

## Tiny Serial Port Converter/Sharer

### tSH-700 Series

#### Tiny Serial Port Sharer



tSH-700 series



### Features ▶▶▶

- Supports baud rate conversion application
- Supports two masters sharing one slave port
- Read-cache ensures faster response
- Redundant power inputs: PoE and DC jack
- Tiny form-factor and low power consumption
- Supports Modbus RTU/ASCII protocol conversion
- Raw data mode for most query-response protocols
- Built-in web server for easy configuration (HTTP)
- Allows automatic RS-485 direction control
- Power or Signal isolation for i versions
- ±4 kV ESD protection

### Introduction

Following the success of the original tGW-700/tDS-700 modules, ICP DAS has continued to develop new functions for these products in order to provide increased support for a greater number of applications. The tGW-700 modules are Modbus TCP-to-Serial gateway, while the tSH-700 modules are Serial Port Sharers working as Serial-to-Serial converters. The tSH-700 module provides a number of functions, including "Baud Rate Conversion", "Modbus RTU/ASCII Conversion" and "Two Masters Share One Slave". The built-in web server provides easy configuration interface, and no console commands are required.

#### • Baud Rate Conversion:

This function allows a single master device to communicate with slave devices using different baud rates and data formats. Most query-response protocols (half-duplex), e.g. DCON, are supported in the raw data mode. Full-duplex communication should also work when the data size is smaller than the built-in 512 bytes buffer on each serial port.



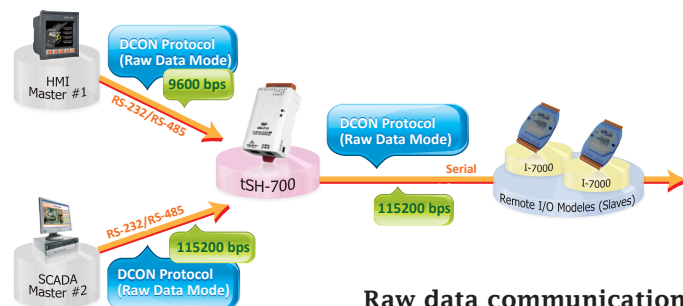
#### • Modbus RTU/ASCII Conversion:

This function allows a single Modbus RTU/ASCII master device to communicate with Modbus RTU/ASCII slave devices using different protocols, baud rates and data formats.



#### • Two Masters Share One Slave:

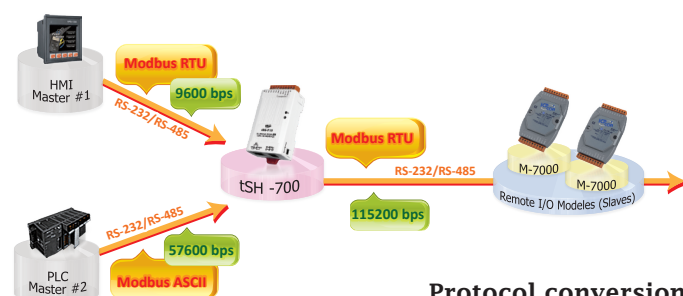
This function allows two master devices connected to different serial ports to share slave devices. The queries from the masters are queued in the tSH-700 module and then processed one-by-one. Modbus mode can be used to convert the Modbus RTU/ASCII protocols, while raw data mode can be used for DCON or other query-response protocols. Different baud rates and data formats can also be used on the different serial ports.



