CiA Draft Standard Proposal 420

Profiles for Extruder Downstream Devices

Part 1: General definitions

This is a draft standard proposal and may be changed without notification

Version 1.0
22 October 2002

HISTORY

Date	Changes
22/10/2002	First public release

CONTENTS

1 Scope

The CANopen profiles for extruder downstream devices include several parts:

Part 1 describes general definitions
Part 2 defines the device profile for a puller downstream device
Part 3 defines the device profile for a corrugator downstream device
Part 4 defines the device profile for a saw downstream device

All parts of this specification have been developed jointly with the European Committee of Machinery Manufacturers for the Plastics and Rubber Industries (Euromap).

Devices compliant to these profiles use communication techniques, which conforms to those described in the CANopen communication profile (CiA Draft Standard DS-301). In addition, extruder downstream devices may use communication techniques, which conform to those described in the framework for programmable CANopen Devices (CiA Draft Standard Proposal DSP-302). These specifications should be consulted in parallel to these device profile specifications.

2 Normative references

/1/: ISO 11898, Road vehicles – Interchange of digital information – Controller area network (CAN), November 1993.

/2/: CiA DS 301 V4.02, CANopen application layer and communication profile, June 2002.

/3/ CiA DRP 303-1 V1.11, CANopen cabling and connector pin assignment, December 2001.

/4/ CiA DSP 302 V3.1.2, Framework for programmable CANopen devices, June 2002

/5/ Euromap 66-1 V1.1, Protocol for communication with peripheral equipment, General description, July 2002.

3 Acronyms and abbreviations

CAN

Controller Area Network. Data link layer protocol for serial communication as specified in ISO 11898-1 (1999).

COB

Communication Object, which is made of one or more CAN frames. Any information transmitted via CANopen has to be mapped into COBs.

COB-ID

COB-Identifier. Identifies a COB uniquely in a CAN network. The identifier determines the priority of that COB in the data link layer, too.

RPDO

Receive Process Data Object. Communication object of a device, which contains output data.

SDO

Service Data Object. Peer-to-peer communication with access to the Object Dictionary of a CANopen device.

TPDO

Transmit Process Data Object. Communication object of a device, which contains input data.

4 Definitions and operating principles

4.1 General definitions

The extruder downstream devices compliant with this specification shall provide CANopen NMT-slave functionality; the extruder shall provide CANopen NMT-master functionality. It is not allowed to use this CANopen network for local sub-system communication purposes.

