



China

HollySys Group (Group Headquarters)
No.2 Di Sheng Middle Road, Economic-Technological Development Area, Beijing 100176
Tel: +86 10 58981000 Fax: +86 10 58981100
Hangzhou HollySys Automation Co., Ltd. (Industrial Automation Headquarters)
No.1 North No.19 Street, Qiantang District, Hangzhou 310018
Tel: +86 571 81633600 Fax: +86 571 81633700

Singapore

HollySys (Asia Pacific) Pte. Ltd. (International Headquarters)
Changi Business Park Crescent, #04-01/02/03 Plaza 8 @ CBP, Tower A, Singapore 486025
Tel: +65 6777 0950 Fax: +65 6777 2730

India

HollySys Automation India Pvt. Ltd.
D-84, Ground Floor, Sector 63, Noida, Uttar Pradesh 201301
Tel: +91 12045 50652

Indonesia

PT. HollySys Automation Indonesia
Metropolitan Tower, 10th Floor Unit E, Jl. R.A. Kartini Kav. 14, Jakarta 12430
Tel: +62 21 2918 2926 Fax: +62 21 2918 2936

Web: www.hollysys.com
E-mail: sales_international@hollysys.com (Sales)
iaservice@hollysys.com (After-sales Service)

T800K

DIGITAL ELECTRO-HYDRAULIC (DEH) TURBINE CONTROL SYSTEM

Intelligence
For Excellence

Profile

Founded in 1993, HollySys is a leading supplier of intelligence solutions with more than 4,700 employees and operates in both China and abroad. HollySys is headquartered in Beijing with R&D, production, and service bases in Beijing, Hangzhou, Xi'an, Singapore, and local branches in major cities in China, as well as offices in India, Malaysia and Indonesia, establishing a comprehensive service network across the world.

HollySys business consists of industrial intelligence, transportation intelligence, and food and pharmaceutical intelligence, covering the main industries for the national economy and the people's livelihood. With years of technological accumulation in various fields and continuous capacity building, we can provide customers with customized integrated solutions, stable and reliable products, and full lifecycle services, helping them improve market competitiveness. Over the past three decades, we have served more than 35,000 clients, successfully completed more than 45,000 projects, and gained more than 1,000 new clients each year, making HollySys a world-renowned brand in automation and intelligence filed.

The HOLLIAS industrial control platform of HollySys features a series of advanced, practical and reliable industrial automation systems and HollySys automation instrumentations products. The system products include MACS-K, MACS-S industrial control system DCS, professional control systems such as DEH, ETS and SIS, and whole-process information-based software for manufacturing enterprises. Instrumentation products include isolated safety barriers, signal isolators, surge protectors, power transmitters, pressure transmitters, electromagnetic flowmeters, metal tube float meters, magnetic level gauges, radar level gauges, throttling elements, thermal elements, and pressure gauges.

The company's products have been successfully applied to major projects and key equipment, including 1000MW ultra-supercritical thermal power units, 1.2 million tons of urea and 5 million tons of oil refining main units, earning a good reputation in the industry.

Specializing in HollySys Instrumentation and control system engineering and integration, the company can provide both new and brown field projects of enterprises with HollySys proprietary products, as well as comprehensive engineering services such as customized design and construction & commissioning.

HollySys has always pursued continuous innovation and R&D while sticking to its vision "create the most valuable intelligent company through stable and sustainable development" to provide more reliable, secure, and intelligent technology and products for our customers.

Product Description

T800K is a Digital Electro-Hydraulic (DEH) Turbine Control System for steam turbines. It is based on HOLLIAS MACS-K platform, and can realize the basic control and advanced auto-start control of steam turbines. T800K can also be applied to power plants, petrochemical plants, chemical plants, and steel mills, for controlling the power equipment such as feedwater pumps, induced draft fans, and compressors. The intelligent DEH special modules include the K-FC01 turbine speed module and the K-SV01 turbine servo module.



Technical Features

 Full redundancy configuration of system power, field power, and communication bus, and optional redundancy configuration of all I/O modules

 Execution cycles: 50 ms, 100 ms, 200 ms, 500 ms, and 1 s configurable for different requirements

 Direct connection of 6-wire, 3-wire, and DC-type LVDT displacement sensors

 Intelligent servo module for valve control: -200mA~200mA servo output signals, to drive various electro-hydraulic converters

 Rotor stress calculation and advanced control of turbine auto-start

 Intelligent speed module: 1~30kHz frequency measurement, with independent overspeed protection function, in a 2oo3 redundant configuration mode

 Quick speed feedback via high-speed CAN bus to ensure good governing quality and isolated grid operation capability