Raw data communication

#### • Read-Cache Function:

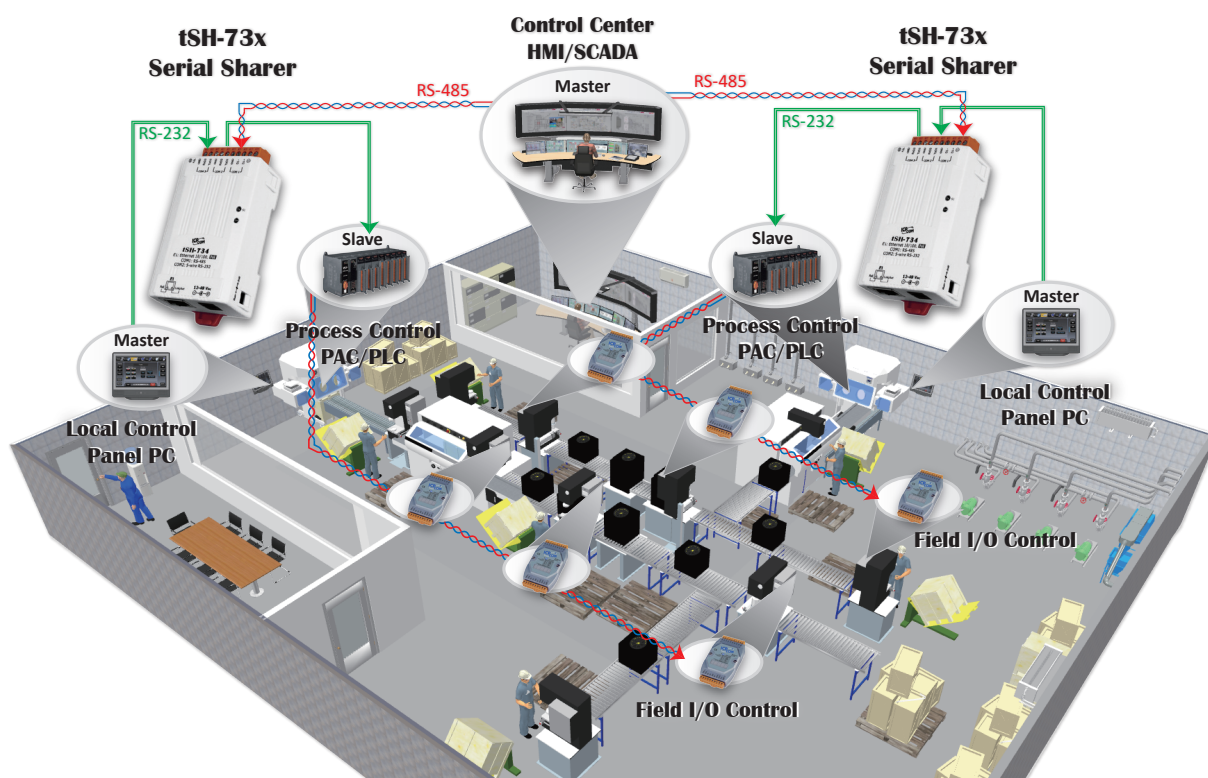
The built-in read-cache function is used to store previous requests and responses of the Modbus messages in the memory buffer of the tSH-700 module. When other HMI/SCADA master controllers requiring the same information from the same slave RTU device, the cached response is returned immediately. This feature dramatically reduces the loading on the slave serial port communication, ensures faster responses to the master, and improves the stability of the entire system.



