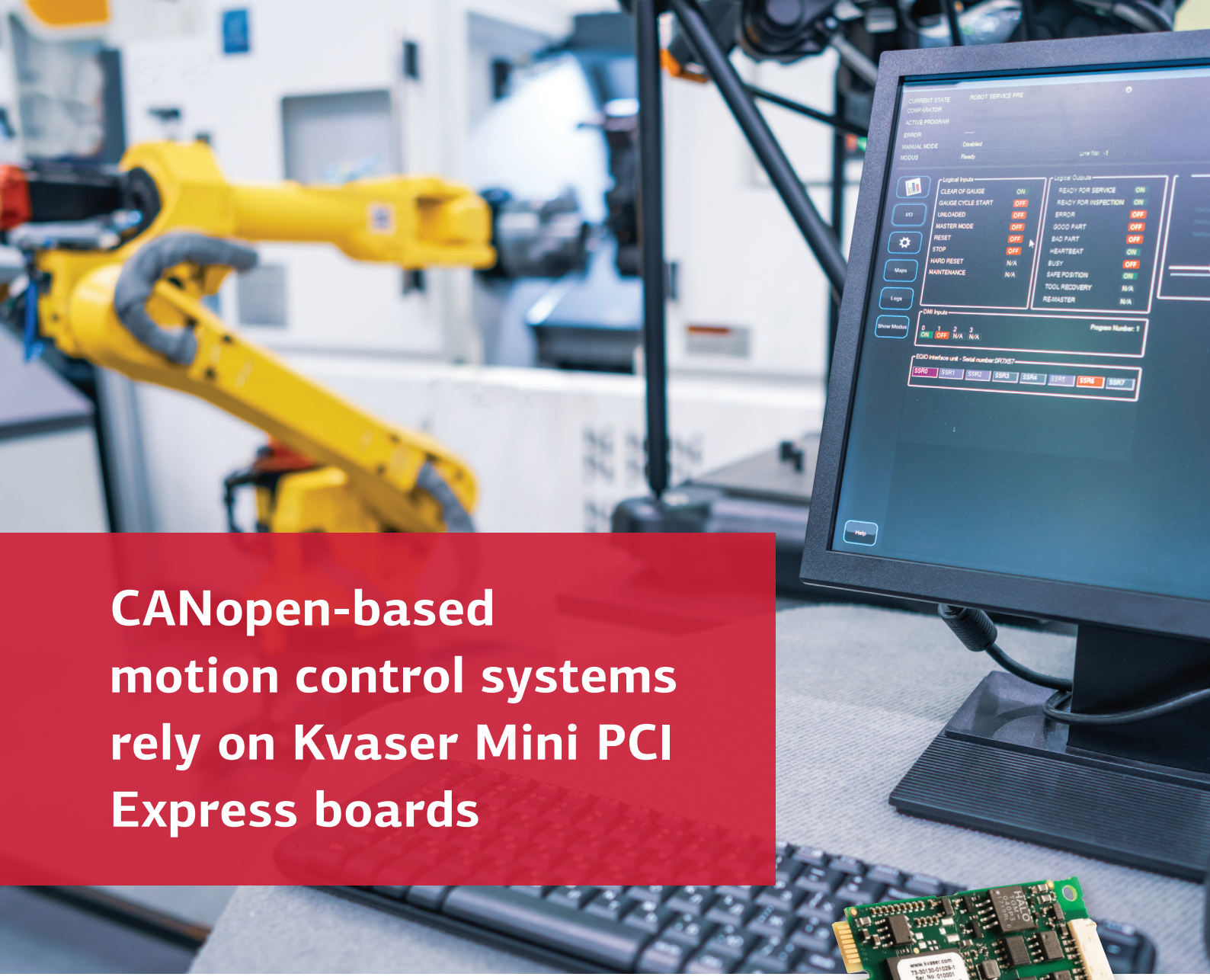
CANopen device profiles for batteries and chargers

The CiA 418 and CiA 419 CANopen device profiles specify the data to be exchanged between a battery module and a battery charger to perform charging. CiA 418 defines the application data to be implemented on the battery module. A compliant battery provides at least the information about the battery type, capacity, number of cells, maximum permissible charge current, and the battery temperature. Additional information may include e.g. the charge history, battery voltage, state-of-charge, requested current, etc. Compliant batteries have to support TPDO 1 (transmit process data object) and RPDO 1 (receive process data object) to exchange mandatory data.

The purpose of the CiA-419-compliant charger is to provide a CiA-418 battery module with the required information to perform charging. The battery status, charger status, and the battery pack temperature is the mandatory information to be implemented. Additionally, the delivered Ampere-hours, battery voltage, requested charge current, state-of-charge values (for battery and charger), etc. can be supported. Via TPDO 1 and RPDO 1 the mandatory information is exchanged. The COB-ID (communication object identifier) parameters of the PDOs are configured dynamically. Therefore, the charger scans the network for a battery by reading the object 1000_h of the connected nodes. If a battery module is detected, the charger reads the configured COB-IDs of the PDOs and assigns these values to its PDOs correspondingly.

Battery modules and chargers compliant to the CANopen device profiles use the communication techniques as specified in the CANopen application layer and communication profile (CiA 301). CiA 301, CiA 418, and CiA 419 can be downloaded free of charge from the CiA's website.

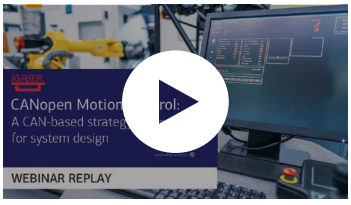
CANopen-based motion control systems rely on Kvaser Mini PCI Express boards



Kvaser Mini PCI Express 2xHS v2

Communicate with and configure your CANopen application securely using Kvaser's CAN interfaces and software from our Technical Associates.

- A true fit-and-forget solution: Swedish-made hardware, with high-performance features and exacting production, ensures long-term reliability.
- Enclosed interfaces or PCI-based boards for embedded networking: the choice is yours.
- A free, universal and forward-compatible API simplifies software integration.
- A global network of technical associates offers expertise in CANopen, CANopen FD, software and system-design.



Watch the Webinar
CANopen Motion Control: A CAN-based strategy for motion control.
Presented by Copley Controls
kvaser.com/canopen

copley controls · Olympus Controls · Actronic Solutions · axis New England New York · Rotalec · Guide Automation

KVASER