 CE, G3 corrosion resistance, and CCS certifications

 Communication with other systems via Modbus

 Environmental specifications: -20~60°C, 5%~90% RH (non-condensing), 3,000 m above sea level

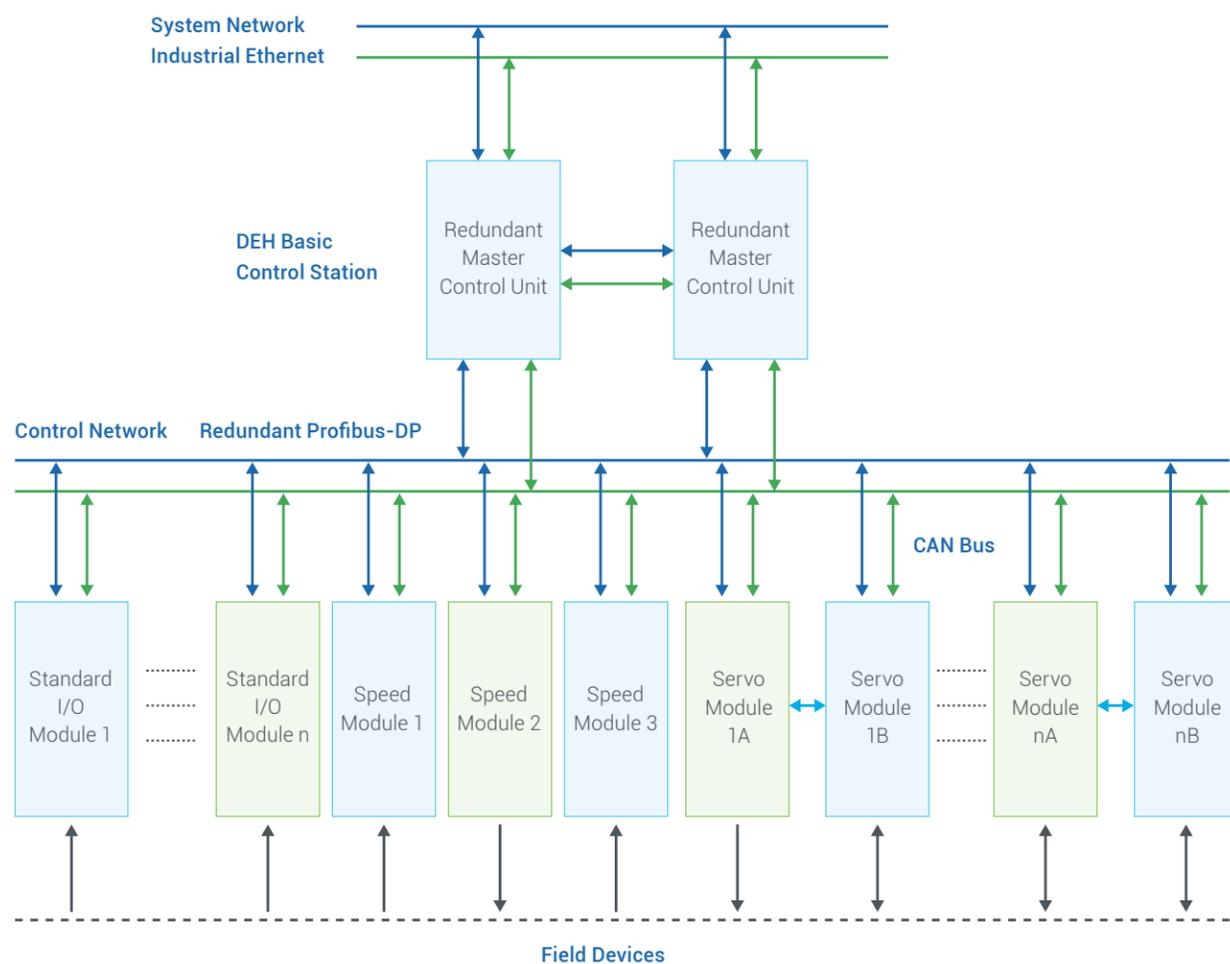
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Technical Advantage



