Multi-DOF Networked Control System Instructions

Multi-DOF networked control system is completely independent development by Beijing Hollysys Electric Technology Co,LTD, which consists of CAN(or RS485) and Ethernet network. The system technology is based on the research achievement of the key technologies of national science and technology major project. HS series of all-digital networked servo drive has four national patents (including three invention patents). The product is stable,reliable and feature rich.

■ System components

System configuration	description
Motion controller （SC-MBOX）	Ethernet to CAN bus bidirectional data transfer **Please refer to "SC-MBOX Motion Controller User's Guide".**
Communication adapter plate （COM-EXT）	**Support 3-way(or 6) CAN communication or RS485 communication adapter.**
HS networked servo drives	Support CAN/RS485/RS232 communications **Please refer to the "all-digital AC servo drives HS series Guide"**
Communication cable	CAN bus communication cable	Achieve motion controller and communication adapter plate CAN communication connection
	HS servo communication cable	Achieve communication adapter plate to connect CAN/RS485 communication of HS servo drive. Each servo drive is equipped with a communication cable.

□ SC-MBOX Introduction

SC-MBOX is a motion controller of bi-directional data transfer from Ethernet to CAN bus which is designed for application of the HS servo networked control. It is a multifunction controller including RS232/RS485, 12-way digital outputs, 2-way analog outputs, 8-way digital inputs signal interface, etc. the CAN bus uses electrical isolation techniques to ensure a reliable and safe bus driver.

SC-MBOX Motion Controller

□ SC-MBOX Features
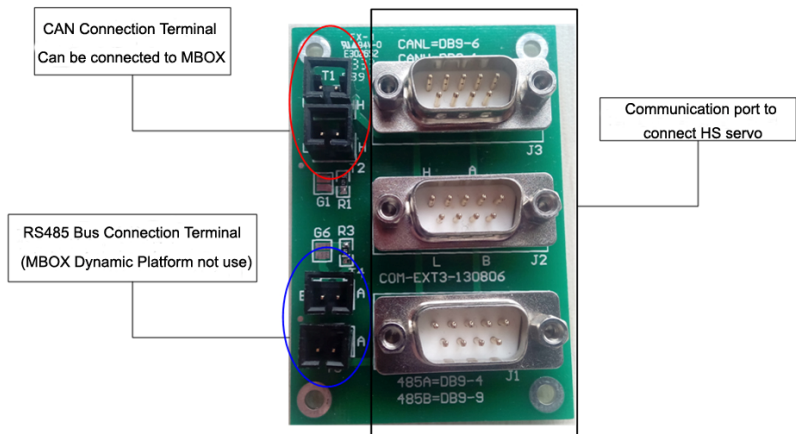
a. Controlled by CAN(or RS485) bus and two-level networked servo

b. Location information, speed information, the load rate information and control state information for each servo motor feed back to the host computer.

c. Set the operating parameters of application communication controller according to a particular condition. Such as initial positioning origin, and a plurality of servo motors can be adjusted according to the given target position.

d. Built-in 12 digital outputs, 2 analog outputs, 8 digital input signal interface

e. Built-in multiple fault protection measures

NOTE: Please refer to "SC-Mbox Motion Platform System User Manual" for detailed instructions.
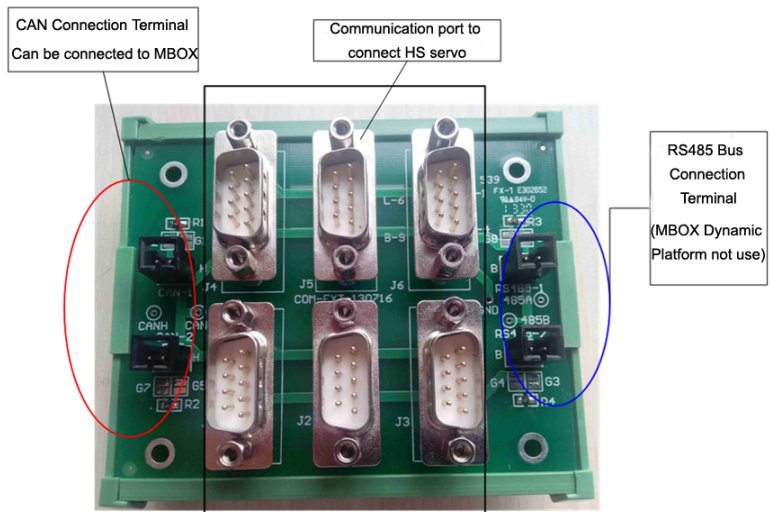
□ Communication Adapter Plate

For the SC-MBOX motion controller and HS servo drives communication connections, providing COM-EXT-3 and COM-EXT-6 which are respectively for 3-axis motion platform and 6-axis motion platform.

