

CiA 402 Statusword & Controlword: Bit Reference

Objects 0x6041 and 0x6040 · IEC 61800-7-201 / 61800-7-301 · CiA 402-2:2021

Statusword (0x6041, drive → master)

BIT	MASK	NAME	MEANING
0	0x0001	Ready to Switch On RTS0	DC bus ready. Set in Ready to Switch On, Switched On, Operation Enabled, Quick Stop Active.
1	0x0002	Switched On S0	Power stage on. Set in Switched On, Operation Enabled, Quick Stop Active.
2	0x0004	Operation Enabled OE	PWM modulating, motor under control. Set in Operation Enabled and Quick Stop Active only.
3	0x0008	Fault F	Drive in Fault or Fault Reaction Active. Read 0x603F for the fault code.
4	0x0010	Voltage Enabled VE	High voltage (DC bus) present and OK.
5	0x0020	Quick Stop QS	Active-low: 1 = no quick stop, 0 = quick stop commanded. Inverted by spec.
6	0x0040	Switch On Disabled SOD	Drive disabled. Set only in Switch On Disabled state.
7	0x0080	Warning W	Vendor-defined warning. No state change. Check vendor warning register.
8	0x0100	Manufacturer Specific MS	Vendor-defined. Yaskawa: brake. Beckhoff: motion active. Elmo: motor-on.
9	0x0200	Remote REM	Fieldbus controlword is being processed. 0 = drive on local/keypad control.
10	0x0400	Target Reached TR	Setpoint reached within window. Meaning depends on mode (PP/PV/HM/CS*).
11	0x0800	Internal Limit Active ILA	Setpoint clamped by software position, torque, or velocity limit.
12	0x1000	Operation Mode Specific OMS1	PP: Setpoint Ack. HM: Homing Attained. IP: IP active. CS*: Drive follows command.
13	0x2000	Operation Mode Specific OMS2	PP/CSP: Following Error. PV: Max Slippage. HM: Homing Error.
14	0x4000	Manufacturer Specific MS2	Vendor-defined. Commonly: AKD brake, Yaskawa tuning, Beckhoff TxPDO toggle.
15	0x8000	Manufacturer Specific MS3	Vendor-defined. Commonly: STO status, warning-latched, homing subphase.

Controlword (0x6040, master → drive)

BIT	MASK	NAME	MEANING
0	0x0001	Switch On S0	Part of the core transition pattern (SO+EV+QS+EO).
1	0x0002	Enable Voltage EV	Must be 1 to leave Switch On Disabled. 0 = Disable Voltage (coast).
2	0x0004	Quick Stop QS	Active-low: 0 commands Quick Stop, 1 means no quick stop.
3	0x0008	Enable Operation EO	Must be 1 together with SO+EV+QS to reach Operation Enabled.
4	0x0010	Operation Mode Specific OMS1	PP: New Setpoint (rising edge). HM: Start Homing. IP: Enable Interpolation.
5	0x0020	Operation Mode Specific OMS2	PP: Change Set Immediately (1 = abort current, 0 = buffer).
6	0x0040	Operation Mode Specific OMS3	PP: Absolute / Relative (0 = absolute, 1 = relative target).

BIT	MASK	NAME	MEANING
7	0x0080	Fault Reset FR	Edge-triggered 0→1. Clears Fault if cause removed. Do not hold high.
8	0x0100	Halt H	Stops motion per 0x605D without leaving Operation Enabled.
9	0x0200	Operation Mode Specific OMS4	PP: Change on Setpoint. Other modes: reserved.
10	0x0400	Reserved R	Shall be 0 per the CiA 402 profile.
11	0x0800	Manufacturer Specific MS1	Vendor-defined. EPOS4: endless movement toggle. Copley: input shaping.
12	0x1000	Manufacturer Specific MS2	Vendor-defined.
13	0x2000	Manufacturer Specific MS3	Vendor-defined.
14	0x4000	Manufacturer Specific MS4	Vendor-defined.
15	0x8000	Manufacturer Specific MS5	Vendor-defined.

States: mask, value, and the controlword that gets you there

Identify a state by masking the statusword and comparing: (statusword & mask) == value. The typical column is what a real drive usually reports, with bits 9 (Remote) and 4 (Voltage Enabled) set on top of the canonical pattern.

STATE	MASK	VALUE	TYPICAL	CONTROLWORD	NEXT STEP
Not Ready to Switch On	0x004F	0x0000	0x0000	–	Automatic state at power-up. Cannot be entered or exited by command.
Switch On Disabled	0x004F	0x0040	0x0250	0x0000	Send 0x0006 (Shutdown) to move to Ready to Switch On.
Ready to Switch On	0x006F	0x0021	0x0231	0x0006	Send 0x0007 (Switch On) to close the output stage.
Switched On	0x006F	0x0023	0x0233	0x0007	Send 0x000F (Enable Operation) to start motion control.
Operation Enabled	0x006F	0x0027	0x0237	0x000F	Running state. Send motion setpoints. Halt = 0x010F. Disable = 0x0007.
Quick Stop Active	0x006F	0x0007	0x0217	0x0002	Enter from Operation Enabled with CW bit 2 = 0 (typically 0x0002).
Fault Reaction Active	0x004F	0x000F	0x021F	–	Internal transition. Cannot be commanded. Auto-advances to Fault.
Fault	0x004F	0x0008	0x0218	0x0080	Clear with a rising edge on CW bit 7 (send 0x0080, then 0x0000 or 0x0006).

Startup sequence

CONTROLWORD	COMMAND	DRIVE ENDS UP IN
0x0006	Shutdown	Ready to Switch On
0x0007	Switch On	Switched On: output stage closed, zero-current hold
0x000F	Enable Operation	Operation Enabled: motion commands accepted
0x0002	Quick Stop	Quick Stop Active
0x0080	Fault Reset	Switch On Disabled, on the rising edge of bit 7 only

Bit 5 of both words is **active-low by spec**: controlword bit 2 = 0 commands Quick Stop, and statusword bit 5 = 1 means no quick stop is active. A disconnected master therefore commands a safe stop. Bits 10–15 of the statusword and 4–9 of the controlword are mode-specific; their meaning depends on 0x6060. Manufacturers may deviate; check the drive manual before trusting bits 8, 11 and 14–15.

Generated from the same data that drives the interactive decoder at motionconvert.com/statusword/. Paste a captured value there to decode it bit by bit. MotionConvert 1.3.4.