4.4 REMOTE CONTROL / METERING OF POWER SUPPLIES cont.

4.4.2 COMPUTER REMOTE PROGRAMMING via SERIAL PORT

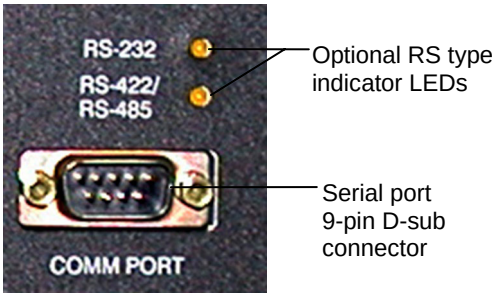

Fig. 4.4-4 RS-232 nine-pin D-sub computer connector on a typical power supply
The connector may be labeled **RS-232** or **COMPUTER** or **SERIAL COMM.** (serial communicator) or **COMM PORT**.

The EGPS or IGPS Power Supply includes a FlexPanel digital control programming board and a serial port connector for communication with the users' computer system. This provides both remote monitoring of all meter signals, and remote programming control of all individual power supplies. Using the command set of the Kimball Physics protocol, the user can write a computer program to operate the gun remotely.

The meter signals that can be monitored and the supplies that can be programmed depend on the particular gun model and are listed in the configuration tables below and in Section 4.1 on controls.

The standard serial communicator is RS-232. In some units, it can be either RS-232 or RS-422/RS-485, as indicated by amber LEDs near the serial port. The RS-422/RS-485 option must be specified when the unit is ordered.

If present, the **PROGRAMMING** remote/local switches on the back of the power supply must be set to **LOCAL** mode for this type of remote access, so that the FlexPanel is operable.

NOTE: For RS-232, a null modem cable must be used with the serial connector, or the wiring connections will not be correct. For RS-422/RS-485, use a standard cable.

COMMUNICATION SETTINGS

Table 4.4-2 RS-232 or RS-422/RS-485 Communication Settings

Speed	19.2 K Bits/second
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	Xon / Xoff

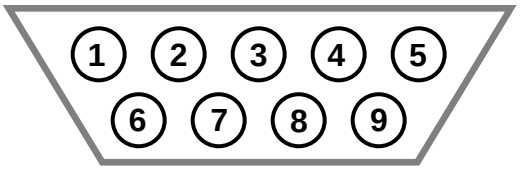

Fig. 4.4-5 RS-232 or RS-422/RS-485 connector pinout, as seen from outside the unit

NOTE

For RS-232 , a null modem cable must be used with serial connector. If a standard cable is used the wiring connections will not be correct.
For RS-422/RS-485, use a standard cable.

Programming remote /local switches must be set to **LOCAL** for communication with FlexPanel.

CONNECTOR WIRING

Table 4.4-3 Nine-pin D-sub connector wiring

Pin #	RS-232 Signal	RS-422/RS-485 Signal
1	(Not used)	GND (ground)
2	TD	CTS+
3	RD	RTS+
4	DTR	RXD+
5	GND (ground)	RXD-
6	DSR	CTS-
7	CTS	RTS-
8	RTS	TXD+
9	RI	TXD-

