Machinekit & CANopen

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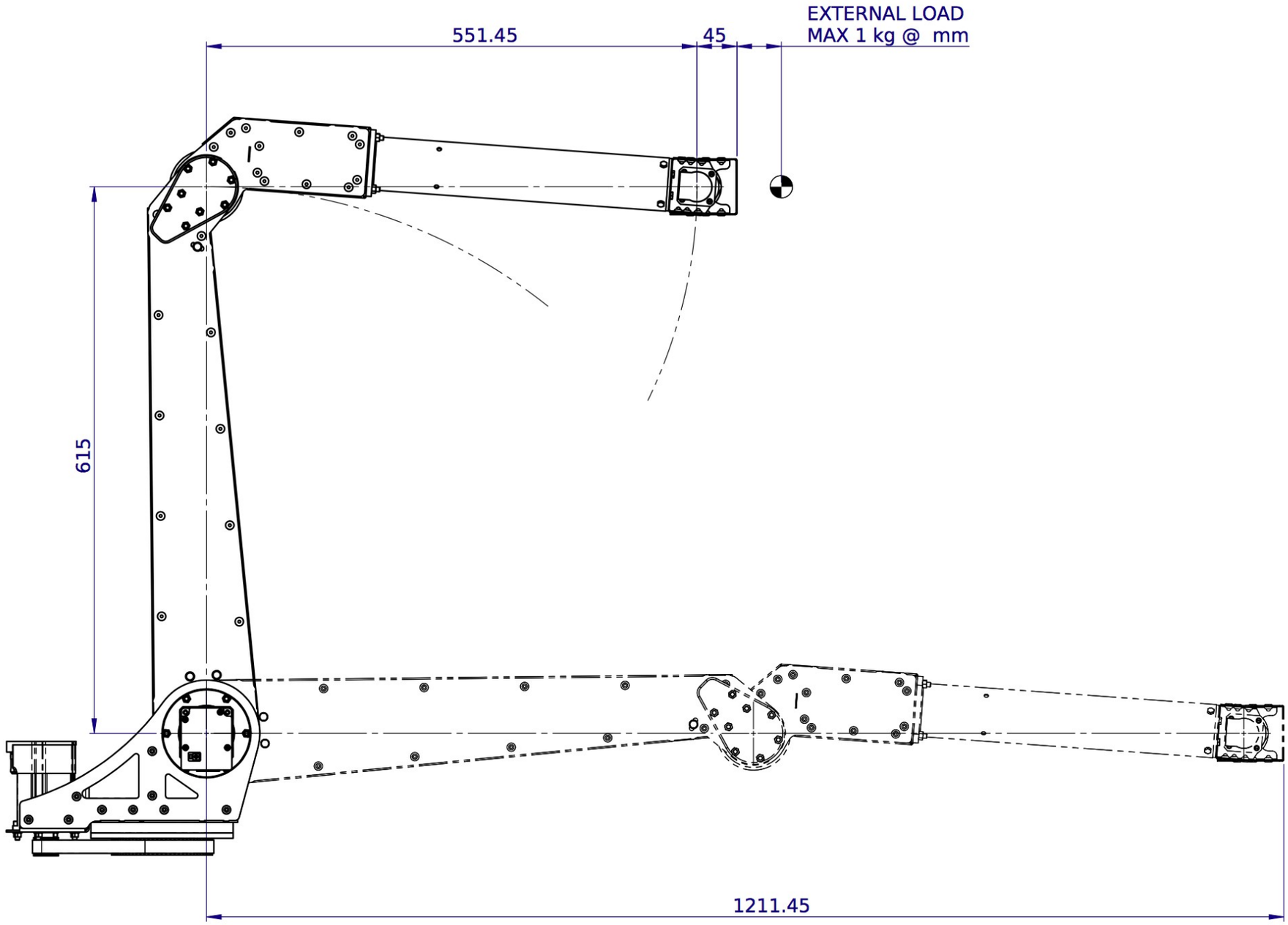
Machinekit
Moves. Controls. Things.

