Control via RS232

General information

Communication between devices and PC is message-based. Every device can send messages at any time. There is no handshake. Therefore, devices, as well as PC, have buffers to keep raw (unprocessed) messages.

Transfer is considered to be performed without mistakes, therefore, no data confirmation and mistake control messages are necessary.

Names

The RS232 port simultaneous control of several devices (e.g., laser, data unit, parametric generator). Therefore, each device has a unique name composed of two or three symbols A... z and 0..9. The name is used as the address when sending commands. To answer a message, the sender must also have a name (using the same format). The name of the laser is NL.

An additional name is reserved for the main control program: MS. At this address, error messages, etc. are sent.

General message form

The Receiving device does not repeat the received symbols. Therefore, if a terminal program (HyperTerminal...) is used for manual operation, you should switch on the option'echo typed characters locally' to view symbols.

General format of a message is:
[ReceiverName:MessageBody \SenderNaime]

Message body form

A message might contain one or several commands. Commands are space delimited. A message cannot exceed 127 symbols including addresses and spaces [ ]. Messages exceeding 127 symbols are ignored.

The Device does not decode an incoming message until the terminator is received. Commands are executed in the order they are transmitted.

Command form

Two types of commands are available: system command and general command.

1. System command

   A system command is a single word (alphanumeric string). A system command might be with a parameter or without it. Parameters are separated from a command by '=' symbol or closed within inverted commas. For example, *[NAME=NL] and [NAME"NL"]* are equivalent. If symbols " " are used, symbols / \ [ ] = : and space symbol are restricted for parameters. In case symbol = is used, symbols \ [ ] are restricted for parameter and a message should contain only a single command.

   Several commands are common for all devices:

   SAY - the most harmless command.. An answer is READY or BUSY. This command is used to check what devices are on line. A device responds BUSY when some operations are being executed, e.g., start up operation.

   PowerON - device sends after connection to mains

   READY - device sends when it is ready to execute commands.

2. General command.

General commands are used to control device sub-sections. The Device sub-section is a one- dimensional array of numbers or string constants. Elements of an array may be read, written, increased or decreased. To explain syntax, the following example is given (a command to set laser to the adjustment mode):

EO/S1

Here:

E - the array name, it is a single letter A...z.

0 - index, this is a word type number 0...65535. {it is not clear what this means}

/ - separator.

S - action key. May be the following: 'S', 'A', 'P', '?'.

- S (SET) - writes the parameter.
- A (ADD) - increases or decreases the parameter.
- P (PROGRAM) - makes the parameter NONVOLATILE. This is used in devices where constants are saved in EEPROM.
- ? - indicates an inquiry. The device replies to this inquiry by an answer following the same syntax. E.g., if the laser is in the adjustment mode, *NL300* will answer EO/S1 to inquiry EO/?.

Not all actions keys are valid for every sub-section. See device command summary.

1 - parameter. It might be a real or integer number or a string constant. String constant must begin with '='.

Command summary

System commands:

Sender	Command	Response	Description
PC	VER	VER=string	string contains software version information
PC	SN	SN=string	string contains hardware version information
PC	START	START=int	int – a bit mask, shows possible errors: 1 –not ready 2 –overheat 4 –flash lamp 8 – interlock 16- cover
PC	STOP		{what happens?}
PC	PACK		produces a packet of optical pulses
PC	NAME		renames the device
PC	SAY	READY=int BUSY	int – a bit mask, shows possible errors: 1 –not ready 2 –overheat 4 - flash lamp 8 – interlock 16- cover
Device	Power ON		Power ON procedure is started
Device	COVER		cover is open
Device	CONTROL		CONTROL input is cut
Device	READY		Power ON procedure was successful
Device	CB t/out		control board malfunction
Device	WAIT		

General commands:

