Faults detected and reported by Vue Controllers

1. ## General description of Vue Series Controller fault handling

All Vue controllers detect several conditions that may endanger the safety of the laser diode, the TEC or the controller itself. When one of these occurs the laser is disabled. The controller, when queried with the f? (fault?) command, responds with an integer value that represents the specific fault that caused the shutdown.

When the controller is operating normally the f? command returns 0. A non-zero return indicates the presence of a fault condition, and under all circumstances the laser is disabled. The laser remains disabled until the command "cf" (clear fault) is sent to the controller. The "l1" (laser on) command will not clear the fault.

WinVue continually polls the controller and indicates the presence of a fault by displaying a red banner near the upper right hand corner of the program window. The laser cannot be turned on until the Clear Fault button is pressed.

The mapping of fault codes to conditions varies from one product to another, and is documented in section 3.

Special procedures for LV and TEC controllers

These controllers have an additional command that will retrieve specific information about an active fault. The command is "fdesc?" and it returns a human-readable character string that further describes the condition that triggered the fault. Details are given below under each individual fault. If there is no fault (i.e., f? returns 0) then fdesc? will return "No fault".

WinVue displays this specific string when the fdesc? command is available.

2. ## List of all fault conditions

ADC timeout

Indicates a failure of the internal analog to digital converter. Report this fault to Krona and return the controller for factory repair.

Burn-in interrupted

Internal to Krona manufacturing procedures.

Cathode over voltage

Indicates a problem with internal controller circuitry.

CPU over temperature

The controller's on-board CPU chip has reported an over-temperature condition. Check for proper cooling of the controller.

Current at rail

The current control servo on LV has reached its limit but is not able to produce the user-requested current.

fdesc? returns either "Current servo at lower limit" or "Current servo at upper limit"

Please note that on LV-30 firmware versions less than 6 the word 'at' was omitted from "Current servo at lower limit".

Current regulation

The measured current through the laser diode differs significantly from the requested value. Report this fault to Krona.

DiodeGuard

The DiodeGuard circuitry unexpectedly failed to reach its operating point, indicating a possible intermittent connection between the laser diode and the controller.

Flash memory

The CPU's non-volatile memory has reported a fault. Report this to Krona.

Hardware fault in TEC #1 drive

The TEC driving circuit has reported a fault condition. Report this to Krona.

Hardware fault in TEC #2 drive

The TEC driving circuit has reported a fault condition. Report this to Krona.

Illegal state

The controller cannot perform constant power regulation in pulsed mode.

Input over voltage

The input power supply voltage is higher than the controller's allowed operating limit.

Input under voltage

The input power supply voltage is lower than the controller's allowed operating limit.

Interlock

The controller's interlock safety circuit is open.

Input voltage

The DC input voltage to the controller is out of bounds, either high or low.

On TEC controllers fdesc? returns either "Input voltage low (x.xx)" or "Input voltage high (x.xx)", where x.xx is a floating point number.

On LV controllers fdesc? returns either "Input voltage low (x.xx need >x.xx)" or "Input voltage high (x.xx need x.xx)", where x.xx is a floating point number.

Key switch

The controller's key switch is in the off position.

Laser over temperature

The laser temperature sensor reported a reading indicating that the laser is too hot.

Laser over voltage

The voltage across the laser diode exceeds the controller's specification. This can be caused by an open in the laser output circuit.

Laser under temperature

The laser temperature sensor reported a reading indicating that the laser is too cold. Condensation on optical surfaces may occur under these conditions.

Laser under voltage

The voltage across the laser diode is less than the controller's specification. This can be caused by a short in the laser output circuit.

Light loop at rail

The light loop (constant power regulation) is enabled, the controller is producing the maximum allowed output current, and the desired light power cannot be achieved.

Output power limit

The total output power to the laser (current times voltage) exceeds the controller's specification.

On TEC controllers fdesc? returns "Max output exceeded x.x" where x.x is a floating point number.

On LV controllers fdesc? returns "Output > xW (x.xxx)" where x is a whole number and x.xxx is a floating point number.

Output transistor temperature

The transistor that produces the laser current is too hot. This indicates a problem with air flow around the unit, or an ambient temperature that is too high.

Output voltage

The output voltage has exceeded the controller's limit. On TEC controllers this is 98% of the input voltage.

fdesc? returns "Output over voltage x.xxx" where x.xxx is a floating point number.

SPI bus fault

An internal fault. Report this fault to Krona and return the controller for factory repair.

SPI write collision

An internal fault. Report this fault to Krona and return the controller for factory repair.

Temperature servo

A temperature servo has reported a fault condition. Commands are available to determine further information (see product-specific command lists).

3. <u>Fault codes by product</u>

DPSS 3.0

0	No fault
1	Temperature servo
2	SPI bus fault
3	Interlock
4	Light loop at rail
5	SPI write collision
6	Hardware fault in TEC #1 drive
7	Hardware fault in TEC #2 drive

LV

0	No fault
1	Laser under temperature
2	Laser over temperature
3	Interlock
4	Flash memory
5	Key switch
6	Input voltage
7	Output voltage
8	Current at rail
9	Output power limit

HCT

0	No fault
1	ADC timeout
2	Temperature servo
3	Interlock
4	CPU over temperature
5	Laser under voltage
6	Input over voltage
7	Input under voltage
8	Laser over voltage
9	Current regulation
10	Illegal state

MV

0	No fault
1	ADC timeout
2	Laser under voltage
3	Input over voltage
4	Input under voltage
5	Laser over voltage
6	CPU over temperature
7	Output power limit
8	Interlock
9	Current regulation
10	Key switch
11	Laser over temperature
12	Laser under temperature
13	Burn-in interrupted
14	Cathode over voltage
15	DiodeGuard
16	Illegal state

TEC

0	No fault
1	Flash memory
2	Temperature servo
3	Input voltage
4	Output voltage
5	TEC over current XXX
6	Output power limit