Summary

- Introduction
- Matilda
- CANopen
  - Some general remarks
  - Focus on messages, the PDO's
- Demo

Matilda



Matilda (ctd)

- 1200 mm reach (horizontal pose)
- 1 kg payload at effector
- Joint speed max 90° s^{-1} when extended
- 5 DOF
- 5 CANopen motors with Gearbox

CANopen

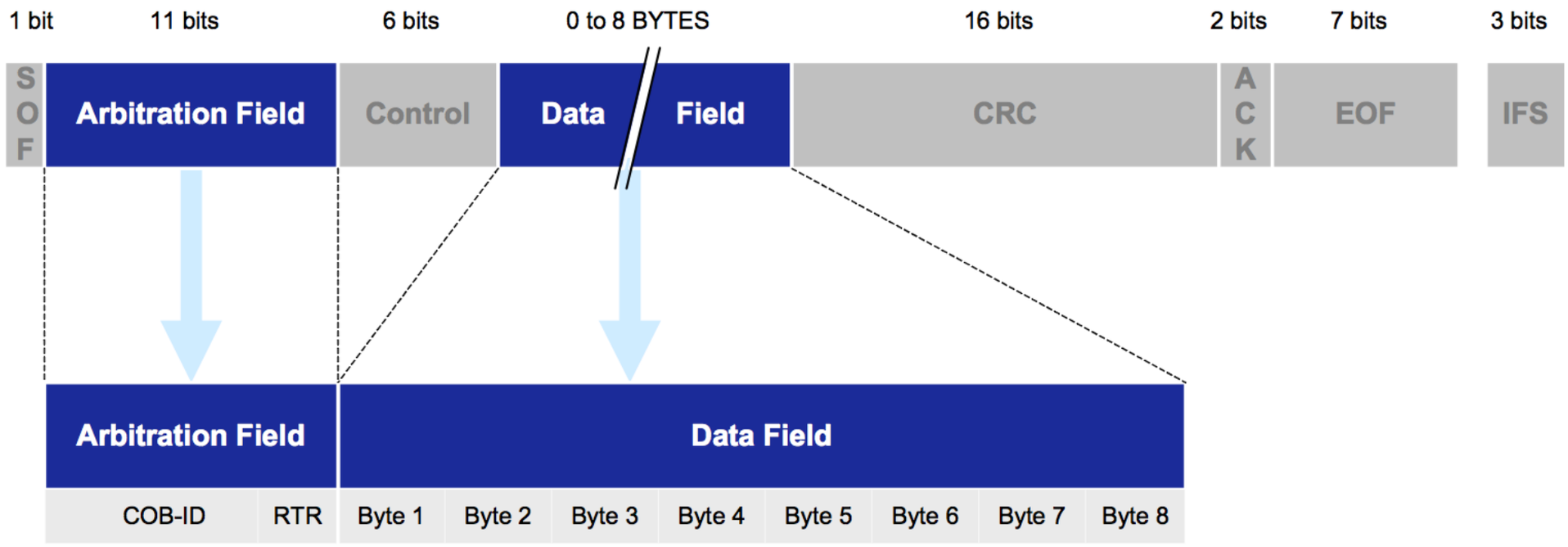
- Different device profiles
  - 301 generic interface of logic device
  - 401 generic I/O modules
  - 402 motion controllers and drives

- Registers (Object Dictionary)

- State machines

- Messages (the relevant ones for us)
  - OD (object dictionary) → initialising device
  - SDO (service data object) → set OD registers
  - PDO (process data object) → transfer data

