IVC2L-RS485 通信模块用户手册

提示：

在开始使用之前，请仔细阅读本手册中的操作指示和注意事项，以减少意外的发生。负责产品安装、操作的人员必须经严格培训，遵守相关行业的安全规范，严格遵守本手册提供的相关设备注意事项和特殊安全指示，按正确的操作方法进行设备的各项操作。

1 产品介绍

1.1 模块简介

IVC2L-RS485 通信模块（简称 IVC2L-RS485），以扩展模块的形式连接到 IVC2L 系列 PLC 系统中，为 PLC 系统和其他 RS485 设备之间提供一路隔离的 RS485 通信接口。

深圳市英威腾自动控制技术有限公司

合格证

检验员： ────────

客户服务中心

产品质量反馈单

用户姓名		电话	
用户地址		邮编	
产品名称及型号		安装日期	
机器编号			
产品外观或结构			
产品性能			
产品包装			
产品资料			
使用中质量情况			
您对该产品的改进意见或建议			

深圳市南山区龙井高发科技园　　邮政编码：518055

1.2 外形结构

IVC2L-RS485 的外形结构如图 1-1 和图 1-2 所示。

图1-1　IVC2L-RS485 接口和指示灯

图1-2　拨码开关示意图

机械尺寸（长×宽×高）：32mm×90mm×81mm

1.3 指示灯说明

IVC2L-RS485 面板上有三个指示灯，分别为 POWER、RD 和 SD。其具体含义如表 1-1 所示。

表1-1　指示灯说明

指示灯	颜色	功能说明	状态说明	
			亮	灭
POWER	绿色	电源指示灯	电源正常	无电源
RD	绿色	接收状态指示灯	数据接收中	无接收数据
SD	绿色	发送状态指示灯	数据发送中	无发送数据

1.4 通信端子

通信端子为随机发放的欧式端子排，通信电缆采用螺丝固定。通信端子实物请参见图1-1。图1-3为通信端子管脚分布示意图。
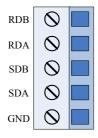
图1-3 通信端子管脚分布

管脚定义如表1-2所示。

表1-2 通信端子管脚定义

管脚名称	功能	信号方向
RDB	接收差分信号 B	IVC2L-RS485 ← 其他设备
RDA	接收差分信号 A	
SDB	发送差分信号 B	IVC2L-RS485 → 其他设备
SDA	发送差分信号 A	
GND	信号地	—

2 技术参数

2.1 电源指标

IVC2L-RS485 的 5Vdc 电源通过扩展电缆由 PLC 主模块提供。最大允许纹波电压 5%，最大输入电流 125mA。

2.2 环境要求

IVC2L-RS485 使用环境、储存环境和运输环境要求见表2-1。

表2-1 环境要求

环境参数	使用环境	运输环境	储存环境
温度范围	−5℃～+55℃	−40℃～+70℃	
温度变化	—	1℃/min	—
相对湿度	95%（30±2℃）	95%（40±2℃）	—
凝露	无凝露		
气压	80 kPa～106kPa		

2.3 通信性能参数

IVC2L-RS485 通信端子的通信性能参数见表2-2。

表2-2 通信性能参数

参数	描述
传输标准	RS485
隔离类型	光耦隔离
总线端口类型	5-pin 欧式端子排
通信模式	半双工/全双工
支持协议	自由口协议；MODBUS 协议
编址范围	自由口协议：无地址 MODBUS 网络地址：1～247
网络容量	网络中最大节点数为 31
通信波特率	可由用户配置，最高为 115.2kbps
最大传输距离	1000m

3 安装及使用

3.1 安装环境

IVC2L-RS485 应安装在满足标准规定的环境条件下（见表 2-1），特别应远离有可燃性气体、爆炸性气体或尘埃的危险场所，以防止发生火灾或爆炸。

3.2 机械安装

IVC2L-RS485 可以采用螺钉安装或 DIN 导轨安装。具体采用何种安装方式请根据现场情况确定。建议采用与 PLC 系统其它模块相同的安装方式。具体请参见相关模块用户手册的安装部分。