System Architecture



System Functions

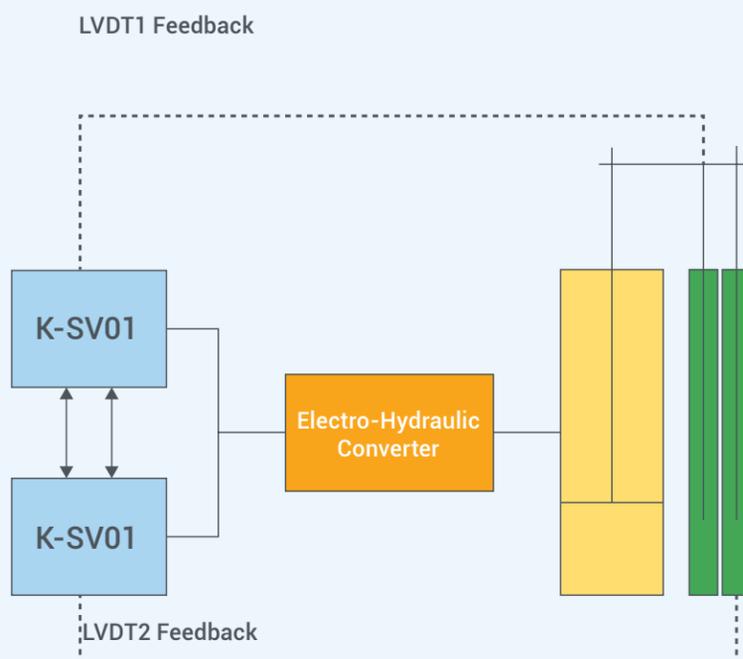
T800K Digital Electro-Hydraulic (DEH) Turbine Control System



Technical Specifications

Speed control accuracy	$\leq \pm 1r / \text{min}$
Maximum rising speed during load shedding	<7% rated speed
Load control accuracy	<0.5%
Extraction pressure control accuracy	$\leq \pm 0.01 \text{Mpa}$
Control cycle	<50ms
Mean Time Between Failures (MTBF)	>100000h

Redundant Servo



- Redundant wire connection between servo modules
- Connection of servo output end to the electro-hydraulic converter
- Online redundant hot standby for servo channels
- Automatic tracking of the active module's working status by the standby module
- Automatic switch to the standby module when the active module fails
- Servo module switching time: $\leq 10 \text{ ms}$

K-FC01 Technical Specifications

K-FC01 Turbine Speed Module

Power Supply	
Power Supply	Dual 24V DC (anti-reverse protection)
Input Voltage	Input voltage range: 18-36V DC
Power Consumption (max.)	$\leq 15\text{W}$
Response Time	
Emergency Shutdown Time and Overspeed Trip Response Time	$\leq 20\text{ms}$
Digital Input Channel	
Number of Channels	1
Response Time	$\leq 5\text{ms}$
Query Current	$5\text{mA} \pm 20\% @ \text{DC}24\text{V}$
Signal Access Mode	Single-ended input
Signal Type	Dry contact
Digital Output Channel	
Number of Channels	4
Signal Type	Dry contact
Contact Capacity	$\text{DC}24\text{V}/0.4\text{A}$ (resistive load) @ $\text{DC}60\text{V}$
Analog Output Channel	
Number of Channels	2
Accuracy (25° C)	0.2%F.S.
Load	$\leq 600\Omega$
Stability	0.10%
Temperature Drift	$\pm 50\text{ppm}/^\circ\text{C}$
Voltage Protection	+30V DC (1 min.)
Frequency Input Channel	
Number of Channels	1
Measurement Range	Square wave: 1~30KHz
	Sine wave: 0.5~30KHz
Sensor Type	Zero-cross, non-zero-cross adaptive
Signal Amplitude	Valid within 1~50Vp-p
Frequency Measurement Accuracy (25° C)	0.01%
Input Impedance	More than 26 K

DP Communication	
Protocol	Profibus DP
Communication Rate	187.5 Kbps, 500 Kbps, and 1.5 Mbps adaptive
Signal Type	RS-485
Number of Channels	2
Redundancy	DP redundancy supported
Wiring	Shielded wires for communication, grounding on the controller side
Station Address	Slave station supported, with the address to be set by pressing keys
Ethernet Communication	
Number of Channels	1
Communication Protocol	Modbus TCP
Ethernet Port	RJ45
Function	Module maintenance and diagnosis
CAN Communication	
Number of Channels	1
Communication Protocol	CAN 2.0B communication (free message buffer)
Data Exchange	Arbitrary node data exchange supported
Communication Rate	50 K, 100 K, 125 K, 250 K, 500 K, 800 K, 1 M
Function	Quick single-pulse modulation
Display	
Type	OLED
Backlight and Text	No backlight, yellow font
Item Dimensions	54.0mmX39.5mmX8.5mm
Viewable Area	37.0mmX19.5mm
Resolution	128 × 64
Keyboard	
Number of Keys	Total
Keyboard Definition	Up, Down, Left, Right, SET, MODE
Physical Characteristics	
Installation Method	Guide rail or panel installation
Module Size (W × H × D)	240 mm × 110 mm × 57 mm
Ingress Protection Rating of Enclosure	IP20
Wiring Terminal	Fault-proof design
Environmental Condition	
Operating Temperature	-20° C~60° C
Operating Relative Humidity	5%~95%, non-condensing
Storage Temperature	-40° C ~70° C
Storage Relative Humidity	5%~95%, non-condensing
Altitude	3000 m