CANopen: Messages



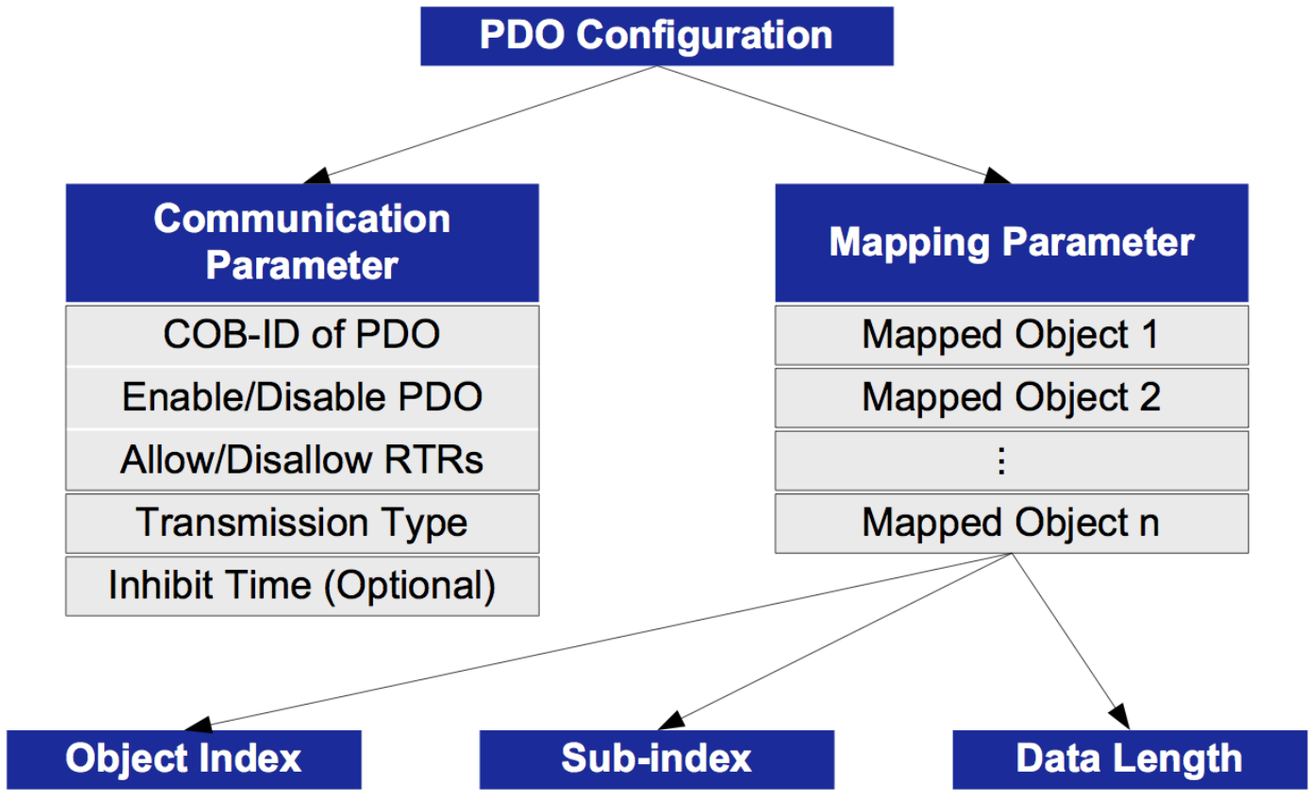
COB-ID is the message “type”, i.e. 000 is an NMT message, 185 is TPDO1 from node '5'

DATA contains specific content of that message.