4.2 Extruder downstream device definitions

4.2.1 Puller device

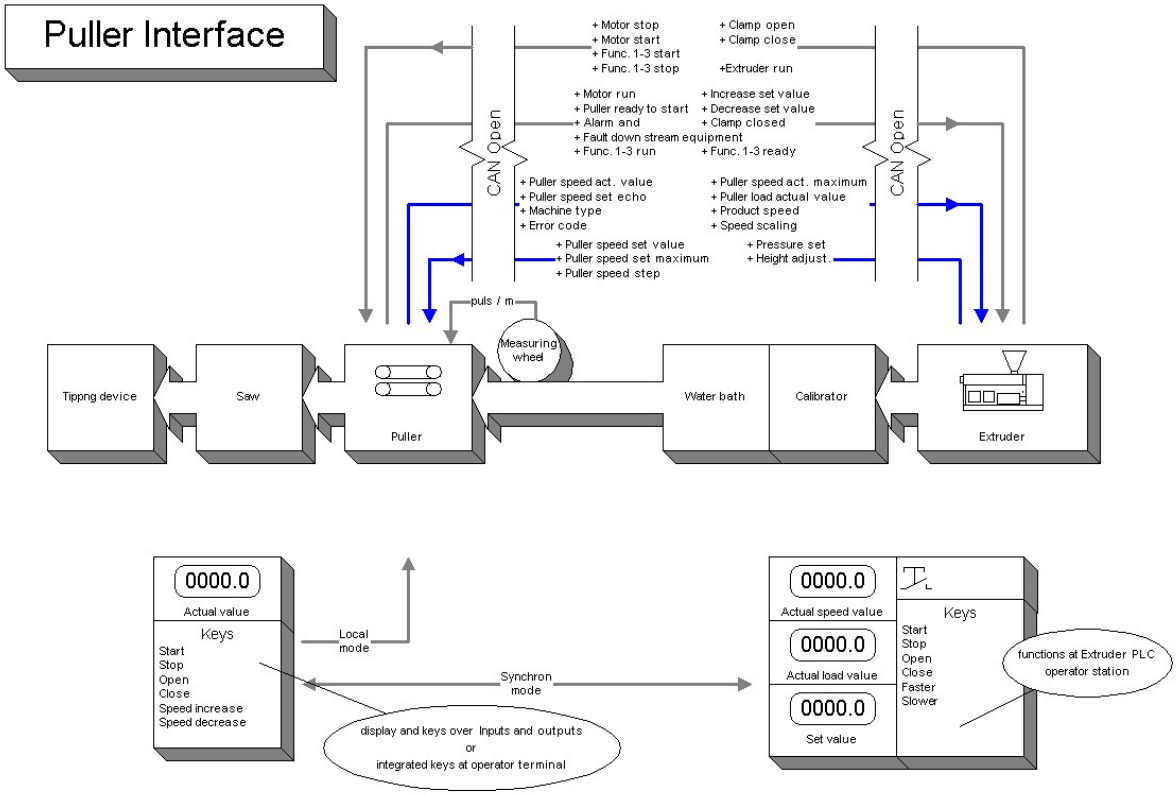

Fig. 1: Puller and extruder block diagram

4.2.2 Corrugator device

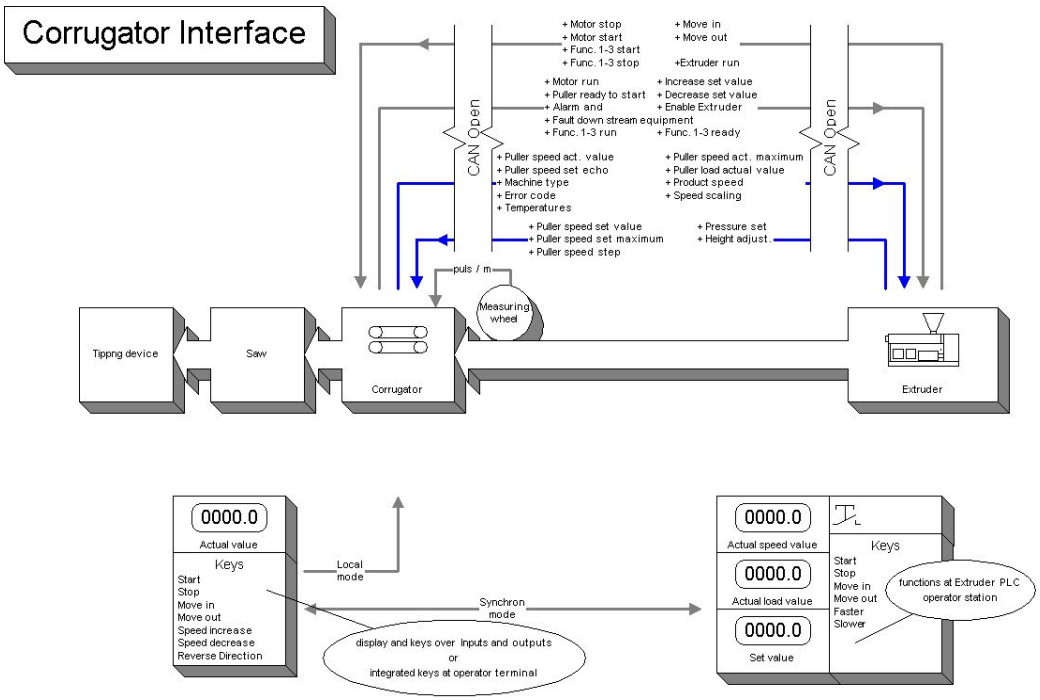

Fig. 2: Corrugator and extruder block diagram

4.2.3 Saw device

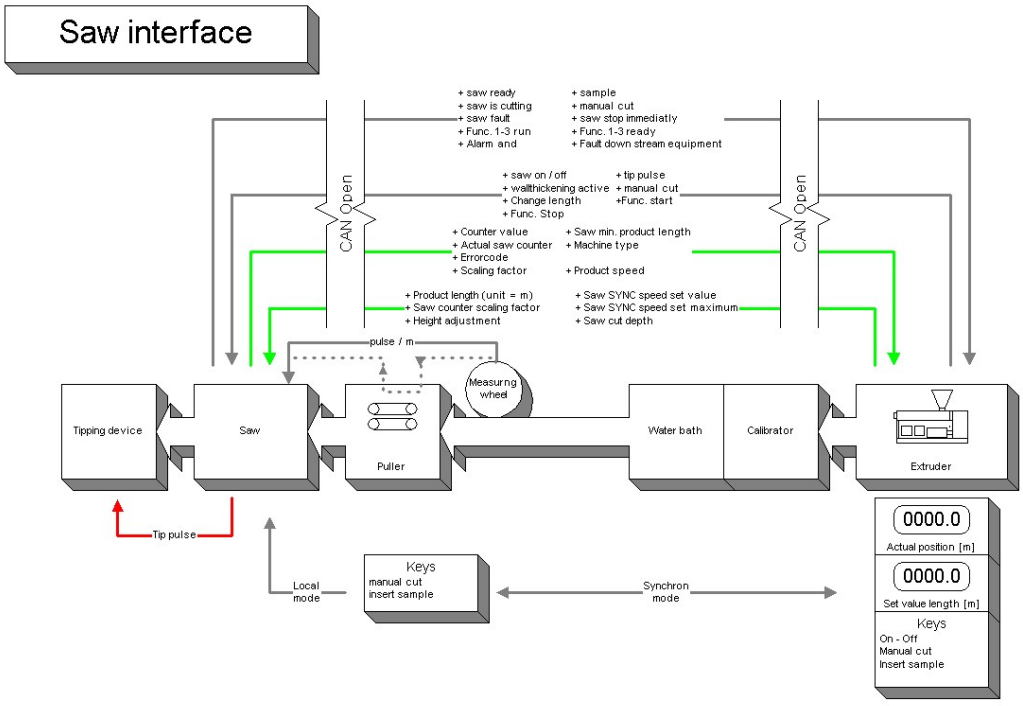

Fig. 3: Saw and extruder block diagram

4.3 Physical layer definitions

4.3.1 Hardware adjustments

Baud-rates and node-ID shall be adjustable from outside via DIP-switches or local operator stations, adjustments via CANopen or programming tools are not allowed. The default baud-rate shall be 250 kbit/s, optional baud-rates are 125 kbit/s and 500 kbit/s. The maximum network length is specified in /2/.

4.3.2 Node-ID range

The node-ID range shall be 1 to 64 and may be optionally enhanced to 128.

4.3.3 Termination resistor

The default termination resistor shall be 120 Ohm.

4.3.4 Cable definition

The used cables shall be compliant to Euromap 66-1 (see chapter 3.1). The schematic connection order of the devices shall be as shown in figure 4.

