

# CAN Newsletter Online

CiA 461 SERIES

## CANopen weighing device profiles

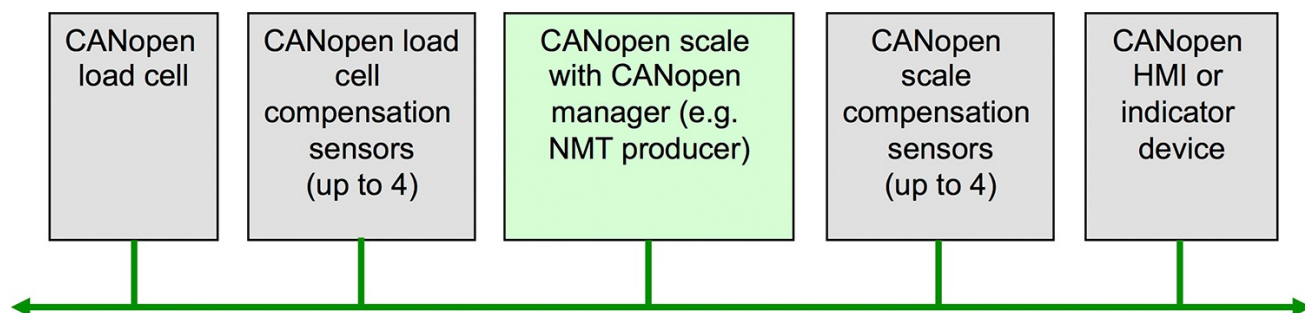
CAN in Automation (CiA) has released version 2.0.0 of the CiA 461 profile specification series. It introduces functional safety and provides legal-for-trade features.



Source: Adobe Stock

The CiA 461 document series comprises four parts specifying the CANopen interfaces of weighing devices. A simple CANopen weighing network consists of load cells, compensation sensors, scales, and HMI (human machine interface) devices or indicators. Such a network can comprise several devices of the same kind (instances). Load cells and scales feature optionally locally or remotely connected compensation sensors. Scales provide optionally locally or remotely connected indicators.

Devices compliant with this profile are suitable for industrial weighing applications. This includes truck scales and weighbridges. On-board weighing devices with CANopen connectivity are specified in the CiA 459 series.



Simple CANopen weighing network: In more complex systems multiple load cell, scale, and indicator devices can be integrated (Source: CiA)

Devices compliant with CiA 461 are controlled and operated by a weighing process control function located in the scale. This entity supports also CANopen manager capabilities (NMT producer, configuration manager, and Heartbeat consumer) to configure, control, and monitor the CANopen network system. If a scale does not provide a weighing controller, a PLC (programmable logic controller) or an industrial PC can provide this functionality.

Version 2.0.0 of CiA 461 series introduces CANopen Safety functions as internationally standardized in EN 50325-5. The documents specify SRDOs (safety-related data objects). They are mapped to two CAN data frames with bit-wise inverted content using different CAN-IDs.

The legal-for-trade (LFT) functions are the same as in the previous version. There are three LFT modes defined for the load cell, the scale, and the HMI devices. Of course, the devices need to meet additionally the requirements of the national authorities responsible for legal metrology. The profile specification also specifies data integrity and authentication functionality.

The weighing controller residing in a scale or a PLC, writes the same Trivium key to all devices in the weighing network before sealing it in a secure environment, therefore no further authentication is required after the weighing system is sealed. The weighing controller writes an initial value to initiate the data exchange procedure. This happens at the start of the communication between participants or in case, the weighing data integrity has failed. An initial value reception by the weighing device initiates the

encryption of the weighing data. The weighing controller requests process data by means of the SDO segmented or block transfer service. This data is transmitted encrypted. The weighing device can request compensation, which is also encrypted.

[hz](#)