Protocol conversion

## Applications

### Accessing a Process Controller from Local Panel and Control Center

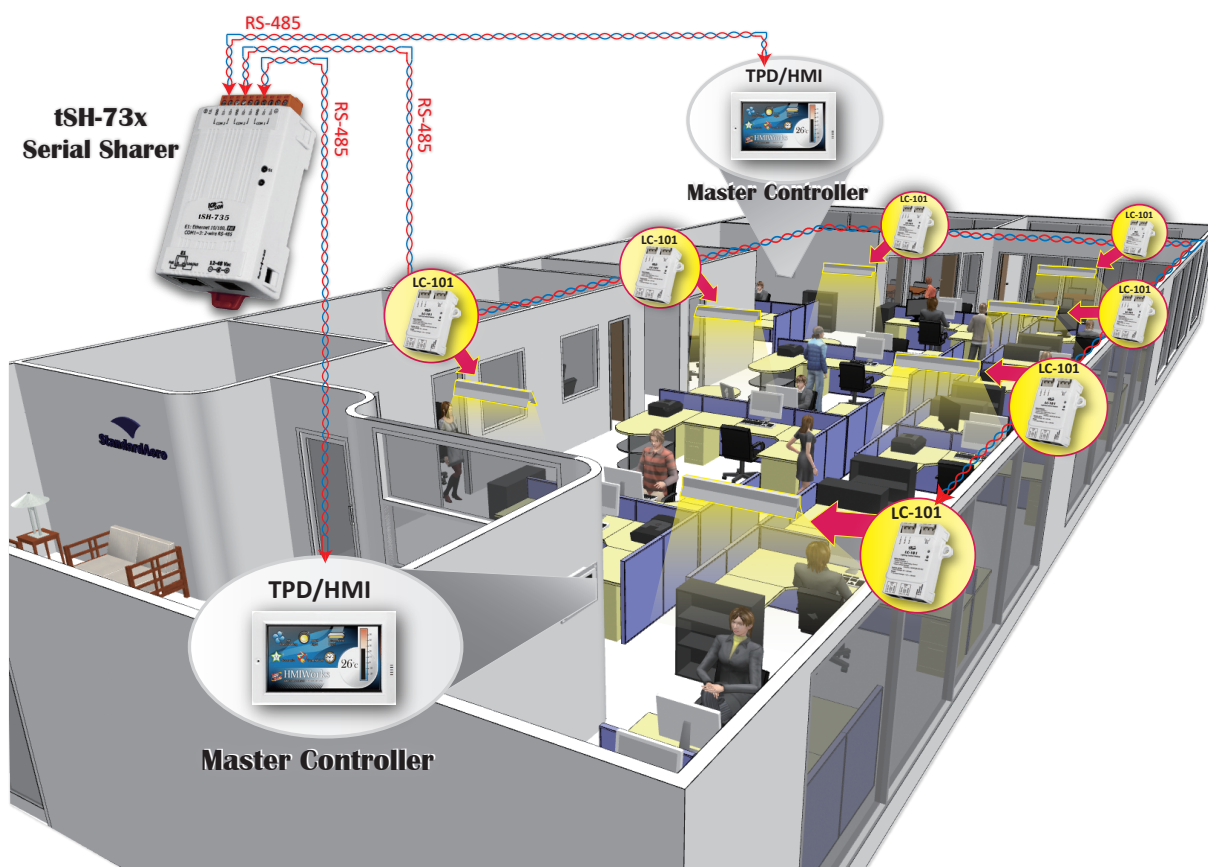


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Serial Device Server

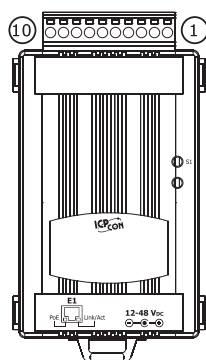
### Control Office Lightings from Two HMI Devices (Masters) in Different Places