Source: CANopen COMMUNICATION MANUAL, Advanced Motion Controls

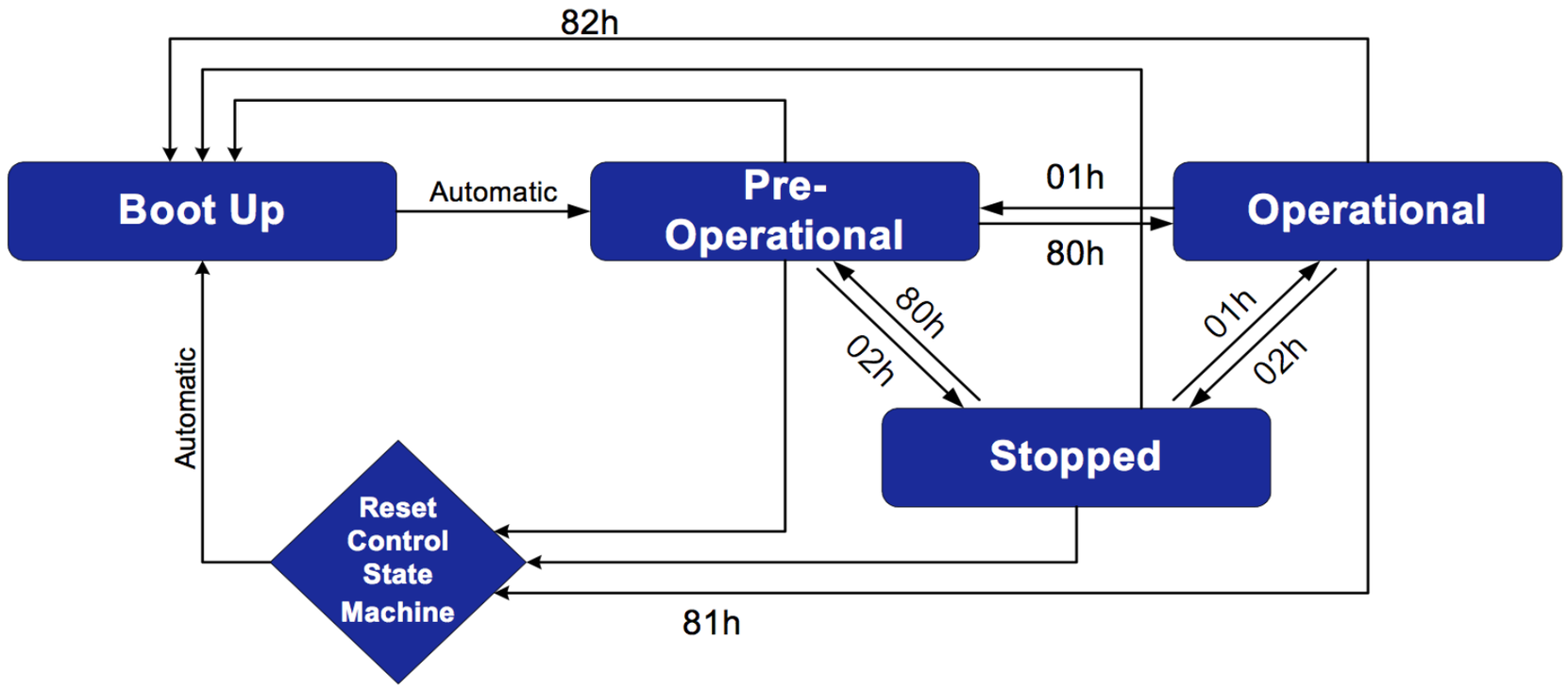
CANopen: SDO & PDO

OD	(object dictionary)	→	initialising device
SDO	(service data object)	→	set OD registers
PDO	(process data object)	→	transfer data