Table 4.4-4 Commands

Command	Format	Unit Response	Notes
Reset FlexPanel	rst\r\n	rst\r\n	Resets FlexPanel, sets all outputs to 0. Use only to recover from failure.
Shutdown FlexPanel	sdn\r\n	sdn\r\n (shutdown started)	Ramps outputs to 0 one at a time.
	(if locked out by interlock)	esdn:i\r\n	
Resume FlexPanel	rsm\r\n	rsm\r\n (resume started)	Ramps outputs to saved values one at a time.
	(if locked out by interlock)	esdn:i\r\n	
Save FlexPanel	sav\r\n	sav\r\n (output values saved)	Stores current output values for later resume use.
Get Status	gs\r\n	gs:<status_byte>\r\n	See definition below.
Get FirmWare	gfw\r\n	gfw:<firmware revision# in XX.XX format>\r\n	
Get Serial Number	gsn\r\n	gsn:<serial#>\r\n	
Put Output	po:<chan#>,<actual value>\r\n	po:<chan#>,<actual value>\r\n	
	if locked out by interlock	epo:i\r\n	
	if bad channel number	epo:c\r\n	
Get Output	go:<chan#>\r\n	go:<chan#>,<actual value>\r\n	
	(if bad channel number)	ego:c\r\n	
Get Input	gi:<chan#>\r\n	gi:<chan#>,<actual value>\r\n	
	(if bad channel number)	egi:c\r\n	
Put Panel Enable	ppe:<0-panel off or 1-panel on>\r\n	ppe:<0-panel off or 1-panel on>\r\n	
	(if not in dual mode)	eppe\r\n	
Put Debug Enable	pde:<0-debug off or 1-debug on>\r\n	pde:<0-debug off or 1-debug on>\r\n	Debug mode is unused at this time. Leave debug off
Help	help\r\n	(responds with list of all commands / responses)	
Bad Command Response		ebc\r\n	
Software Error Assert		esw\r\n	Should never happen. If it does, report it to Kimball Physics.

4.4 REMOTE CONTROL / METERING OF POWER SUPPLIES cont.

KIMBALL PHYSICS PROTOCOL cont.

Status Byte Definition
The status_byte returned is coded as hex ASCII, with two characters representing the most and least significant hex digit of the status byte. The error flags are bit coded into the status byte, at the defined bits shown in Table 4.4-5.

Thus an interlock fault would return “gs:10\r\n”, and an interlock fault, along with no config would return “gs:30\r\n”

Most of these are internal errors which should not happen and indicate hardware or software error conditions; these should be reported to Kimball Physics if they occur

INTERLOCK_FAULT indicates that the connection interlock system has detected a fault; the controller must be powered down, the faulty connection must be corrected and then power can be re-applied for normal operation.

Table 4.4-5 Error Status

Flags	Value
CONTROL_MODE	00
NOT_READY	01
UNKNOWN_ERROR	02
HARDWARE_NOT_RESPONDING	04
SOFTWARE_ERROR	08
INTERLOCK_FAULT	10
NO_CONFIG	20

EGPS-1022 CONFIGURATION for RS-232

Table 4.4-6 EGPS-1022 Power Supply Control Outputs

Output #	Description	Value	Equates to
0	**Energy**	0 - 20000	0 to 2000.0 V
1	**Source**	0 - 2000	0 to 2.000 V (when ECC is OFF) 0 to 20.00 µA (when ECC is ON)
2	**Grid**	0 - 5000	0 to 50.00 V
3	**1st Anode**	0 - 2000	0 to -200.0 V
4	**Focus**	0 - 20000	0 to 2000.0 V
5	n/a		
6	**X Deflection**	- 15000 - +15000	-150.00 V to +150.00 V
7	**Y Deflection**	- 15000 - +15000	-150.00 V to +150.00 V

NOTE: If the front panel ECC ON/OFF rocker switch is OFF, the Source is in voltage controlled mode. The feedback circuitry will measure the Source voltage, and the Source power supply will be adjusted to maintain a constant voltage as set by Output 1.
If the front panel ECC ON/OFF rocker switch is ON, the Source is in ECC mode. The feedback circuitry will measure the emission current, and the Source power supply will be adjusted to maintain a constant emission current as set by Output 1.

Table 4.4-7 EGPS-1022 Power Supply Metering Inputs

Input #	Description	Value	Equates to
0	**Energy**	0 - 20000	0 to 2000.0 V
1	**Source Voltage**	0 - 2000	0 to 2.000 V
2	**Grid Voltage**	0 - 5000	0 to 50.00 V
3	**1st Anode Voltage**	0 - 2000	0 to -200.0 V
4	**Focus Voltage**	0 - 20000	0 to 2000.0 V
5-7	n/a		
8	**X Deflection Voltage**	- 15000 - +15000	-150.00 V to +150.00 V
9	**Y Deflection Voltage**	- 15000 - +15000	-150.00 V to +150.00 V
10	**Emission Current**	0 - 2000	0 to 20.00 µA
11	**Source Current**	0 - 2000	0 to 2.000 A