## System Specifications

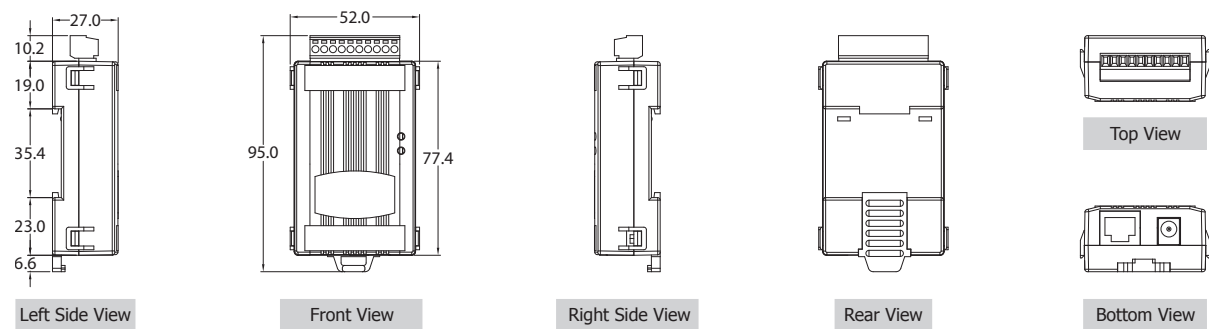
| Models                                          | tSH-722<br>tSH-722i                                                               | tSH-732<br>tSH-732i | tSH-725<br>tSH-725i                     | tSH-735<br>tSH-735i | tSH-724<br>tSH-724i      | tSH-734<br>tSH-734i      |
|-------------------------------------------------|-----------------------------------------------------------------------------------|---------------------|-----------------------------------------|---------------------|--------------------------|--------------------------|
| System                                          |                                                                                   |                     |                                         |                     |                          |                          |
| CPU                                             | 32-bit MCU                                                                        |                     |                                         |                     |                          |                          |
| Communication Interface                         |                                                                                   |                     |                                         |                     |                          |                          |
| Ethernet                                        | 10/100 Base-TX, 8-pin RJ-45 x 1, (Auto-negotiating, Auto-MDI/MDIX, LED indicator) |                     |                                         |                     |                          |                          |
| PoE                                             | IEEE 802.3af, Class 1                                                             |                     |                                         |                     |                          |                          |
| COM Port                                        | 2 × RS-232                                                                        | 3 × RS-232          | 2 × RS-485                              | 3 × RS-485          | 1 × RS-485<br>1 × RS-232 | 1 × RS-485<br>2 × RS-232 |
| Self-Tuner                                      | —                                                                                 |                     | Yes, automatic RS-485 direction control |                     |                          |                          |
| Power Isolation                                 | 1000 V <sub>DC</sub> for only tSH-722i/ 732i                                      |                     |                                         |                     |                          |                          |
| Signal Isolation                                | 3000 V <sub>DC</sub> for only tSH-725i/ 735i /724i /734i                          |                     |                                         |                     |                          |                          |
| ESD Protection                                  | +/-4 kV                                                                           |                     |                                         |                     |                          |                          |
| COM Port Capability (16C550 or compatible UART) |                                                                                   |                     |                                         |                     |                          |                          |
| Baud Rate                                       | 115200 bps Max.                                                                   |                     |                                         |                     |                          |                          |
| Data Bit                                        | 5, 6, 7, 8                                                                        |                     |                                         |                     |                          |                          |
| Parity                                          | None, Odd, Even, Mark, Space                                                      |                     |                                         |                     |                          |                          |
| Stop Bit                                        | 1, 2                                                                              |                     |                                         |                     |                          |                          |
| Power                                           |                                                                                   |                     |                                         |                     |                          |                          |
| Power Input                                     | IEEE 802.3af, Class 1 for PoE; +12 ~ 48 VDC for DC Jack                           |                     |                                         |                     |                          |                          |
| Power Consumption                               | 0.07 A @ 24 V <sub>DC</sub>                                                       |                     |                                         |                     |                          |                          |
| Mechanical                                      |                                                                                   |                     |                                         |                     |                          |                          |
| Connector                                       | 10-pin Removable Terminal Block x 1                                               |                     |                                         |                     |                          |                          |
| Dimensions (W x H x D)                          | 52 mm x 95 mm x 27 mm                                                             |                     |                                         |                     |                          |                          |
| Installation                                    | DIN-Rail mounting                                                                 |                     |                                         |                     |                          |                          |
| Case                                            | Plastic                                                                           |                     |                                         |                     |                          |                          |
| Environment                                     |                                                                                   |                     |                                         |                     |                          |                          |
| Operating Temperature                           | -25 °C ~ +75 °C                                                                   |                     |                                         |                     |                          |                          |
| Storage Temperature                             | -30 °C ~ +80 °C                                                                   |                     |                                         |                     |                          |                          |
| Humidity                                        | 10 ~ 90% RH, non-condensing                                                       |                     |                                         |                     |                          |                          |

