

LNN-101 RS-232 Serial Port

Communications Protocol – s/w 602600

1. General.

The LNN-101 liquid nitrogen controller features a full duplex opto-isolated RS232 serial port. This may be used for remote control and monitoring of the LNN-101 by an external VDU or external computer system (eg. a PC). This document describes the protocol of this communications link.

2. Port Hardware.

The RS232 port uses a 3 wire link. Connection is via a miniature D connector on the rear of the LNN-101. Pin connections are as follows.

2	Rx	RS232 data in
3	Tx	RS232 data out
5	0v	RS232 signal ground

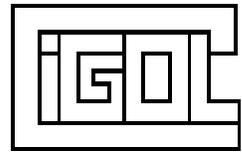
(All other pins are not connected)

For correct operation with an external PC the PC com port handshake lines should be wired active. A suitable lead is as follows.

LNN-101 9 pin D socket		PC COM1 9 pin D socket
3	Data from LNN-101 to PC →	2
2	Data from PC to LNN-101 ←	3
5	Signal Ground	5
		7
		8
		1
		4
		6

3. Communications Format.

ASCII characters are used throughout. Communications is at 1200 baud using 8 bit data, 1 start bit, 1 stop bit, no parity asynchronous serial transmission. Each incoming command must be terminated with an ASCII <CR> character. Incoming <LF> characters are ignored



without error. Numbers are represented in decimal notation (using the ASCII characters 0 to 9). Character strings output by the LNN-101 are terminated with a <CR> <LF> pair.

4. LNN-101 Commands.

4.1 SN

The LNN-101 responds with

SN=aaa

Where aaa is a decimal number of the LNN-101 software version number.

4.2 PT=nnn

The LNN-101 sets the internal periodic data output timer to the value nnn (in seconds (0 to 600)). If this is zero there is no periodic data output. If this is non zero then the periodic status string (section 5 below) is periodically output.

4.3 MC=n (where n = 0 to 200 corresponding to 0 to -200°C)

The LNN-101 sets the meissner is cold set point to the value -n (in °C).

4.4 MW=n (where n = 0 to 200 corresponding to 0 to -200°C)

The LNN-101 sets the meissner is not cold set point to the value -n (in °C). This value is typically 15°C warmer than the MC set point.

4.5 VT=n (where n = 0 to 9999)

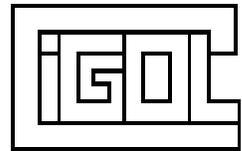
The time in seconds for which the compressed air must be energised before the vent enable condition becomes valid.

4.6 RT=n (where n = 0 to 9999)

The maximum time in seconds allowed for the resistor heater to be energised at any one time (zero indicates unlimited time).

4.7 NT=n (where n = 0 to 9999)

The maximum time in seconds allowed for liquid nitrogen valve to be continuously energised at any one time. If this time is exceeded the LNN-101 automatically jumps to the off mode. This forms a safety cut out in the event of the thermocouple sensor not being placed in the meissner trap. (zero indicates unlimited time).



4.8 RP=n (where n = 0 to 100)

The on period (as a percentage) for the resistor heater mark / space ratio. 0 indicates that the resistor heater will never be energised.

4.9 VE=x

The LNN-101 sets the polarity of the vent enable relay output. If x = 0 the relay is energised to enable venting. If x = 1 the relay is de-energised to enable venting.

4.10 FT=x

The LNN-101 sets the polarity of the thermocouple fault relay output. If x = 0 the relay is energised when there is a fault condition. If x = 1 the relay is de-energised to indicate a fault condition.

4.11 PE=y

The internal front panel push button enable flag is set to the value y, which can be 0 or 1. If set to 0 the LNN-101 front panel push buttons are disabled.

4.12 BT

This command reads back the state of the four front panel push buttons - with bit 0 = PROG, bit 1 = DOWN, bit 2 = UP, bit 3 = STEP

4.13 OC

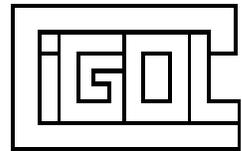
This command reads back the thermocouple open circuit status - with bit 0 = meissner open circuit.

4.14 WD

The LNN-101 responds with WD=xxxx where xxxx is the number of watch dog resets that have occurred. This is provided as a diagnostic aid. Under normal conditions this figure should be zero. The internal counter may be reset to zero using the command WD=0.

4.15 UI

The LNN-101 responds with UI=xxxx where xxxx is the number of unexpected interrupt resets that have occurred. This is provided as a diagnostic aid. Under normal conditions this figure should be zero. The internal counter may be reset to zero using the command UI=0.



4.16 CM

The LNN-101 responds with CM=xxxx where xxxx is the number of internal clock monitor resets that have occurred. This is provided as a diagnostic aid. Under normal conditions this figure should be zero. The internal counter may be reset to zero using the command CM=0.

5. LNN-101 Periodic Data Output.

If the value of the periodic data time is non-zero then the following data string is periodically output.

?=Muvwxyzllllmmmmllnnnn

where M is the overall mode (O = off, C = cooling, W = warming)

u is the state of the meissner thermocouple (1 = open circuit)

v is the state of the meissner valve (1 = open)

w is the state of the compressed air warm valve (1 = open)

x is the state of the compressed air warm resistor relay (1 = resistor being heated)

y is the state of the vent enable output (1 = is OK to vent)

z is the state of the thermocouple fault relay (1 = fault present)

llll is the current measured meissner temperature in °C, sent as a decimal number (with a leading '-' sign for negative temperatures)

mmm is the current meissner is cold set point temperature in °C, sent as a decimal number

nnnn is the current meissner is not cold set point temperature in °C, sent as a decimal number