Description

Harmony rack I/O incorporates a variety of input and output devices to interface process signals to the Symphony^{TM} Enterprise Management and Control System. An IMHSS03 Hydraulic Servo module and an IMFCS01 Frequency Counter module interface field inputs and outputs used in turbine control. The modules each consist of a single printed circuit board that occupies one slot in a module mounting unit (MMU). In general, jumpers and switches on the printed circuit board and jumpers and dipshunts on the termination unit configure the module and its I/O channels. A cable connects the I/O module to its termination unit. The physical connection points for field wiring are on the termination unit.

IMHSS03 Hydraulic Servo

The IMHSS03 Hydraulic Servo module is a valve position control module. It provides an interface through which a Harmony controller can drive a servo valve or I/H converter to provide manual or automatic control of a hydraulic actuator. The controller utilizes function code 55 or 150 (hydraulic servo) to configure and access the module input/output channels.

Typical uses for the module are positioning of steam turbine throttle and control valves, gas turbine fuel valves, inlet guide vanes, and nozzle angle. By regulating the current to the servo valve, the IMHSS03 module can initiate a change in actuator position. The hydraulic actuator can then position, for example, a gas turbine fuel valve or a steam governor valve. As the valve opens or closes, it regulates fuel or steam flow to the turbine, thus controlling the turbine speed. A linear variable differential transformer (LVDT) provides actuator position feedback to the hydraulic servo module.

The IMHSS03 module is an intelligent I/O module with an onboard microprocessor, memory, and communication circuitry. In most applications, the IMHSS03 module works with the IMFCS01 Frequency Counter module.

IMFCS01 Frequency Counter

The IMFCS01 Frequency Counter module provides a single channel frequency input to a Harmony controller. The controller utilizes function code 145 (frequency counter) to configure and access the module input channel.

The IMFCS01 module conditions, converts, and processes pulse inputs from a magnetic pickup attached to the front standard of a steam or gas turbine. The converted digital data represents a

count of the input pulses and the period of the count. The controller uses the data to calculate frequency and consequently turbine speed. The calculated speed can then be used to drive servo valve outputs for turbine speed control. The IMFCS01 module provides exceptional frequency counting accuracy required by steam or gas turbine control systems.

The IMFCS01 module is an intelligent I/O module with an onboard microprocessor, memory, and communication circuitry. In most applications, the IMFCS01 module works with the IMHSS03 Hydraulic Servo module.

Related Documents

Number	Document Title
WBPEEUS240011?0	Harmony Rack Input/Output, Overview

Specifications

Property	Characteristic/Value
General	
Mounting	Occupies one slot in a standard module mounting unit.
Environmental	
Ambient temperature	0° to 70°C (32° to 158°F)
Relative humidity	5% to 95% up to 55°C (131°F) (noncondensing) 5% to 45% at 70°C (158°F) (noncondensing)
Altitude	Sea level to 3 km (1.86 miles)
Air quality	Noncorrosive
Surge protection	Meets IEEE-472-1974 surge withstand capability test.
CE mark declaration (pending for IMFCS01)	This product, when installed in a Symphony cabinet, complies with the following Directives/Standards for CE marking.
EMC96 Directive 89/336/EEC	EN50082-2 Generic Immunity Standard - Part 2: Industrial Environment EN50081-2 Generic Emission Standard - Part 2: Industrial Environment
Low Voltage Directive 73/23/EEC	EN61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
Certifications	
Canadian Standards Association (CSA)	Certified for use as process control equipment in an ordinary (nonhazardous) location.

Factory Mutual (FM) (pending for IMHSS03)	Approval for the following categories:
	    Nonincendive for:
	        Class I Division 2, Groups A,B,C,D
	        Class II, Division 2, Groups F,G

IMHSS03	
Power requirements	
Operating voltage	+5 VDC, ±5% at 576 mA typical +15 VDC, ±5% at 15 mA typical -15 VDC, ±5% at 12 mA typical +24 VDC, ±10% at 335 mA typical (from termination unit)
Power dissipation	2.88 W (+5 VDC) typical 0.23 W (+15 VDC) typical 0.18 W (-15 VDC) typical 8.04 W (24 VDC) typical

Property	Characteristic/Value
IMHSS03 *(continued)*	
LVDT secondary 2-position inputs	4 analog inputs total, 2 LVDT secondary inputs (each with 2 secondaries) 24 V_{PP} ±7 VDC common mode, 10 kΩ differential input impedance
LVDT supply primary excitation outputs	2 analog outputs: LVDT primary 1 and 2 Operating frequency: 400 Hz to 15 kHz
Servo valve coil outputs	4 analog outputs total, 2 redundant analog outputs (selectable) with servo output protection. Shorting or opening 1 output does not affect the other output.
Position panel meter output Output current	1 analog output (scaled feedback output) 4 to 20 mA at 300 Ω maximum impedance
I/H converter output Output current	1 analog output 4 to 20 mA at 300 Ω maximum impedance 20 to 160 mA at 15 Ω maximum impedance
Unscaled position feedback output Output current	1 analog output 2 mA at 5 kΩ minimum impedance
Test mode output Output current	1 analog output 1 mA at 5 kΩ minimum impedance

Digital inputs
   On
   Off
	3 optically isolated (250 VDC) contact inputs (raise, lower and trip bias)
	18 VDC minimum at 2.8 mA nominal forward current (V_{IN} = 24 VDC nominal)
	11 VDC maximum at 10 µA maximum leakage current

Digital output
 	
   On
   Off
	1 independent, optically isolated (250 VDC), open collector output (hard manual)
	2.4 VDC at 250 mA
	24 VDC at 10 µA

IMFCS01	

Power requirements
 	
   Operating voltage
 	
   Power dissipation
	
	5 VDC at 241 mA typical
	15 VDC at 6.88 mA typical
	−15 VDC at 5.39 mA typical
	
	1.2 W (5 VDC)
	185 mW (±15 VDC)

LVDT supply primary excitation outputs table:

LVDT Excitation Voltage (V_{PP})	Min. LVDT Impedance (Ω)	LVDT Excitation Voltage (V_{PP})	Min. LVDT Impedance (Ω)
2.1	15.0	6.0	40.0
2.6	18.0	7.7	51.3
3.6	24.0	9.0	60.0
4.5	30.0	13.5	90.0
5.4	36.0	18.0	120.0

Servo valve coil outputs table:

Output Current (mA)	Max. Coil Impedance (Ω)	Output Current (mA)	Max. Coil Impedance (Ω)
±8	750	±40	150
±16	375	±48	125
±24	250	±56	107
±32	187	±64	93

Property	Characteristic/Value
IMFCS01 *(continued)*	

Input
    Voltage range
    Frequency response
	1 frequency input channel
	300 mV$_{PP}$ to 120 V$_{RMS}$ (150 mV$_P$ to 170 V$_P$)
	1 Hz to 12.5 kHz

Accuracy	±0.25 Hz at 1 Hz to 5 kHz ±0.50 Hz at 5 kHz to 10 kHz ±0.63 Hz at 10 kHz to 12.5 kHz
A-to-D resolution	24 bits

Module time base
    Frequency
    Accuracy
    Count
	
	1 MHz
	0.005 %
	±1 of time base

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

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