

HR-Series RF Power Supply (Generator) Analog Interface Connections

The analog interface connector is located on the rear panel of the Radio Frequency Power Supply. Control and status signals for the RF Power Supply are available on this connector. See the tables below for descriptions of the interface connector signals.

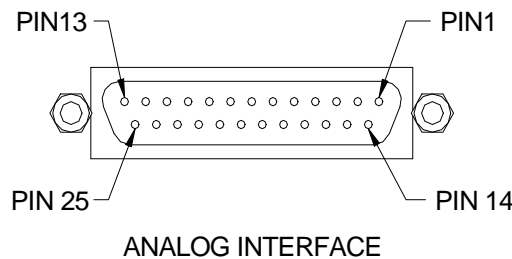
HR-Series RF Power supplies equipped with the Standard Analog Interface have a 25-pin Analog Interface connector. The 25-pin HR-Series Standard Analog Interface is pin-compatible with the 25-pin Analog Interface used on the Seren IPS R/LX01-Series RF power supplies.

Half-Rack HR-Series RF power supplies equipped with an *optional* DeviceNet or PROFIBUS communications interface have a 9-Pin Analog Interface connector which supports a subset of the Standard Analog Interface connector's signals.

Connector type:

Units with Standard Analog Interface:	25 Pin female "D" type
Half-Rack Units with DeviceNet or PROFIBUS Communications:	9 Pin female "D" type

Analog Interface Connector Pin List – 25-Pin Female Standard Interface



Pin Locations, 25-Pin Analog Interface Connector

PIN LIST: HR-SERIES STANDARD 25-PIN FEMALE ANALOG INTERFACE CONNECTOR (For units equipped with Standard Analog Interface)		
PIN	SIGNAL NAME	DESCRIPTION
1	PSYNC	<p>Pulse Synchronization Output. TTL-compatible output, with an internal pull-up resistor.</p> <p>Outputs a pulse train from the internal pulse train generator when internal pulsing is selected and active.</p> <p>Outputs the pulse train from the Gate signal (pin 7) when external pulsing is selected.</p> <p>A TTL high state corresponds to RF output at SETPOINT level or "High Power Pulse" level, a TTL low state corresponds to 0 Watts or "Low Power Pulse" level. Refer to the pulsing parameters in the programmable parameters section for operational details.</p> <p>Return reference: GNDI Signal, Pins 16 and 17</p>

PIN LIST: HR-SERIES STANDARD 25-PIN FEMALE ANALOG INTERFACE CONNECTOR (For units equipped with Standard Analog Interface)		
PIN	SIGNAL NAME	DESCRIPTION
2	INTERLOCK	<p>External Interlock. TTL – compatible input, active low, with an internal pull-up resistor.</p> <p>A dry switch (or relay) contact closure between pin 2 and pin 15 or a TTL “low” signal applied to pin 2 is required <u>before</u> the RF output can be enabled.</p> <p>An open circuit or a TTL “high” signal applied to pin 2 while the RF output is enabled, will cause the RF output to turn off.</p> <p>An open circuit or a TTL “high” signal applied to pin 2 while the RF output is off, will prevent the RF output from being enabled.</p> <p>This signal is active in <u>all</u> control modes.</p>
3	RFON*	<p>RF Output Enable/Disable. TTL – compatible input, active low, edge triggered, with an internal pull-up resistor.</p> <p>A dry switch (or relay) contact closure between pin 3 and pin 16 or a TTL signal transition from “high” to “low” applied to pin 3 enables the RF output, provided Pin 2 is at TTL “low” state.</p> <p>An open circuit between pin 3 and pin 16 or a TTL signal transition from “low” to “high” applied to pin 3 disables the RF output.</p> <p>This signal is active only in “Analog” control mode.</p>
4	PWR/VLT*	<p>Power or Voltage leveling mode select. TTL – compatible input with internal pull-up resistor.</p> <p>An open circuit or TTL “high” signal applied to pin 4 selects the power supply’s internal power sensor for power regulation.</p> <p>A dry switch (or relay) contact closure between pin 4 and pin 16 or a TTL “low” signal applied to pin 4 selects forward power regulation based on an external feedback signal (FEEDBACK signal – Pin 12).</p> <p>Refer to the controls section of the operator’s manual for detailed instructions on how to configure and use this mode.</p>
5	SLAVE*	<p>Selects internal oscillator/exciter (Master Mode) or external oscillator/exciter (Slave Mode) as a frequency source for operation. TTL – compatible input with an internal pull-up resistor.</p> <p>A dry switch (or relay) contact closure between pin 5 and pin 17 or applying a TTL “low” signal to pin 5 selects external frequency source (Slave Mode) operation. The external frequency source is connected to the “CEX IN” connector on the rear panel.</p> <p>An open circuit or TTL “high” applied to pin 5 selects the power supply’s internal oscillator/exciter as the frequency source.</p> <p>Note: The external frequency source must be the same frequency as the RF Power supply’s rated output frequency.</p>