3.3 连接 IVC2L-RS485 到 PLC 系统

直接将 IVC2L-RS485 上的扩展电缆（见图 1-1）插入 IVC2L 系列 PLC 系统中任意模块的扩展电缆接口中即可。

📖 注意

1．IVC2L-RS485 跟其它扩展模块一样，可以连接到扩展总线的任意位置。

2．同一个 PLC 主模块后面最多只能连接 1 个 IVC2L-RS485。

3．PLC 系统中的其它扩展模块和 IVC2L-RS485 的总功耗不能超过主模块提供的总电源容量。

3.4 连接 IVC2L-RS485 到 RS485 总线

📖 **注意**

1．**请勿带电插拔通信端子，以免对通信模块造成损坏。**

2．**建议用户使用屏蔽双绞线进行通信。**

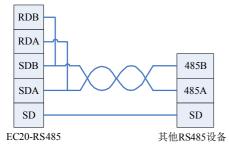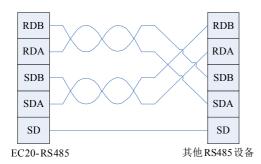IVC2L-RS485 通信电缆的连接可以采用两线制或者四线制。连线方式如图 3-1 以及图 3-2 所示。

图3-1 两线制通信连线示意图

图3-2 四线制通信连线示意图

3.5 设置终端匹配电阻

IVC2L-RS485 内置有可选择的终端匹配电阻。终端匹配电阻通过模块上的拨码开关的 1～3 位进行选择。拨码开关在 IVC2L-RS485 上的位置见图 1-2。请按照实际的通信需求，根据表 3-1 设置匹配电阻。

表3-1 终端匹配电阻设置

B1	B2	B3	图示	配置状态
On	Off	Off	ON ← B1 ■□ B2 □■ B3 □■	110Ω
Off	On	On	ON ← B1 □■ B2 ■□ B3 ■□	330Ω
Off	Off	Off	ON ← B1 □■ B2 □■ B3 □■	不匹配
其它			—	不允许
注： 如果用户选择终端匹配电阻，两线制建议选择 110Ω，而四线制则建议选择 330Ω				

3.6 切换半双工和全双工

IVC2L-RS485 支持半双工通信和全双工通信。请按照表 3-2 通过拨码开关的第四位进行半双工和全双工的切换。拨码开关在 IVC2L-RS485 上的位置见图 1-2。

表3-2 通信模式配置

B4	图示	配置状态
On	ON ← B4 ■□	半双工
Off	ON ← B4 □■	全双工

3.7 配置模块

用户在使用 IVC2L-RS485 之前还需在 PLC 后台软件中对其进行配置。配置是在**系统块**的**通信模块**选项卡中进行，如图 3-3 所示。其配置内容类似于主模块的 COM0 和 COM1，具体请参见《IVC 系列小型可编程控制器编程手册》中的*第十章 通讯功能使用指南*以及 *6.12 通讯指令*。

图3-3 对模块进行配置

配置完成后用户应将程序下载到 PLC 系统主模块中。IVC2L-RS485 的通信口作为 PLC 的 COM2，可以通过通信指令实现相应的 RS485 通信功能。其操作与 COM0 和 COM1 的操作相同，具体请参见《IVC 系列小型可编程控制器编程手册》中的*第十章 通讯功能使用指南*以及 *6.12 通讯指令*。

4 故障处理

IVC2L-RS485 在使用过程中如果出现故障，用户可以根据其面板上的指示灯状态来判断故障类型并排除故障。具体参见表 1-1。

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邮编：518055

公司网址：www.invt.com.cn

用户须知

1．保修范围指可编程控制器本体。

2．保修期为十八个月，保修期内正常使用情况下，产品发生故障或损坏，我公司免费维修。

3．保修期起始时间为产品制造出厂日期，机器编码是判断保修期的唯一依据，无机器编码的设备按过保处理。

4．即使在保修期内，如发生以下情况，将收取一定的维修费用：

不按用户手册操作导致的机器故障；

由于火灾、水灾、电压异常等造成的机器损坏；

将可编程控制器用于非正常功能时造成的损坏。

5．服务费按实际费用计算，如另有合同，以合同优先的原则处理。

6．请您务必保留此卡，并在保修时出示给维修单位。

7．如您有问题可与代理商联系，也可直接与我公司联系。

IVC2L-RS485 Communication Module User Manual

Note:

To reduce the chance of accident, please carefully read the operating instructions and safety precautions prior to use. Only adequately trained personnel shall install or operate this product. In operation, strict compliance with applicable safety rules in the industry, the operating instructions and safety precautions in this manual is required.

To Customers:

Thank you for choosing our products. To improve the product and provide better service for you, could you please fill in the form after the product has been operated for 1 month, and mail or fax it to our Customer Service Center? We will send you an exquisite souvenir upon receiving the complete Product Quality Feedback Form. Furthermore, if you can give us some advices on improving the product and service quality, you will be awarded a special gift. Thank you very much!