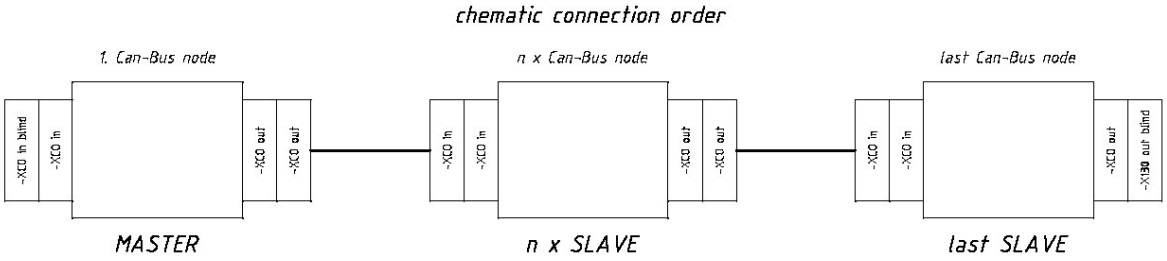

Fig. 4: Schematic connection order of master and slave devices

4.3.5 Connector definition

The Han Quintax connector from Harting or a compatible connector shall be used. The pinning shall be as shown in figure 5.

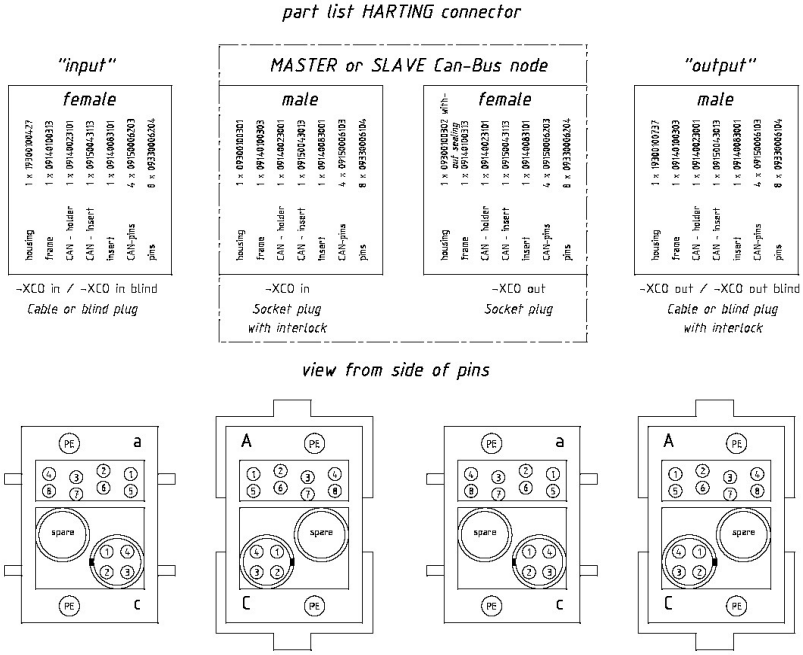

Fig. 5: Pinning of the male and female connector

4.3.6 Emergency-stop wiring

The emergency-stop wiring shall be as shown in figure 6.