PIN LIST: HR-SERIES STANDARD 25-PIN FEMALE ANALOG INTERFACE CONNECTOR (For units equipped with Standard Analog Interface)		
PIN	SIGNAL NAME	DESCRIPTION
6	GATEN*	<p>Selects Continuous Wave (CW) or Pulse Operation. TTL – compatible input with an internal pull-up resistor.</p> <p>A dry switch (or relay) contact closure between pin 6 and pin 17 or applying a TTL “low” signal to pin 6 selects pulse operation. Apply the external pulse train to Pin 7.</p> <p>Applying a logic level high to this pin or allowing this pin to float selects continuous wave (CW) operation.</p>
7	GATE	<p>External Pulse Train input. Toggles output power between setpoint value and 0 Watts. TTL – compatible input with internal pull-up resistor.</p> <p>An open circuit or TTL “high” signal applied to pin 7 holds the RF output to the setpoint level.</p> <p>A dry switch (or relay) contact closure between pin 7 and pin 17 or a TTL “low” signal applied to pin 7 switches the RF output power to 0 Watts.</p> <p><u>Note:</u> For pulsing operation, a pulse source with a TTL-level output is preferred.</p> <p>Active when pin 6 (GATEN*) is in a TTL “low” state.</p>
8	RFENABLED*	<p>RF output status signal. Active low, open collector output. 24VDC maximum, 15mA maximum current sink, 150mW maximum power dissipation.</p> <p>Signal output is 0V (low) for an RF on condition; signal output is “open” for an RF off condition.</p> <p>The RFENABLED* signal can also indicate the presence of excessive reflected power by changing from a “low” state to a “high” state when the RF output is enabled. Refer to “Reflected Power Alarm ON/OFF” and “Reflected Alarm Threshold” in the Programmable Parameters section for details.</p> <p>The RFENABLED* output signal may also be used to pre-position Seren IPS Inc. AT-Series Matching Networks. Refer to “Matching Network Preset Mode”, “Tune Capacitor Preset Position”, and “Load Capacitor Preset Position” in the Programmable Parameters section. Requires +5VDC pull-up enabled.</p> <p>NOTE: This pin may be configured as internally pulled up to +5VDC (factory default configuration) or without a +5VDC pull-up. (OEM custom configurations). Configuration is set at the factory. Use pin 18 for a reference return.</p>