K-SV01 Technical Specifications

K-SV01 Turbine Servo Module

Power Supply	
Power Supply	Dual 24V DC (anti-reverse protection)
Input Voltage	Input voltage range: 18~36V DC
Power Consumption (max)	≤ 15W
Response Time	
Servo Circuit Control Time	≤ 10mS
Digital Input Channel	
Number of Channels	2
Response Time	≤ 5mS
Query Current	5mA±20%@DC24V
Signal Access Mode	Single-ended input (two terminals)
Signal Type	Dry contact point
Contact Type	Contact type
Digital Output Channel	
Number of Channels	2
Response Time	W5mS (before relay)
Signal Type	Dry contact point
Contact Capacity	DC24V/0.4A (resistive load) @DC60V
Analog Input Channel	
Number of Channels	2
Maximum Input Range	0~25mA
Valid Input Range	4~20mA
Input Impedance	≤ 300Ω
Number of ADC Bits	16 bits
Accuracy (25° C)	0.2%F.S.
Stability	0.1%F.S.
Temperature Drift	±50ppm/° C
Common-Mode Rejection Ratio	150VAC@60dB (4-wire system)
Differential Mode Rejection Ratio	40dB (4-wire system)
Overlimit Alarm	Lower limit: 2mA; Upper limit: 22mA
Anti-reverse Protection	Supported
Overvoltage Protection	±30 V (1 minute), channels not damaged

Analog Output Channel	
Number of Channels	1
Maximum Output Range	0~25mA
Valid Output Range	4~20mA
Time of Establishment	≤ 5mS
Accuracy (25C)	0.2%F.S.
Load	≤ 600Ω
Stability	0.10%
Temperature Drift	±50ppm/C
Overvoltage Protection	+30V DC (1 minute)
Hot Reset Output Hold	Supported
Cold Reset	The output is consistent with that in the power failure state

LVDT Input Channel	
Number of Channels	2
Sensor Type	3, 4, 5, 6-wire AC feedback LVDT; 0-10VDC feedback LVDT
Stability	0.1%FS
Linearity (calibrated)	1%
Disconnection Alarm	Supported

Servo Signal Output Channel	
Number of Channels	2
Output Type	Current
Signal Range	Maximum ±200 mA, ±12 V
Load Requirements	≤ 55 ohms
Circuit Control Cycle	≤ 5ms
Accuracy (25° C)	2%F.S.
Stability	0.1%F.S
Time Drift	500ppm/year
Temperature Drift	±50ppm/ °C
Output Flutter Signal	Online setting available
Flutter Value	0.1 × 2nA (n=0, 1, 2, 3, 4, 5) that can be set online, with a 50Hz sine wave
Hot Reset Output Hold	Protect the hydraulic servo-motor stroke from disturbance
Cold Reset	Protect the hydraulic servo-motor stroke from disturbance

Ethernet Communication	
Number of Channels	1
Communication Protocol	ModbusTCP
Ethernet Port	RJ45
Function	Module maintenance and diagnosis
Transmission Rate	10/100 Mbps adaptive

DP Communication	
Protocol	Profibus DP
Communication Rate	187.5 Kbps, 500 Kbps, and 1.5 Mbps adaptive
Signal Type	RS-485
Number of Channels	2
Redundancy	DP redundancy supported
Wiring	Shielded wires for communication, grounding on the controller side
Station Address	Slave station supported, with the address to be set by pressing keys

Redundant Interface	
Number of Channels	1
Signal Type	RS485
Baud Rate	5M
Transmission Distance	480mm ± 10%

CAN Communication	
Number of Channels	1
Communication Protocol	CAN 2.0B communication (free message buffer)
Data Exchange	Arbitrary node data exchange supported
Communication Rate	50 K, 100 K, 125 K, 250 K, 500 K, 800 K, 1 M

Display	
Type	OLED
Backlight and Text	No backlight, yellow font
Item Dimensions	54.0 mm × 39.5 mm × 8.5 mm
Viewable Area	37.0 mm × 19.5 mm
Resolution	128*64

Keyboard	
Number of Keys	Total: 6
Keyboard Definition	Up, Down, Left, Right, SET, MODE

Physical Characteristics	
Installation Method	Guide rail or panel installation
Module Size (W × H × D)	240mm × 110mm × 57mm
Ingress Protection Rating of Enclosure	IP20
Wiring Terminal	Fault-proof design

Environmental Condition	
Operating Temperature	-20°C ~60°C
Operating Relative Humidity	5%~95%, non-condensing
Storage Temperature	-40°C ~70°C
Storage Relative Humidity	5%~95%, non-condensing
Altitude	3000 m