IPG YLR SERIES FIELDBUS INTERFACE

This document provides information on the IPG YLR Series Fieldbus Interface. This interface currently provides support for cyclical messaging to the YLR client.

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1. INPUT/RESPONSE PROCESS DESCRIPTION

The Input/Response process is the cyclical data provided from the YLR Laser to the client. The input data is comprised of **16 bytes** as shown below.

Byte	Tag	Variable	Type	Description	Detail
0-1	**Status**	GENERAL	Bit field	Laser Status Output signals	Table 1-2 Table 1-3
2-3	**Sensor**	OUTPUT_POWER	Unsigned 16	Laser Output Power monitor	Table 1-4
4-5		BACK_REFLECTION	Unsigned 16	Laser Back Reflection monitor	
6-7		CASE_TEMP	Unsigned 16	Laser Case Temperature	
8-15	**RESERVED**	RESERVED	--	Reserved for future use	

TABLE 1-1 INPUT PROCESS MAPPING

STATUS BITS

The mapping of the YLR Laser status signals is provided in the following tables. Bits that are labeled as errors are latched once the error condition has occurred. A reset errors command must be asserted in order to reset the error bit state(s). Bits that are not specifically designated as errors will set or clear continuously based on their required condition. A value of "1" indicates that the required condition has been satisfied. A value of "0" indicates the condition has not been met.

	Bit	Signal	Description
Byte 0 - GENERAL	**0**	EMISSION_ON	Laser Emission is ON
	1	LASER_READY	Laser is Ready (normal operation)
	2	LASER_ERROR	Laser Error(s) detected
	3	MAIN_PWR_ON	Main Power Supply is ON†
	4	PWR_KEY_ON	Power Key Switch is ON†
	5	INTLK1_OPEN	Interlock Ch.1 contact is OPEN
	6	INTLK2_OPEN	Interlock Ch. 2 contact is OPEN
	7	RS232_LINK_UP	RS-232 link connected

TABLE 1-2 INPUT PROCESS STATUS BYTE 0 "GENERAL"

	Bit	Signal	Description
Byte 1 -GENERAL	**0**	Reserved	Reserved for future use
	1	Reserved	Reserved for future use
	2	Reserved	Reserved for future use
	3	Reserved	Reserved for future use
	4	Reserved	Reserved for future use
	5	Reserved	Reserved for future use
	6	Reserved	Reserved for future use
	7	Reserved	Reserved for future use

TABLE 1-3 INPUT PROCESS STATUS BYTE 1 "GENERAL"

† This signal not available on YLR-U CW Series

SENSOR READINGS

The sensor reading values are all provided in the input process as 16-bit unsigned integers. In the YLR Fieldbus Interface, all sensor readings are internally scaled in floats based on their respective units. To accommodate floating point precision, the interface will scale the sensor readings before sending them as integers to the client via Fieldbus. The client can then divide the input data by the scale factor to receive the equivalent float.

Sensor	Input Type	Units	SCALE	Description
OUTPUT POWER	Unsigned 16	%	100	Laser Output Power reading
BACK REFLECTION	Unsigned 16	%	100	Laser Back Reflection reading*
CASE TEMP	Unsigned 16	°C	100	Laser Case Temperature

TABLE 1-4 INPUT PROCESS SENSOR READING BYTES

The OUTPUT POWER sensor parameter returns the laser's actual power currently in effect as a percentage ranging from 0 to 100% of its maximum nominal power. This parameter is a translation of the laser power output monitor's analog voltage signal where full nominal power (100%) corresponds to a value of 65535 (0xFFFF in hex). The scaling applied to OUTPUT POWER is shown in the example below.

Data Type: 16-bit unsigned integer
Example: Output Power = 80% = (100 x 52428) / 65535 ← 52428 (0xCCCC) when analog signal at 80% of its max.

The BACK REFLECTION sensor* parameter returns the laser's back reflection power currently in effect as a percentage ranging from 0 to 100% of its maximum permissible level. This parameter is a translation of the back reflection monitor's analog voltage signal where maximum permissible back reflection (100%) corresponds to a value of 65535 (0xFFFF in hex). The scaling applied to BACK REFLECTION is shown in the example below.

Data Type: 16-bit unsigned integer
Example: Back Reflection = 3.0% = (100 x 1966) / 65535 ← 1966 (0x7AE) when analog signal at 3.0% of its max.