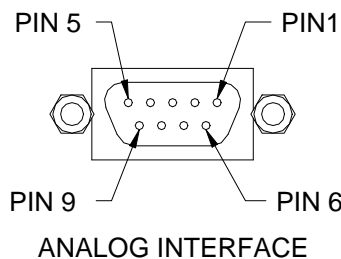
PIN LIST: HR-SERIES STANDARD 25-PIN FEMALE ANALOG INTERFACE CONNECTOR (For units equipped with Standard Analog Interface)		
PIN	SIGNAL NAME	DESCRIPTION
9	GND	Internally connected to chassis ground. Connect to system controller common or ground reference.
10	FWD MON	<p>Forward power monitor output signal. Analog output, selectable 0 to +5VDC or 0 to +10VDC range via front panel controls. Output is linearly proportional to 0 to 100% of rated forward power.</p> <p>Refer to the Power Monitor Scaling subsection in the appropriate model specification for forward power monitor scaling details.</p> <p>The forward power monitor output signal may also be used to pre-position Seren IPS Inc. AT-Series and ATS-Series Matching Networks. Refer to "Matching Network Preset Mode", "Tune Capacitor Preset Position", and "Load Capacitor Preset Position" in the Programmable Parameters section.</p> <p>Measure monitor voltage with respect to pin 22 (FWDRET).</p>
11	REFP MON	<p>Reflected power monitor output signal. Analog output, selectable 0 to +5VDC or 0 to +10VDC range via front panel controls.</p> <p>Refer to the Power Monitor Scaling subsection in the appropriate model specification for reflected power monitor scaling details.</p> <p>The reflected power monitor output signal may also be used to pre-position Seren IPS Inc. AT-Series and ATS-Series Matching Networks. Refer to "Matching Network Preset Mode", "Tune Capacitor Preset Position", and "Load Capacitor Preset Position" in the Programmable Parameters section.</p> <p>Measure monitor voltage with respect to pin 23 (REFRET).</p>
12	FEEDBACK	<p>External feedback voltage signal. Analog input, 0 to +10.0VDC . Use pin 16 or 17 or (GNDI) for return reference.</p> <p>The RF Power Supply will automatically adjust its output power to maintain the FEEDBACK signal's magnitude at the same level as the SETPOINT signal magnitude. The PROBE voltage can be displayed on the <i>optional</i> Display Panel or retrieved via the communications interface (Serial, DeviceNet, PROFIBUS etc.). The PROBE attenuation factor can be configured from the optional Display Panel or through the communications interface (Serial, DeviceNet, PROFIBUS, etc.).</p> <p>The external feedback signal is derived from a voltage probe (RF or DC) located elsewhere in the plasma or process system. Refer to the controls section for detailed instructions on how to configure and use this mode.</p> <p>Note: The feedback voltage polarity must be Positive (+). The RF Power Supply's external feedback circuitry is not designed to function with Negative (-) polarity signals applied to this pin.</p>

PIN LIST: HR-SERIES STANDARD 25-PIN FEMALE ANALOG INTERFACE CONNECTOR (For units equipped with Standard Analog Interface)		
PIN	SIGNAL NAME	DESCRIPTION
13	SETPOINT	<p>Power or Voltage setpoint input. Analog, high-impedance, differential input with selectable 0 to +5.0VDC or 0 to +10.0VDC range via front panel controls.</p> <p>Refer to the controls section of the operator's manual for detailed instructions on how to configure and use this mode</p> <p>NOTE: SETRET (pin 25) MUST be referenced to common or ground at the setpoint voltage source (system controller) or the RF output power will behave erratically.</p> <p>Refer to the Analog Setpoint Sensitivity subsection of the appropriate model specification for setpoint sensitivity details.</p> <p>NOTE: Feedback voltage range and polarity must match setpoint voltage range and polarity for proper operation in voltage control mode.</p> <p>Pin 13 is the positive (+) input of the differential setpoint amplifier.</p> <p>Active only in ANALOG control mode.</p>
14	No Connection	No Connection
15	INTERLOCK-RTN	Ground return for External Interlock (pin 2)
16	GNDI	<p>Ground return for pins 1,3,4,5,6,7,19. Internally connected to chassis ground.</p> <p>Connect to system controller common or ground reference</p>
17	GNDI	<p>Ground return for pins 1,3,4,5,6,7,19. Internally connected to chassis ground.</p> <p>Connect to system controller common or ground reference</p>
18	RFENABLED RET	<p>Ground return for pin 8 (RFENABLED* signal).</p> <p>This pin may be configured as internally connected to chassis ground (GNDI) (factory default configuration) or isolated from chassis ground (OEM custom configurations). Configuration is set at the factory.</p> <p>Connect to system controller common or ground reference.</p>
19	RL-IN	<p>Limit input. Analog input, 0 to +5VDC range. Use pin 16 or 17 (GNDI) for return reference.</p> <p>Used in dual-bias or multiple power supply systems to fold-back the power supply's output power if reflected power is detected by another power supply in the system. Output power folds back in response to an external voltage applied to this input. Foldback threshold is factory preset at +5.00VDC (Disabled). Consult factory for assistance.</p>
20	RL-OUT	<p>Limit Output. Analog output, 0 to +10VDC range. Buffered, high-speed, non-linearized directional coupler reflected power signal. Return reference is pin 23.</p> <p>Used on dual-bias or multiple power supply systems. Consult factory for assistance.</p>

Summary of product specifications - consult operator's manual, local Seren IPS representative, or factory for full detail.