Product Quality Feedback Form

Customer name		Tele	
Address		Zip code	
Model		Date of use	
Machine SN			
Appearance or structure			
Performance			
Package			
Material			
Quality problem during usage			
Suggestion about improvement			

Address: Gaofa Industrial Park, Longjing, Nanshan District, 518055, Shenzhen, PRC

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Tel:

1 Product Introduction

1.1 Module Description

IVC2L-RS485 communication module (for short, IVC2L-RS485) is connected to the PLC system as an extension module, providing an isolated RS485 communication interface between IVC2L series PLC system and RS485 equipment.

1.2 Appearance & Structure

The appearance and structure of IVC2L-RS485 are shown in Figure 1-1 and Figure 1-2.
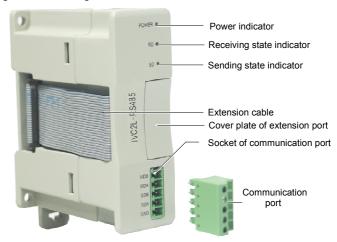

Figure 1-1   IVC2L-RS485 ports and indicators

Figure 1-2   DIP switch

Mechanical sizes (L × W × H): 32mm × 90mm × 81mm

1.3 Indicator Description

Three indicators are positioned on IVC2L-RS485 front panel: POWER, RD and SD. They are described in Table 1-1.

Table 1-1   Indicator description

Indicator	Color	Function	State description	
			On	Off
POWER	Green	Power indicator	Power normal	No power

RD	Green	Receiving state indicator	Receiving data	Not receiving
SD	Green	Sending state indicator	Sending data	Not sending

1.4 Communication Port

The communication port is a terminal block (European type) delivered with IVC2L-RS485. Communication cables are connected to the communication port with screws. See Figure 1-1 for the picture of the port. The pin layout is shown in Figure 1-3.
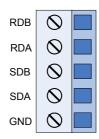
Figure 1-3 Pin layout of communication port

The pins are described in Table 1-2.

Table 1-2 Pin description of communication port

Pin	Function	Signal direction
RDB	Receive differential signal B	IVC2L-RS485 ← Other equipment
RDA	Receive differential signal A	
SDB	Send differential signal B	IVC2L-RS485 → Other equipment
SDA	Send differential signal A	
GND	Signal ground	–

2 Technical Parameters

2.1 Power Supply

The 5Vdc power supply of IVC2L-RS485 comes from the PLC basic module through the extension cable. Maximum allowable ripple voltage: 5%. Maximum input current: 125mA.

2.2 Environmental Requirements

The environmental requirements for the work, storage and transportation of IVC2L-RS485 are listed in Table 2-1.

Table 2-1 Environmental requirements

Parameter	Work	Transportation	Storage
Temperature range	-5°C ~ +55°C	-40°C ~ +70°C	
Temperature change	–	1°C/min	–
Relative humidity	95% (30 ± 2°C)	95% (40 ± 2°C)	–
Condensation	Non-condensing		
Air pressure	80kPa ~ 106kPa		

2.3 Communication Parameters

The communication parameters of IVC2L-RS485 communication port are listed in Table 2-2.

Table 2-2 Communication parameters

Parameter	Description
Transmission standard	RS485
Isolation type	Optocoupler isolation
Bus port type	5-pin terminal block (European type)
Communication mode	Semi-duplex/full-duplex
Supported protocol	Free port protocol, MODBUS
Addressing range	Free port protocol: no address MODBUS network address: 1 ~ 247
Network capacity	Max. number of network nodes: 31
Communication baud rate	Set as per actual needs. Max.: 115.2kbps
Max. transmission range	1000m

3 Installation & Operation

3.1 Installation Environment

The installation position of IVC2L-RS485 should meet the conditions listed in Table 2-1. In particular, the installation position should be free of combustible or explosive gases and dust in order to avoid fire or explosion.

3.2 Mechanical Installation

IVC2L-RS485 can be installed with screws or DIN rail. You can determine the installation mode according to the actual situation. It is recommended to use the installation mode that other PLC modules in the system use. See the installation part in the user manual of the related module.

3.3 Connecting IVC2L-RS485 To PLC System

Insert the extension cable of IVC2L-RS485 (see Figure 1-1) into the extension port of any module in the IVC2L series PLC system.

    Note

1. Like other extension modules, IVC2L-RS485 can be connected to any position in the extension bus.
2. Only one IVC2L-RS485 can be connected to one PLC basic module.
3. The total power consumption of IVC2L-RS485 and all the other extension modules in the PLC system should not exceed the capacity of the basic module.