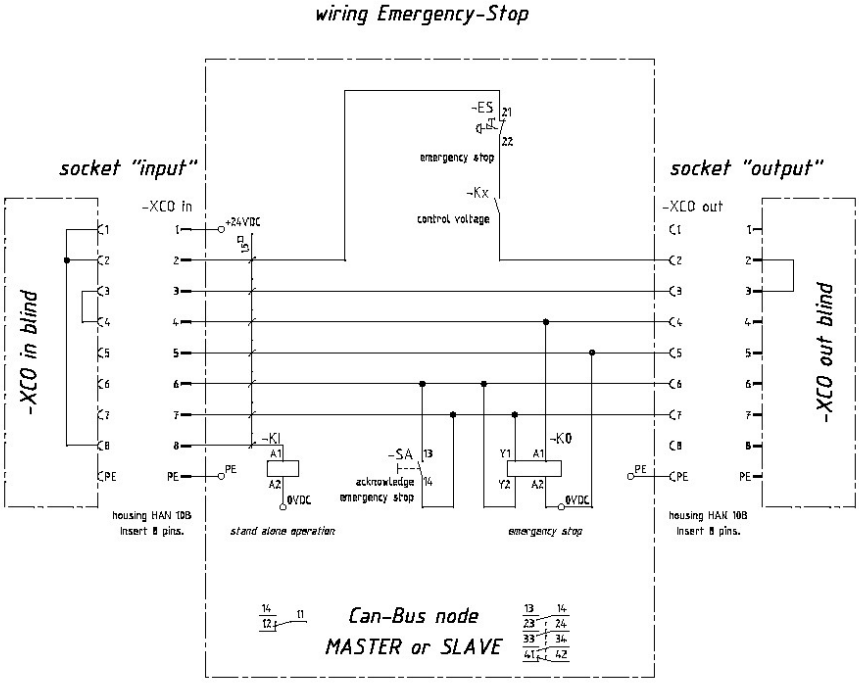

Fig 6: Emergency-stop wiring

4.4 General CANopen definitions

4.4.1 Mandatory CANopen functions

All devices compliant to this specification shall support Heartbeat, Node Guarding shall not be supported. Emergency messages shall be supported; the extruder controller shall process all transmitted Emergency messages. All CANopen messages shall be transmitted with 11-bit identifiers only.
The extruder controller shall support the default Sync telegram with a default period of 20 ms, periods of 40 ms and of 100 ms may be optionally supported.
It is not required that the extruder downstream devices support block or segmented SDO communication or Multiplexed PDO communication.

5 Error handling

5.1 Principle

Emergency Messages shall be triggered by internal errors in the device and they are assigned the highest possible priority to ensure that they get access to the bus without latency. By default, the Emergency Messages shall contain the error field with pre-defined error numbers and additional information.

5.2 Error behavior

If a severe device failure is detected the module shall enter by default autonomously the pre-operational state. If object 1029_h is implemented, the device can be configured to enter alternatively the stopped state or remain in the current state in case of a device failure. Device failures shall include the following communication errors:

- Bus-off conditions of the CAN interface
- Life guarding event with the state ‘occurred’
- Heartbeat event with state ‘occurred’

Severe device errors also can be caused by device internal failures.

5.3 Additional error code meanings

Devices compliant to these profile specifications may use the following error codes:

Error Code	Meaning
$FF10_h$	Internal puller error
$FF20_h$	Internal corrugator error
$FF30_h$	Internal saw error

6 Predefinitions

6.1 Predefined communication objects

6.1.1 Object 1000_h: Device Type

This object describes the type of device and its functionality. For multiple device modules the Additional Information parameter shall contain $FFFF_h$. In this case, the object $67FF_h$ shall be implemented.

MSB			LSB
Additional Information		**General Information**	
Specific functions	*Device class*	*Device Profile Number*	
31 24	23 16	15	0

General Information:

Device Profile Number: 420_d

Additional Information:

Device class:

Code	Function
0_h	reserved
1_h	Puller
2_h	Corrugator
3_h	Saw
4_h to FE_h	reserved

Specific functions for puller devices:

Code	Function
0_h to FE_h	reserved

Specific functions for corrugator devices:

Code	Function
0_h to FE_h	reserved

Specific functions for saw devices:

Code	Function
0_h to FE_h	reserved

6.1.2 Object 1001_h: Error register

The device-specific bit in the error register object is reserved for future use.

6.1.3 Object 1029_h: Error behavior

This object specifies to which state the device shall be set, when a communication error or a device-internal error is detected.

0 = pre-operational (only if current state is operational)
1 = no state change
2 = stopped

Object Description

INDEX	1029_h
Name	Error_behavior
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	0_h
Description	Number_of_error_classes
Access	ro
Entry Category	Mandatory
PDO Mapping	No
Value Range	1_h to 2_h
Default Value	No

Sub-Index	1_h
Description	Communication_error
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	0_h to 2_h
Default Value	0_h

Sub-Index	2_h
Description	Internal_device_error
Access	rw
Entry Category	Mandatory
PDO Mapping	No
Value Range	0_h to 2_h
Default Value	0_h

6.1.4 Object $67FF_h$: Device type

This objects shall describe the first virtual device in a multiple device module according to /2/.