PIN LIST: HR-SERIES STANDARD 25-PIN FEMALE ANALOG INTERFACE CONNECTOR (For units equipped with Standard Analog Interface)		
PIN	SIGNAL NAME	DESCRIPTION
21	No Connection	No Connection
22	FWDRET	Forward Power Monitor return. Analog output. For pin 10.
23	REFRET	Return reference for Reflected Power Monitor and Limit output signals. Analog output. For pins 11 and 20.
24	No Connection	No Connection
25	SETRET	Setpoint Return. Analog differential input (-). Note: This pin must be connected to a ground reference or the unit's output will behave erratically.

Analog Interface Connector Pin List – 9-Pin Female
(optional DeviceNet or PROFIBUS Interface Installed)



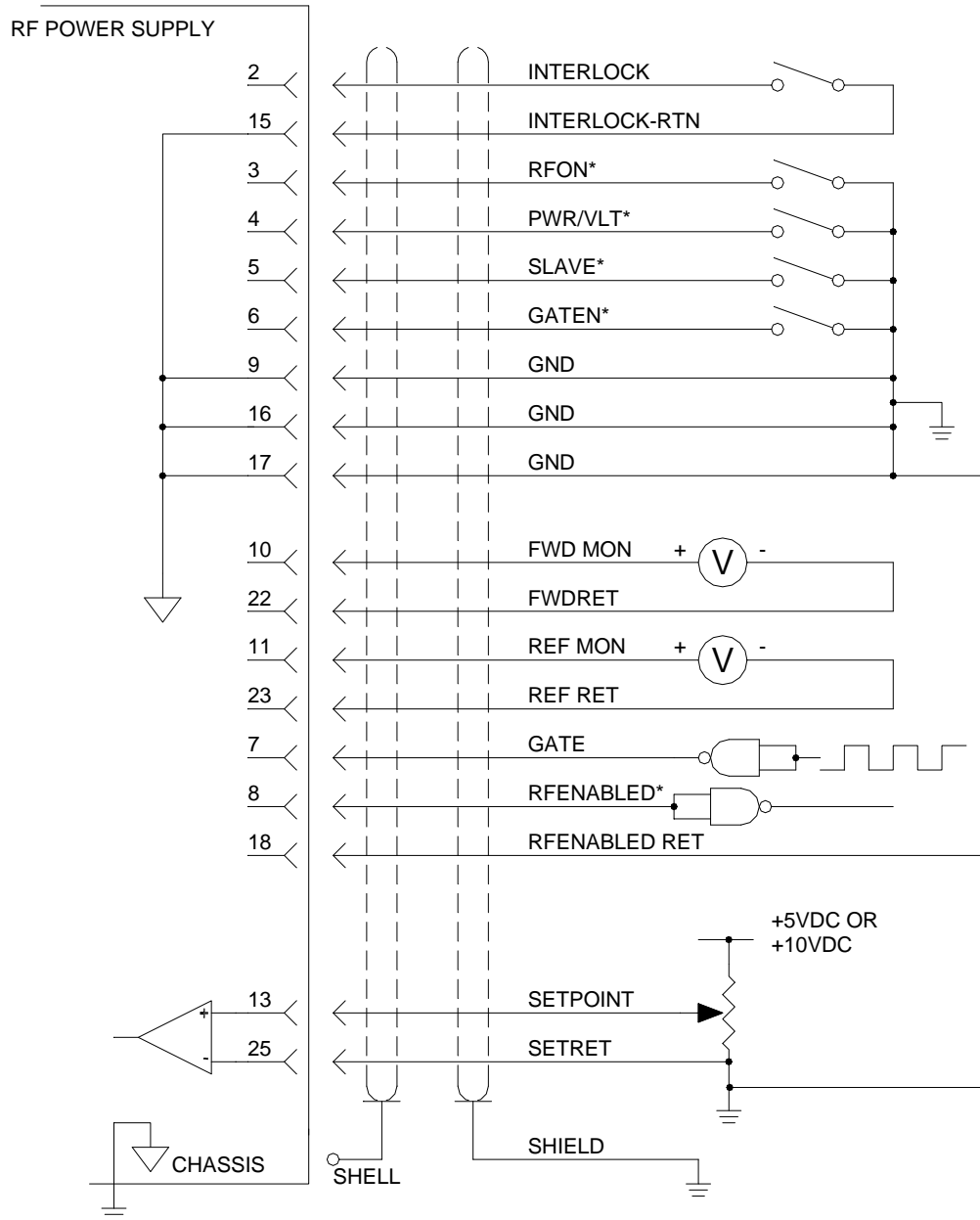
Pin Locations, 9-Pin Female Analog Interface Connector