The communication adapter plate is installed directly on the 35mm rail, the COM-EXT-3 length is 75mm, the COM-EXT-6 length is 96mm.

CAN Connection Terminal
Can be connected to MBOX

RS485 Bus Connection Terminal
(MBOX Dynamic Platform not use)

Communication port to
connect HS servo

Triaxial communications adapter palte COM-EXT-3

CAN Connection Terminal
Can be connected to MBOX

Communication port to
connect HS servo

RS485 Bus
Connection
Terminal
(MBOX Dynamic
Platform not use)

Six-axis communications adapter palte COM-EXT-6

☐ HS Servo Drive Introduction

HS series networked servo drives are a new generation of cost-effective , practical and reliable all-digital AC servo motor drives which are launched by Beijing Hollysys Electric Technology CO.,LTD.

HS series servo drives appearance

HS series networked servo drives use the latest 32 TI with floating point capability of dual-core digital signal processing chip and a new motor control algorithm, which precisely control the position, velocity, acceleration and output torque of PMSM. It is used in CNC servo control, textile machinery and other industrial automation industries and fields.

□ HS series networked servo drives' features

    a. General motion control functions: position, speed, torque control, mode switch

    b. Fast CLA current loop floating point kemel processes, has good performance of dynamic following.

    c. Built-in grid voltage compensation control and automatically adapt to fluctuations of the grid voltage.

    d. Built-in 2-way optional resonance low-pass filter and two resonance notch filter response to mechanical resonance effectively.

    e. Built-in proprietary intelligent regenerative braking control technology

    f. Built-in torque observer technology to automatically adapt to changes in load.

    g. Control gain or internal adaptive matched

    h. Built-in dynamic brake control, to provide additional security for drive.

    i. With overload automatic load shedding algorithm and can be parameterized to choose whether overload protection and automatic smooth load shedding and restoration.

    j. Support RS232 and RS485 communication interface, direct communication with the host computer and touchscreen.

    k. Support CAN bus interface and built-in proprietary communication protocol to easy to use customization.

    l. Control port supports logic settings and programmable filter, flexible and reliable.

    m. Pulse analog interface: pulse input frequency is up to 1MHZ.

    n. 2-way analog outputs can be observed internal state of drive and be convenient on-site commissioning.

    o. Built-in power tube temperature monitoring, overcurrent, overvoltage and overheating protection to ensure reliable drive.

    p. Has history fault records and other reliable management functions.

■ System features

HS series networked servo drives offer three kinds of bus interfaces: RS232, RS485 and CAN bus. RS232 interface is standard communication interface. RS485 and CAN bus communication interface is optional, with electrical isolation and transient voltage suppression protection technology and good electromagnetic compatibility and reliability. RS232 and RS485 communication protocol is a common used industrial protocols. CAN bus communication protocol is the method of the company with independent intellectual property rights.

HS networked servo drives enhance the control function in bus mode, support RS232, RS485 and multiple bus mode control of CAN bus interface. Including:

1. Torque control mode
2. Speed control mode
3. Relative position control mode
4. Absolute position control mode

Standard RS232 interface achieves the point to point communication of touchscreen or HS servo drive and PC, and monitors HS servo drive status, parameters read mode and bus mode, which is commonly used in the parameter configuration and operation monitoring of servo drive. You can choose RS485 bus or CAN bus to achieve HS servo drives networked operation. Generally, CAN bus is flexibility and reliability and suitable for networked real-time control, and MODBUS communications can carry large packets to be suitable for less demanding real-time and large capacity parameter passing and data monitoring.