3.4 Connecting IVC2L-RS485 To RS485 Bus

📖 Note

1. Do not plug or unplug the communication port on-line, lest the communication module should be damaged.
2. It is recommended to use shielded twisted-pair as the communication cable.

The communication cables of IVC2L-RS485 can be connected in two-wire system or four-wire system, as shown in Figure 3-1 and Figure 3-2.
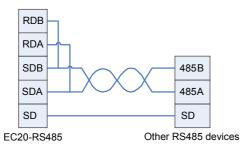

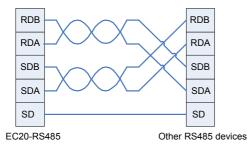*Figure 3-1　Two-wire connection system*

Figure 3-2　Four-wire connection system

3.5 Setting Termination Resistor

IVC2L-RS485 is built-in with optional termination resistors that can be selected through bits 1 ~ 3 of the DIP switch on IVC2L-RS485. The location of the DIP switch on IVC2L-RS485 is shown in Figure 1-2. You should set the termination resistor according to Table 3-1 based on the actual communication needs.

Table 3-1　Setting of termination resistor

B1	B2	B3	Demonstration	Setting
On	Off	Off	ON ← B1 ■□ B2 □■ B3 □■	110Ω
Off	On	On	ON ← B1 □■ B2 ■□ B3 ■□	330Ω
Off	Off	Off	ON ← B1 □■ B2 □■ B3 □■	Open
Others			–	Prohibited
Note: If you intend to select a termination resistor, it is recommended to select 110Ω for two-wire system and 330Ω for four-wire system				

3.6 Setting Semi-duplex & Full-duplex

IVC2L-RS485 supports semi-duplex communication and full-duplex communication. You can set the semi-duplex or full-duplex through bit 4 of the DIP switch according to Table 3-2. The location of the DIP switch on IVC2L-RS485 is shown in Figure 1-2.

Table 3-2　Setting semi-duplex or full-duplex

B4	Demonstration	Setting
On	ON ← B4 ■□	Semi-duplex
Off	ON ← B4 □■	Full-duplex

3.7 Configuration

You need to configure IVC2L-RS485 through the PLC host software before putting it into operation. The configuration is conducted through the **Communication Modules** tab in **System block**, as shown in Figure 3-3. The parameters are similar to those of COM0 and COM1 of the basic module. For details, see *Chapter 10　Using Communication Function* and *6.12　Communication Instruction* in *EC Series Micro-PLC Programming Manual*.
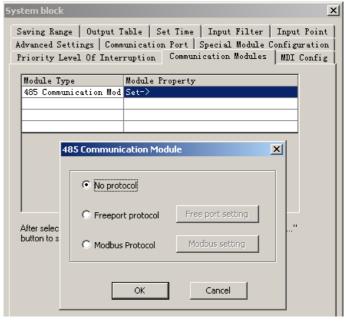

Figure 3-3　Configuring IVC2L-RS485

After the configuration, download the program to the basic module in the PLC system. The communication port of IVC2L-RS485 can serve as COM2 of PLC to realize RS485 communication function through communication instructions. The operation procedures are the same as those of COM0 and COM1. For details, see *Chapter 10　Using Communication Function* and *6.12　Communication Instruction* in *EC Series Micro-PLC Programming Manual*.

4 Troubleshooting

If faults occur during the operation of IVC2L-RS485, you can determine the fault type according to the states of indicators on the front panel and take corresponding measures. For the indicator description, see Table 1-1.

Notice

1. The warranty range is confined to IVC2L-RS485 only.

2. **Warranty period is 18 months**, within which period INVT conducts free maintenance and repairing to the IVC2L-RS485 that has any fault or damage under the normal operation conditions.

3. **The start time of warranty period is the delivery date of the product**, of which the product SN is the sole basis of judgment. The product without a product SN shall be regarded as out of warranty.

4. Even within 18 months, maintenance will also be charged in the following situations:

■ Damages incurred to the IVC2L-RS485 due to mis-operations, which are not in compliance with the User Manual;

■ Damages incurred to the IVC2L-RS485 due to fire, flood, abnormal voltage, etc;

■ Damages incurred to the IVC2L-RS485 due to the improper use of PLC functions.

5. The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.

6. Please keep this paper and show this paper to the maintenance unit when the product needs to be repaired.

7. If you have any question, please contact the distributor or our company directly.