PIN LIST: 9-PIN FEMALE ANALOG INTERFACE CONNECTOR (For HR601/HR1001/HR2001/HR3001/HR4001/HR5001 units equipped with optional DeviceNet or PROFIBUS Communications Interface)		
PIN	SIGNAL NAME	DESCRIPTION
1	INTERLOCK	External Interlock. TTL – compatible input, active low, with an internal pull-up resistor. A dry switch (or relay) contact closure between pin 1 and pin 6 or a TTL “low” signal applied to pin 1 is required before RF output can be enabled. An open circuit or a TTL “high” signal applied to pin 1 while the RF output is enabled, will cause the RF output to turn off. An open circuit or a TTL “high” signal applied to pin 1 while the RF output is off, will prevent the RF output from being enabled. This signal is active in Panel, Analog, or Serial control modes
2	No Connection	No Connection
3	No Connection	No Connection

PIN LIST: 9-PIN FEMALE ANALOG INTERFACE CONNECTOR (For HR601/HR1001/HR2001/HR3001/HR4001/HR5001 units equipped with <i>optional</i> DeviceNet or PROFIBUS Communications Interface)		
PIN	SIGNAL NAME	DESCRIPTION
4	FEEDBACK	<p>External feedback voltage signal. Analog input, 0 to +10.0VDC . Use pin 6 (GNDI) for return reference.</p> <p>The RF Power Supply will automatically adjust its output power to maintain the FEEDBACK signal's magnitude at the same level as the SETPOINT signal magnitude. The PROBE voltage can be displayed on the <i>optional</i> Display Panel or retrieved via the communications interface (Serial, DeviceNet, PROFIBUS, etc.). The PROBE attenuation factor can be configured from the <i>optional</i> Display Panel or communications interface..</p> <p>The external feedback signal is derived from a voltage probe (RF or DC) located elsewhere in the plasma or process system. Refer to the controls section for detailed instructions on how to configure and use this mode.</p> <p>Note: The feedback voltage polarity must be Positive (+) for proper operation of voltage control mode. The RF Power Supply's external feedback circuitry is not designed to function with Negative (-) polarity signals applied to this pin.</p>
5	GND	Chassis ground
6	GNDI	Isolated ground.
7	No Connection	No Connection
8	RL-IN	<p>Limit input. Analog input, 0 to +5VDC range. Use pin 6 (GNDI) for return reference.</p> <p>Used in dual-bias or multiple power supply systems to fold-back the power supply's output power if reflected power is detected by another power supply in the system. Output power folds back in response to an external voltage applied to this input. Foldback threshold is factory preset at +5.00VDC (Disabled). Consult factory for assistance.</p>
9	RL-OUT	<p>Limit Output. Analog output, 0 to +10VDC range. Buffered, high-speed, non-linearized directional coupler reflected power signal. Return reference is pin 5 (GND - chassis ground).</p> <p>Used on dual-bias or multiple power supply systems. Consult factory for assistance.</p>

Typical Analog Interface Connections (Analog Control)

There are many possible analog interface wiring schemes. Basic analog interface connections are diagrammed below. Refer to the Analog Interface Connector pin list in the Rear Panel Controls and Connections section of the operator's manual for signal details. Use shielded cable for all interconnections.



Typical Analog Interface Connections (Standard 25-pin connector shown)

Notes:

- The information in this document is provided as a convenience. For detailed information, consult the product's Operator's Manual.
- For assistance with technical matters, contact your local Seren IPS Inc. representative or the factory.
- All features or functions may not be supported on OEM and custom-configured products.
- In the event of a discrepancy between this document and the product Operator's Manual, the Operator's Manual is the prevailing authority.
- Specifications and information in this document subject to change without notice.