The figure is the HS networked servo drive using CAN bus and SC-MBOX motion controller constitute a typical architecture of networked control systems.

SC-MBOX and host computer achieve Ethernet communication via switch. SC-MBOX and HS servo achieve CAN bus communication. In addition, SC-MBOX also achieve MODBUS communication via such as RS232 interfaces with a local computer or a touch screen to facilitate monitoring and debugging. Meanwhile, SC-MBOX also provide 8 digital inputs, 12 digital outputs and 2 analog output interface, easy to implement low-cost digital and analog interfaces for data acquisition and control via Ethernet bus.
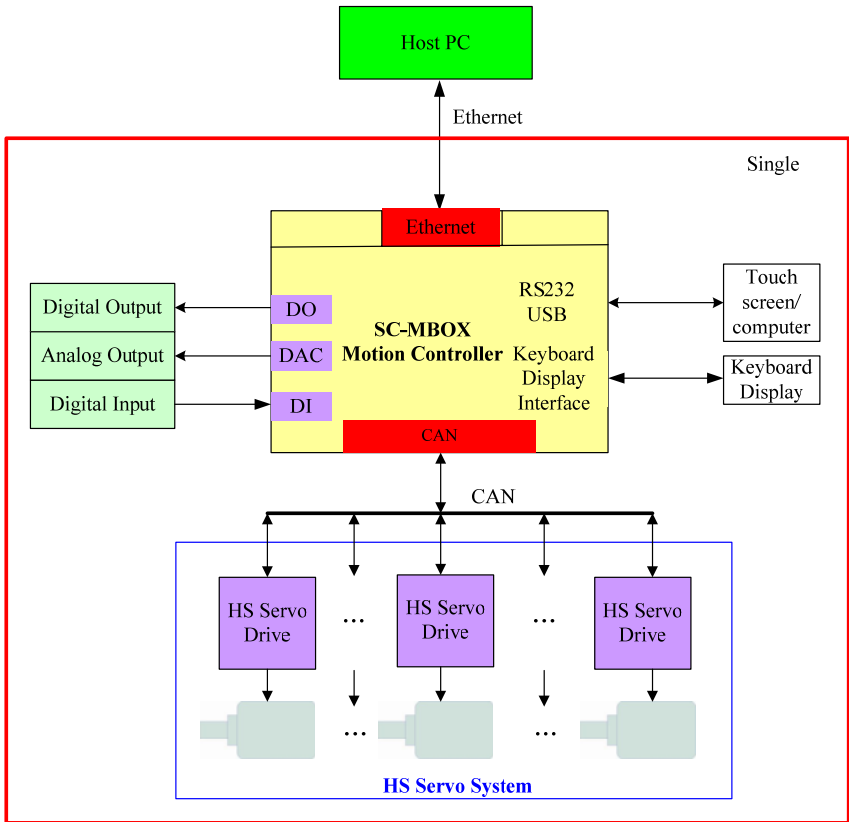
Multi-DOF Networked Control System