Source: CANopen COMMUNICATION MANUAL, Advanced Motion Controls

CANopen: NMT state machine



Message (sent by node) : 705#00 is the boot-up message from node {5}

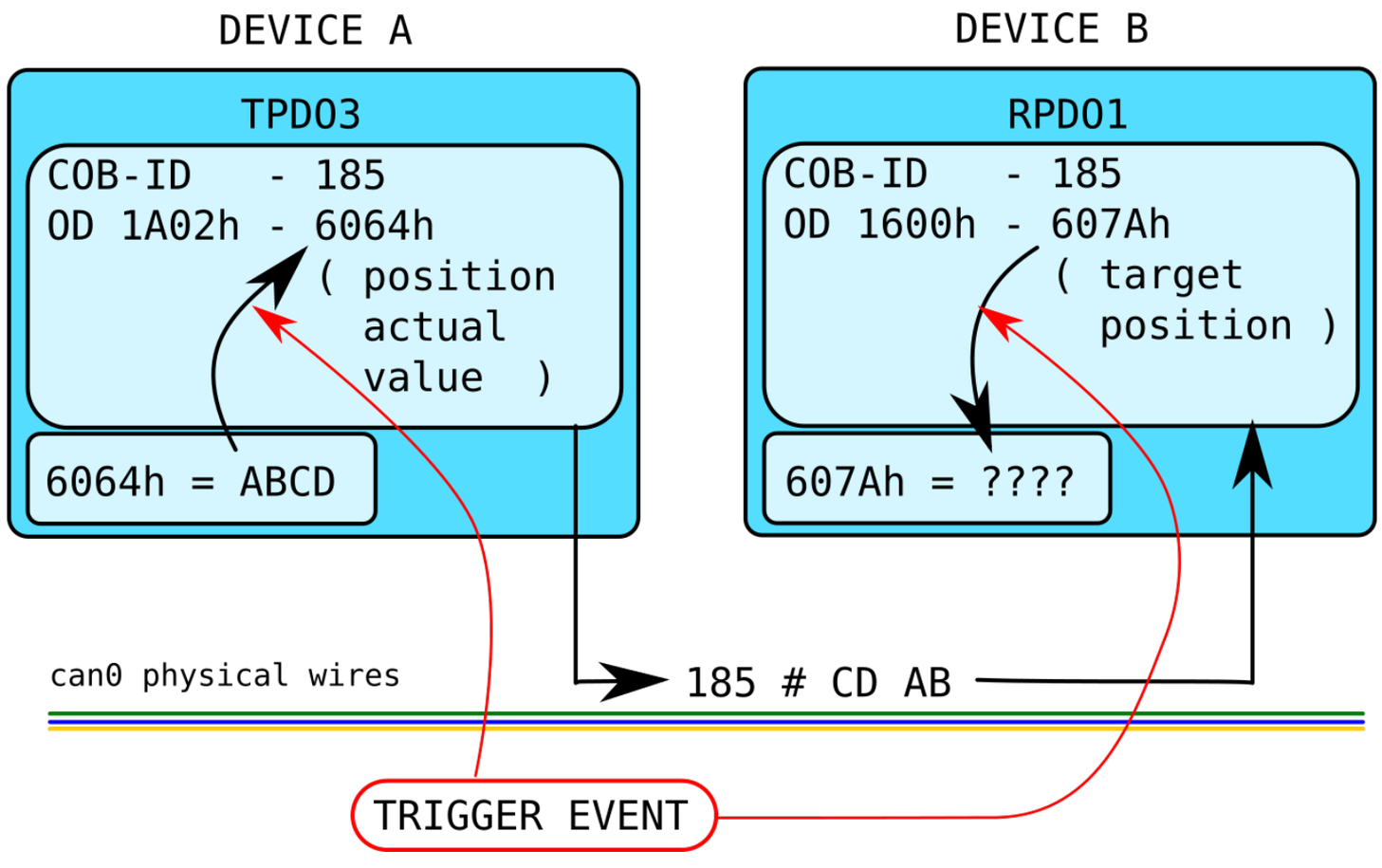
Message (send by NMT) : 000#01 05 device {5} : “pre-operational” → “operational”

