# AKD2G EtherCAT Troubleshooting List

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This list is provided to expedite the troubleshooting process by efficiently gathering system data required to troubleshoot common EtherCAT issues such as scaling, PDO mapping, SDO errors, and cycle timing.

- 1. What is the ECAT master?
- 2. DRV.INFO (for each drive on the network)
  - Includes: Drive model number
  - Includes: Drive Firmware version
- 3. Revision of ESI file currently being used.
  - ESI file name, as provided by Kollmorgen,-
  - Or revision number listed in the xml file under Descriptions / Devices / Device / Type / RevisionNo



- 4. Revision of Workbench
- 5. Does the issue occur when running the same profile with Workbench (without EtherCAT control)?
  - Unplug EtherCAT cable and reboot the drive.

- 6. Master startup script and PDO mappings
- 7. Mode of Operation used (object 6060h)
  - If object 6060h is not set, it will use the default value of 8 Cyclic Synchronous Position Mode.
  - Or read object 6061h
- 8. Object numbers related to the problem
  - Are they used over SDO or PDO?
- 9. EtherCAT master's ECAT update rate.
- 10. Is Distributed Clocks (DC) enabled in master?
- 11. Save new \*.akd parameter files.
- 12. Read-only parameters read in Workbench Terminal
  - ECAT.INFO
    - Diagnostics Report
  - ECAT.STATE
    - Reads the state of the EtherCAT state machine.
    - Read this or scope this while replicating the problem
  - ECAT.PLLSTATE
    - Reads the state of the PPL
  - ECAT.INPUTSHIFT
    - Reads time offset of PLL.
    - Note: Only valid in OP state.
- 13. Parameters of special interest saved in parameter file
  - Related to scaling
    - CANOPEN.WORKBENCHUNITS
    - AXIS#.CANOPEN.FCPRIMARY.FEED
    - AXIS#.CANOPEN.FCPRIMARY.SHAFTREV
    - AXIS#.CANOPEN.GEARPRIMARY.MOTORREV
    - AXIS#.CANOPEN.GEARPRIMARY.SHAFTREV
    - AXIS#.CANOPEN.VELSCALENUM
    - AXIS#.CANOPEN.VELSCALEDENOM
    - AXIS#.CANOPEN.PSCALE

- Related to PLL and cycle timing
  - ECAT.PLLMODE
  - ECAT.USEPLL
  - ECAT.ENRXWARN
  - ECAT.INPUTSHIFTU
  - ECAT.PLLOFFSET

## 14. Objects of Special Interest – used in the EtherCAT Master

- 6060h mode of operation
- 6061h read mode of operation
- 6040h controlword
- 6041h statusword
- 6091h subindex 1 gear ratio numerator
- 6091h subindex 2 gear ratio denominator
- 6092h subindex 1 feed constant numerator
- 6092h subindex 2 feed constant denominator
- 6096h subindex 1 velocity factor numerator
- 6096h subindex 2 velocity factor denominator

## 15. Scope plots

- CSV format is needed, so it can be analyzed in the Workbench scope tool.
- Images (.bmp or .jpg) are useful when several scope plots need to be opened at the same time for quick comparison (just make sure the image shows the pertinent information).

#### **General Motion:**

- AXIS#.IL.FB
- AXIS#.VL.FB
- AXIS#.VL.CMD
- AXIS#.PL.ERR
- AXIS#.PL.FB

## **EtherCAT State:**

- ECAT.STATE
- AXIS#.CANOPEN.CONTROLWORD
- AXIS#.CANOPEN.STATUSWORD

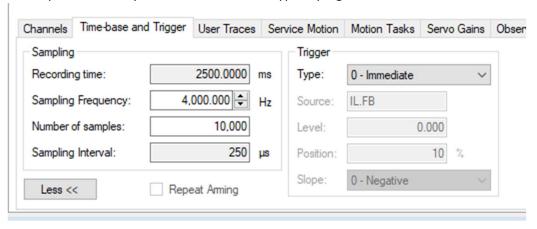
## **EtherCAT PLL and Cycle Timing:** (use 16kHz sample rate)

- ECAT.SYNCOTIME
- ECAT.RXDONETIME
- ECAT.POSLOOPTIME
- ECAT.TXDONETIME
- ECAT.PLLSTATE

### **Scope Sample Rate:**

Depending on the ECAT update rate the Scope Time-Base and Trigger tab will need to be setup such that the Scope is sampled fast enough to capture the issue.

In this example the ECAT update rate was 500usec, so the Sampling Frequency was adjusted such that the Sampling Interval was 250usec. The setup goal should be such that the Sampling Interval is at least at the EtherCAT fieldbus rate or faster. The number of samples can be any number but 10,000 is typically a good value.



#### 16. Wireshark

 A Wireshark capture is sometimes needed to determine the sequence and timing of events.