## Pin Assignments



| tSH-722/tSH-722i |    |      | tSH-732/tSH-732i |      |    | tSH-735/tSH-735i |    |      |
|------------------|----|------|------------------|------|----|------------------|----|------|
| COM2             | 10 | F.G. | 10               | F.G. | 10 | F.G.             | 10 | F.G. |
|                  | 09 | CTS2 | 09               | GND  | 09 | GND              | 09 | GND  |
|                  | 08 | RTS2 | 08               | RxD3 | 08 | D3-              | 08 | D3-  |
|                  | 07 | RxD2 | 07               | TxD3 | 07 | D3+              | 07 | D3+  |
|                  | 06 | TxD2 | 06               | GND  | 06 | GND              | 06 | GND  |
| COM1             | 05 | GND  | 05               | RxD2 | 05 | D2-              | 05 | D2-  |
|                  | 04 | CTS1 | 04               | TxD2 | 04 | D2+              | 04 | D2+  |
|                  | 03 | RTS1 | 03               | GND  | 03 | GND              | 03 | GND  |
|                  | 02 | RxD1 | 02               | RxD1 | 02 | D1-              | 02 | D1-  |
|                  | 01 | TxD1 | 01               | TxD1 | 01 | D1+              | 01 | D1+  |
| tSH-725/tSH-725i |    |      | tSH-724/tSH-724i |      |    | tSH-734/tSH-734i |    |      |
|                  | 10 | F.G. | 10               | F.G. | 10 | F.G.             | 10 | F.G. |
|                  | 09 | N/A  | 09               | N/A  | 09 | GND              | 09 | GND  |
|                  | 08 | N/A  | 08               | CTS2 | 08 | RxD3             | 08 | RxD3 |
|                  | 07 | N/A  | 07               | RTS2 | 07 | TxD3             | 07 | TxD3 |
| COM2             | 06 | GND  | 06               | GND  | 06 | GND              | 06 | GND  |
|                  | 05 | D2-  | 05               | RxD2 | 05 | RxD2             | 05 | RxD2 |
|                  | 04 | D2+  | 04               | TxD2 | 04 | TxD2             | 04 | TxD2 |
| COM1             | 03 | GND  | 03               | GND  | 03 | GND              | 03 | GND  |
|                  | 02 | D1-  | 02               | D1-  | 02 | D1-              | 02 | D1-  |
|                  | 01 | D1+  | 01               | D1+  | 01 | D1+              | 01 | D1+  |

## Dimensions (Unit: mm)



## Ordering Information

| Non-Isolated | Isolated    | Serial Port Sharer: Includes one CA-002 cable.                       |
|--------------|-------------|----------------------------------------------------------------------|
| tSH-722 CR   | tSH-722i CR | Tiny Serial Port Sharer with PoE and 2 RS-232 Ports (RoHS)           |
| tSH-732 CR   | tSH-732i CR | Tiny Serial Port Sharer with PoE and 3 RS-232 Ports (RoHS)           |
| tSH-725 CR   | tSH-725i CR | Tiny Serial Port Sharer with PoE and 2 RS-485 Ports (RoHS)           |
| tSH-735 CR   | tSH-735i CR | Tiny Serial Port Sharer with PoE and 3 RS-485 Ports (RoHS)           |
| tSH-724 CR   | tSH-724i CR | Tiny Serial Port Sharer with PoE, 1 RS-485 and 1 RS-232 Ports (RoHS) |
| tSH-734 CR   | tSH-734i CR | Tiny Serial Port Sharer with PoE, 1 RS-485 and 2 RS-232 Ports (RoHS) |

## Accessories

|                                                                                 |                                                                                                                 |                                                                                                     |                                                                                             |                                                                                                        |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>CA-002</b><br>DC connector to 2-wire power cable, 0.3 M                      | <b>CA-0915</b><br>Male DB-9 to Female DB-9 Cable, 1.5 m                                                         | <b>CA-0910F</b><br>Female DB-9 to Female DB-9 Cable, 1.0 m                                          | <b>CA-0910N</b><br>DB-9 Female-Female 3-wire Null Modem Cable, 1M                           | <b>CA-PC09F</b><br>DB-9 Female Connector with Plastic Cover                                            |
|                                                                                 |                                                                                                                 |                                                                                                     |                                                                                             |                                                                                                        |
| <b>FRA05-S12-SU CR</b><br>12V/0.58A (max.) Power Supply (RoHS, for tDS/tGW-700) | <b>DIN-KA52F CR</b><br>24V/1.04A, 25 W Power Supply with DIN-Rail Mounting (RoHS, for NS-205 and NS-205PSE-24V) | <b>DIN-KA52F-48 CR</b><br>48V/0.52A, 25 W Power Supply with DIN-Rail Mounting (RoHS, for NS-205PSE) | <b>NS-205PSE CR</b><br>Unmanaged Ethernet Switch with 4 PoE Ports and 1 RJ-45 Uplink (RoHS) | <b>NS-205PSE-24V CR</b><br>Unmanaged 5-port 10/100 Mbps PoE (PSE) Ethernet Switch; 24 Vdc Input (RoHS) |
|                                                                                 |                                                                                                                 |                                                                                                     |                                                                                             |                                                                                                        |