Status indications

Normally, when the system is healthy, relay K1 inside the CUBI(x) is energised, and two Status LEDs will be blinking at a rate of one Hz (i.e., 0.5-second on and a 0.5-second off).

On detection of an error or failure, the CUBI is switching relay K1 off and is showing an error code. The error indication uses the two LEDs that are situated between the D-Sub connectors. The Status LED #1 (on the left side) is showing CAN-bus failures and power related errors. The Status LED #2 (on the right side) signals failures of sensors and actuators.

The error indication sequence is starting with the corresponding Status LED being illuminated for two seconds. Next, two series of pulses are started which are separated by a dead time of one second. Each of these pulses has a duration of 0.5 seconds. This is ended by a pause of two seconds after which the error indication sequence is started again. In case that multiple errors are detected, the various errors will be signalled after each other in the same order as shown in the list below.

Status LED #1 (on the left side)

1st	2nd	Detected error / failure	Required action
1	1	24V power supply too low	Measure the 24VDC power supply
1	2	24V power supply too high	Measure the 24VDC power supply
2	1	Fuse F2 tripped (motor supply circuit)	Motor coils short circuited, check cable X5
2	2	Fuse F3 tripped (lamp supply circuit)	Lamp short circuited, check cable X6
2	3	Fuse F4 tripped (serial bus)	External overload, check cable X7
2	4	Motor controller charge pump stopped	Motor driver overloaded, check cable X5
2	5	Temperature too high	Let stepper motor controller cool down
2	6	5V logic supply voltage out of range	Check the sensor ref. voltage (5VDC)
2	7	Sensor reference voltage out of range	Check the sensor ref. voltage (5VDC)
2	8	2.6V Core voltage out of range	Contact the supplier
3	1	CAN communication errors on bus #1	Check the CAN-bus #1 connections
3	2	CAN communication errors on bus #2	Check the CAN-bus #2 connections
4	1	CRC error program memory (Flash)	Contact the supplier
4	2	CRC error EEPROM memory	Contact the supplier
4	3	CRC error back up EEPROM memory	Contact the supplier

Status LED #2 (on the right side)

1st	2nd	Detected error / failure	Required action
1	N	Sensor error (N is the sensor number)	Check sensor supply and signals
2	N	Actuator error (N is the actuator	Check mechanical blockage of levers
3	N	Only applicable in stand-alone ELAS-5 systems	Contact the supplier / Kwant Controls
4	N		

Bus termination

The on-board sliding switches S1 and S2 can be used to terminate the CAN-bus #1 and #2 (respectively) with an internal resistor of 121 Ohms. To do this, the actuator of the corresponding slide switch is moved to the lower position (i.e. towards the edge of the board).

DIP-switch settings

The required DIP-switch settings depend on the application and the position. The settings can be found on the wiring - or cable diagram.

Warning: if the DIP-switches are not in the correct position, then the system is likely to malfunction.

The DIP-switches are pre-setting the desired system settings and the Node-ID as shown in the next table. The DIP-switches are read only once during power up or after a reset.

DIP switch Function ('0'= switch down / '1'= switch up)	
1	'0'= System halted / '1'= System running
2	'0'= Write protect EEPROM / '1'= No write protection of the EEPROM
3	'0'= Configuration from EEPROM / '1'= Configuration from Flash memory
4	Reserved for future use, application specific, do not change
5	Reserved for future use, application specific, do not change
6..10	The position number: ('00001'= pos. 1, '00010'= pos. 2, '11111'= pos. 31) Note: setting '00000' is normally not used.

In case no errors are shown

If both status LEDs are constantly off or the micro controller is not functioning properly, please use the following advice:

1) Ensure that DIP-switch #1 is in the upper position.
2) Reset the CUBI(x) module by flipping DIP-switch #1 down and up again.
3) Check the 24VDC power supply voltage on connector X1 (must be 18..32 VDC including ripple).
4) Unplug connector X1 to allow the MultiFuses to cool down for 10 minutes.
5) Plug in connector X1 again.
6) In case the remedy is not found, contact the supplier / Kwant Controls.

Strange behaviour of the unit

In case the control unit is behaving in an abnormal way, the cause is often a wrong setting of the DIP-switches. Therefore, check that all units have the correct DIP-switch settings with each their own unique node address as shown on the connection diagrams. Next, switch the system off and on, since the DIP-switches are only read at the start of the program.

Another cause for erratic lever – or pointer movement may be a bad connection cable. The minimum bend radius of most cables is equal or more than ten times the outer diameter of the cable. Thus, a connection cable with an outer diameter of ten millimetres may not have a bend radius less than ten centimetres.

Internal fuses

The CUBI module does not contain replaceable fuses. Instead throughout the system fast acting, special PTC-resistors have been used to protect the circuit against overcurrent conditions. Unlike a fuse, they are resettable. A MultiFuse is a solid-state device with a positive temperature coefficient. The MultiFuse is used in series with the power source and the circuit or component that must be protected against damage or fire hazards in the case of an overcurrent. Under normal operating conditions, the resistance of the MultiFuse is comparable to that of a fuse-link, between milli-Ohms and a few Ohms, depending on the specified current carrying capacity. The MultiFuse undergoes an abrupt change in resistance when an overcurrent (trip) heats it up to its trip temperature. Resistance increases to a high value. This increase limits the current from the power source and in the circuit to be protected to a value, that normally does not cause any harm. Switch-off times are similar to those of slow-blow fuse-links. The remaining current (hold) keeps the MultiFuse above its trip temperature and latches it in the protective high resistance state.

The MultiFuse will reset, which means it will return to its low resistance state, if it is allowed to cool below its trip temperature. This can be achieved if the power is switched off or if the current is substantially reduced. Once the MultiFuse is reset, and the fault condition has been cleared, the regular circuit operation resumes.

Disconnecting the X5 connection cable when the CUBI module is powered may damage it beyond repair. Always disconnect connector X1 before disconnecting the X5 connection cable.