■ Multi-node Network Control Application

CAN bus maximum nodes of each SC-MBOX is related with transmission distance and baud rate. The common application nodes are 3, 6, 9, 16, and so on. SC-MBOX Ethernet interface is connected through switch. When a switch port is not enough, can be extended by another switch. In the application, each SC-MBOX has an ID number which is represented by IP address of the Ethernet, for example: 192.168.1.100. The control node of each SC-MBOX is a whole, external cable requires only a 220V power cord and an Ethernet network line, which greatly simplifies the implementation of on-site wiring project. In addition, Ethernet communication uses 10M/100M adaptive way that has a high-speed data transfer, reliability and large capacity and other characteristics.
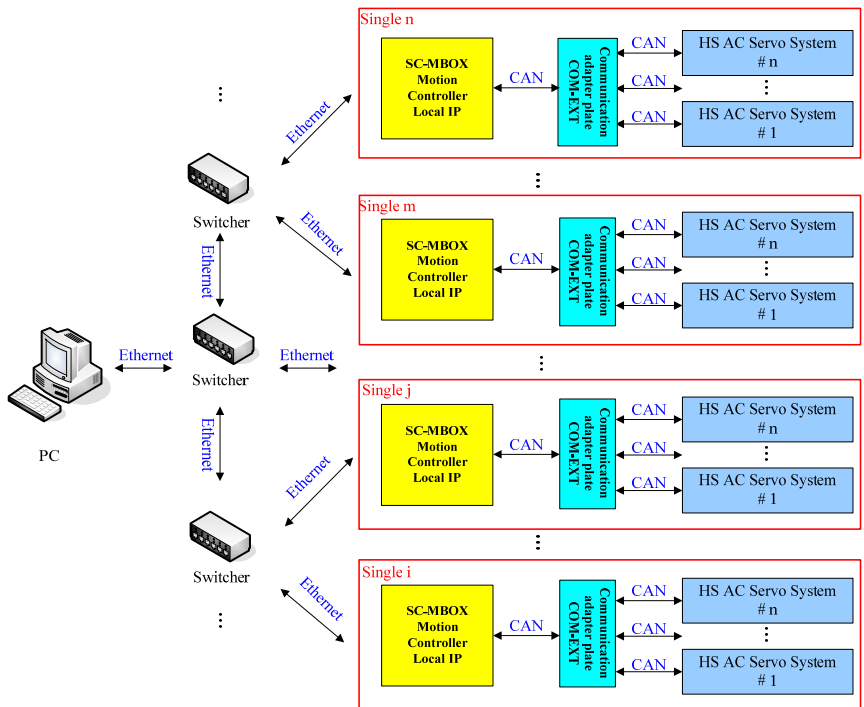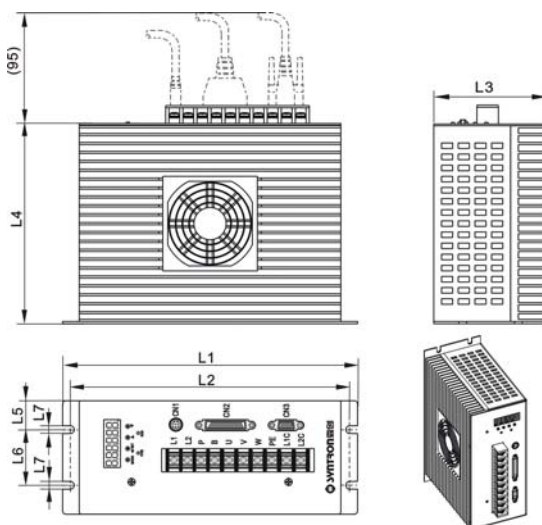

Multi-node Network Control Scheme

■ Dimensions（Unit：mm）
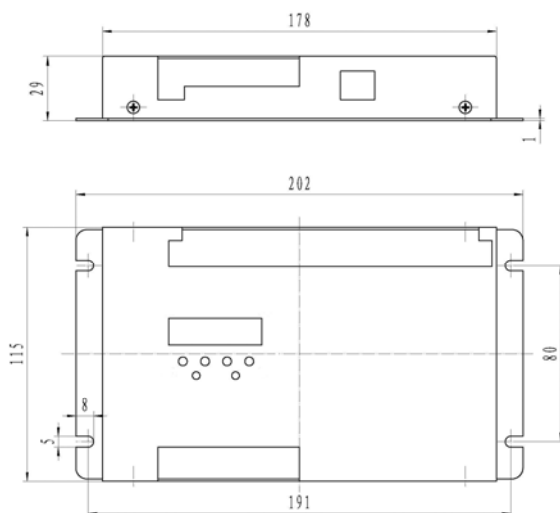
SC-MBOX Dimension

HS Series Servo Drive Dimenstion

Model	Weight (Kg)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)
HS0020A-xxxx	1.8	210	196	77	135	15.5	46	5
HS0040A-xxxx	1.8	210	196	77	135	15.5	46	5
HS0075A-xxxx	2.5	230	216	92	144	23	46	5
HS0100A-xxxx	2.5	230	216	92	144	23	46	5
HS0150A-xxxx	3.75	265	251	102	180	26	50	7
HS0200A-xxxx	3.75	265	251	102	180	26	50	7
HS0250A-xxxx	3.75	265	251	102	180	26	50	7

HS Series Servo Drive Dimension and Weight Data

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Ver 12/2013