Array	Keys	Parameter		Description	Control pad menu item
		type	bounds		
E0	SA?	int.	0...2	0 – electrooptics off 1 – adjustment mode 2 – max. output mode	Home menu
P0	SA?	int.	1…100	Pulses in pack, use PACK to start	Single-shots menu
D0	SA?P	int.	400…4000	Electro-optics delay in max. output mode	EO delay menu
D1	SA?P	int.	400…4000	Electro-optics delay in adjustment mode	EO delay menu
D2	SA?P	int.	-3000…3000	SYNC OUT delay	Delay menu
F0	SA?P	int.	1…10	Repetition rate divider	Frequency divider menu
C0	SA?P	int.	0, 1	0 – internal triggering 1 – external triggering	Synchronization menu
U0	?	int.	1…100	Charge voltage, %	Info menu
U2	?	int.	1…100	Cooling water temperature	Info menu

Description: int. – integer.

- S (SET) writes the parameter.
- A (ADD) increases or decreases the parameter.
- P (PROGRAM) makes the parameter NONVOLATILE. This is used in devices where constants are saved in EEPROM.
- ? indicates an inquiry. The device replies to this inquiry by an answer following the same syntax. E.g., case the wavelength 1 is set to 1000.1 nm, *PG122* answers W1/S1000.1 to inquiry W1/?.

Not all actions keys are valid for every sub-section. See device command summary.

1000.1 - parameter. It might be a real or integer number or a string constant. String constant must begin with '='.

Command summary

PG122 system commands:

Sender	Command	Parameter	Response	Description
PC	VER		VER=string	string contains software version information
PC	SN		SN=string	string contains hardware version information
PC	RESET		READY	resets a device
PC	OFFSETS		O0/Sn0, O1/Sn1...	n0, n1...n5 - offsets
PC	CORRECTIONS		C0/Sn0, C1/Sn1...	n0 – wavelength, n1...n3 - corrections
PC	NAME	string	NAME=string	renames the device
PC	SAY		READY BUSY OFF	
PC	SHUTDOWN		OFF	enters power saving mode, RESET command returns to normal mode
PC	ADDCOR			adds correction point
PC	SAVECOR			saves corrections to NVRAM
PC	ERASECOR			cleans all corrections
PC	INIT		READY	checks connected stepper motors
Device	Power ON			Power ON procedure is started
Device	READY			Power ON procedure was succesful
Device	What?	string		unrecognised string was received
Device	Ignored	string		unrecognised general command was received
Device	Overload!			pump energylimit is exceeded

PG122 general commands:

Command	Keys	*Parameter*		Response	Description	Control pad menu item
		type	bounds			
W1	S?	real	Wavelength	DONE	Wavelength set	Main menu
M0	AS?	int.	*-10000...10000*		OPO1 crystal position	ANGLES→Of
M1	AS?	int.	-10000...10000		OPO2 crystal position	ANGLES→Os
M2	AS?	int.	-10000...10000		SH1 crystal position	ANGLES→Sh
M3	AS?	int.	-10000...10000		SH2 crystal position	ANGLES→Cm
E3	SP?	int.	0...1023		Max energy level for UV beam	OPTIONS→ MAX ENERG UV
C0	?	int.			Count of correction points	
C1	S	int.	-2000...2000		Correction value for OPO1 or SH1 crystal	
C2	S	int.	-2000...2000		Correction value for OPO2 or SH2 crystal	
C0	S	int.	Wavelength	DONE	Add correction point at n wavelength	
K0	S?	int.	0...15		Energy report switch BitMask	
K1	SP?	int.	1...1023		UV photodetector sensitivity	OPTIONS→EM CALIBRATE UV
O1	ASP?	int.	-3000...3000		OPO1 optical zero	
O2	ASP?	int.	-3000...3000		OPO2 optical zero	
O3	ASP?	int.	-3000...3000		SH1 as active optical zero	
O4	ASP?	int.	-3000...3000		SH2 as compensator optical zero	
O5	ASP?	int.	-3000...3000		SH2 as active optical zero	
O6	ASP?	int.	-3000...3000		SH1 as compensator optical zero	

Description: int. - integer