Source: CANopen COMMUNICATION MANUAL, Advanced Motion Controls

CANopen: PDO configuration example

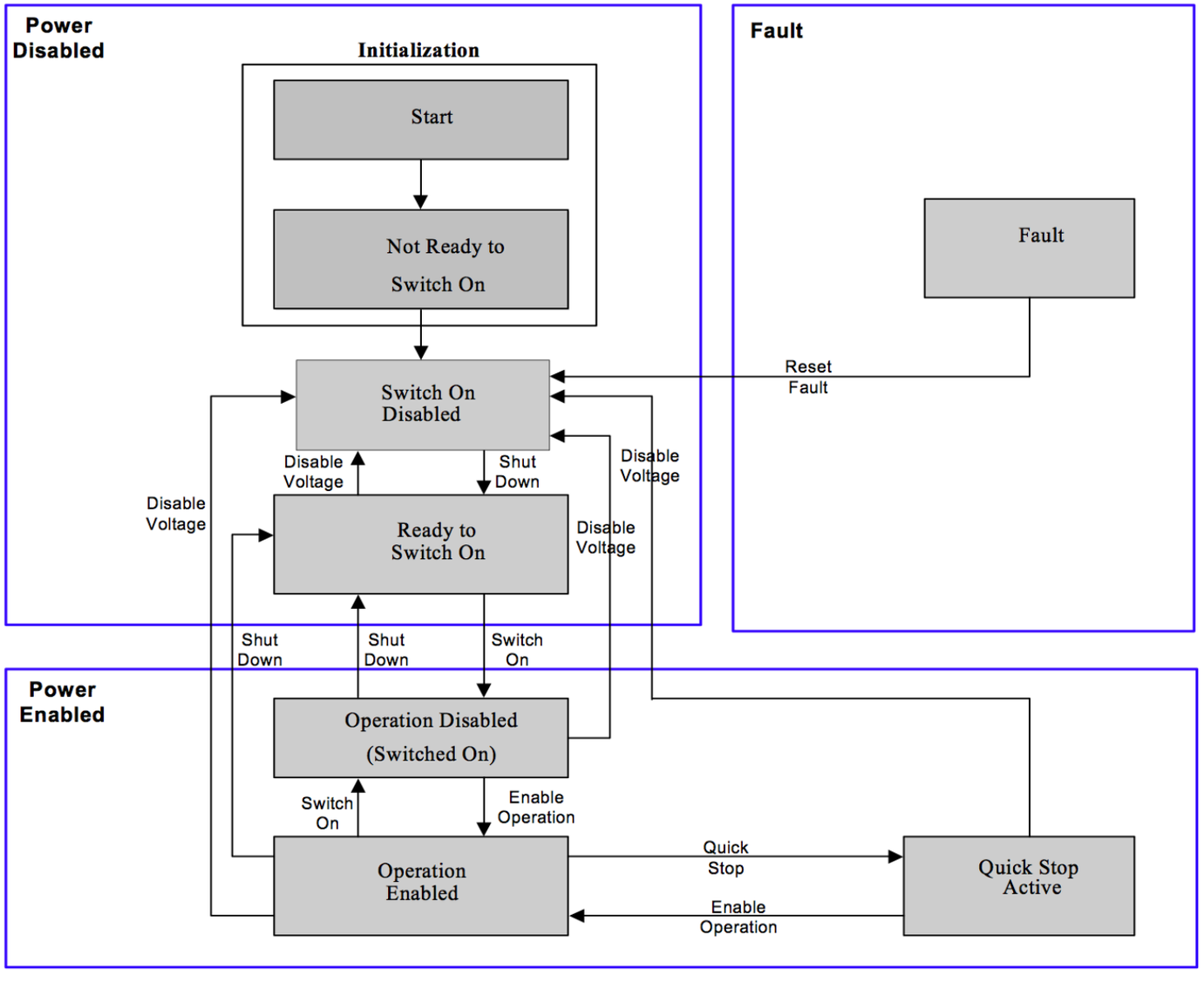
TPDO 3 setup:			
INDEX	**SUBINDEX**	**VALUE**	**DESCRIPTION**
communication parameters			
1802h	0	2	nr of entries
1802h	1	385	`COB-id` to listen to
1802h	2	0	trigger type (SYNC) synchronous (depends on hardware)
1802h	3	-	inhibit time
1802h	4	-	reserved, legacy value, do not use
1802h	5	-	event time
mapping parameters			
1A02h	0	2	2 mapped value
1A02h	1	6064 00 20	OD 6064, sub 0, position actual value, u32
1A02h	2	6041 00 06	OD 6041, sub 0, DS402 status word, u16

CANopen: PDO setup example



Disclaimer: I have not done this setup myself yet.

CANopen: Control state machine



Changing states is done by setting correct values in the control word 6040h

Source: CANopen COMMUNICATION MANUAL, Advanced Motion Controls

CANopen: DEMO

Questions?