The CASE TEMP sensor parameter returns the laser's current operating temperature in a range from 0 to 100 °C. This parameter is a translation of the laser's case temperature where a maximum temperature of 100 °C corresponds to a value of 65535 (0xFFFF in hex). The scaling applied to CASE TEMP is shown in the example below.

Data Type: 16-bit unsigned integer
Example: Case Temperature = 24.5 °C = (100 x 16035) / 65535 ← 16035 (0x3EA3).

* This output signal not available in IPG YLR Multi-kW Fiber Laser Series.

2. OUTPUT/COMMAND PROCESS DESCRIPTION

The Output/Response process is the cyclical data provided from the client to the YLR Laser. The output data is comprised of **16 Bytes** as shown below.

Byte	Tag	Variable	Type	Description	Detail
0-1	**Control**	GENERAL	Bit field	Laser Control Input signals	Table 2-2 Table 2-3
2-3	**Set Power**	SET_POWER	Unsigned 16	Laser Power requested	Table 2-4
4-5	**Modulation**	MOD_FREQ	Unsigned 16	Modulation Frequency requested (Hz)	Table 2-5
6		DUTY_CYCLE	Unsigned 8	Modulation Duty Cycle requested (%)	
7-15	**RESERVED**	RESERVED	--	Reserved for future use	

TABLE 2-1 OUTPUT PROCESS MAPPING

CONTROL BITS

The mapping of the YLR Laser control signals is provided in the following tables. For the CONTROL bits, a value of "1" asserts the respective control, and a value of "0" removes it. Note that some controls are edge-triggered only.

	Bit	Signal	Description
Byte 0 - GENERAL	**0**	EMISSION_ON	Turn laser emission on (Positive edge triggered)
	1	MODULATION_ON	Turn laser modulation on
	2	GUIDE_BEAM_ON	Turn guide laser beam on (Positive edge triggered)
	3	RESET_ERRORS	Clear all resettable laser errors
	4	Reserved	Reserved for future use
	5	Reserved	Reserved for future use
	6	Reserved	Reserved for future use
	7	Reserved	Reserved for future use

TABLE 2-2 OUTPUT PROCESS CONTROL BYTE 0 "GENERAL"

	Bit	Signal	Description
Byte 1 - GENERAL	**0**	Reserved	Reserved for future use
	1	Reserved	Reserved for future use
	2	Reserved	Reserved for future use
	3	Reserved	Reserved for future use
	4	Reserved	Reserved for future use
	5	Reserved	Reserved for future use
	6	Reserved	Reserved for future use
	7	Reserved	Reserved for future use

TABLE 2-3 OUTPUT PROCESS CONTROL BYTE 1 "GENERAL"

Laser Input	Output Type	Units	SCALE	Description
SET_POWER	Unsigned 16	%	100	Laser Set Power Input

TABLE 2-4 OUTPUT PROCESS SET_POWER CONTROL BYTES

SET_POWER

The SET_POWER parameter is used to set the laser power as a percentage ranging from 0 to 100% of its maximum power. This parameter is translated into a control voltage where full power (100%) corresponds to value of 65535 (0xFFFF in hex). The scaling applied to SET_POWER is shown in the example below.

Data Type: 16-bit unsigned integer
Example: Set Power = 80% → (80 x 65535)/100 = 52428 (0xCCCC) → analog control voltage at 80% of its max.

Laser Input	Output Type	Units	SCALE	Description
MOD_FREQ	Unsigned 16	Hz	1	Modulation Frequency (0 – 50 kHz)
DUTY_CYCLE	Unsigned 8	%	1	Modulation Duty Cycle (0 – 100%)

TABLE 2-5 OUTPUT PROCESS MODULATION CONTROL BYTES

MOD_FREQ

The MOD_FREQ parameter is used to set the modulation frequency. This parameter specifies the modulation frequency in Hertz and supports a range of 0 to 50.0 kHz. The MOD_FREQ parameter is scaled as shown in the example below.

Data Type: 16-bit unsigned integer
Example: Mod Frequency = 25.8 kHz = 25800 Hz → 25800 (0x64C8) → drive modulation signal at 25.8 kHz.

DUTY_CYCLE

The DUTY_CYCLE parameter is used to define the ON/OFF ratio of the modulation applied to the laser. This parameter ranges from 0% (modulation fully OFF) to 100% (modulation fully ON). The DUTY_CYCLE parameter is scaled as shown in the example below.

Data Type: 8-bit unsigned integer
Example: Duty Cycle = 30% → 30 (0x1E) → apply duty cycle of 30% ON / 70% OFF to modulation signal.