537

DJSF1352-RN-6 导轨式直流电能表

DJSF1352-RN-6 Din Rail DC Energy Meter

安装使用说明书 V1.1

Installation Instructions V 1.1

安科瑞电气股份有限公司

Acrel Co., Ltd.

申　　明

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Declaration

The Company reserves the right to modify the product specifications described in this manual without prior notice. Before ordering, please contact your local agent for the latest specifications of this product.

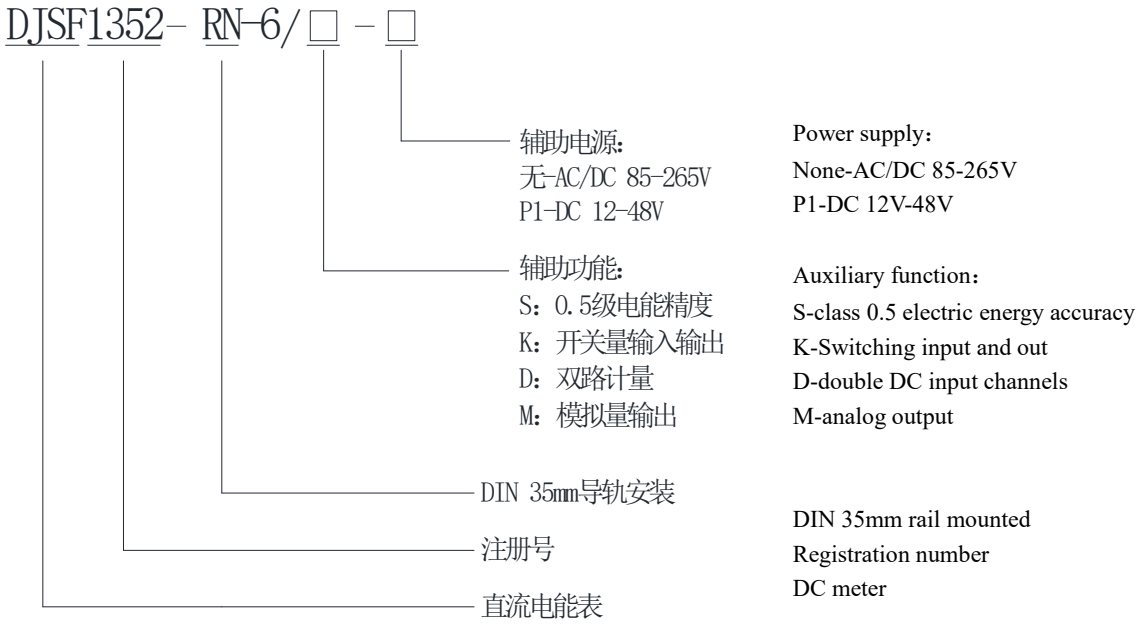
目录
CONTENTS

1 概述 Overview

DJSF1352-RN导轨式直流电能表带有双路直流输入，主要针对电信基站、直流充电桩、太阳能光伏等应用场合而设计，该系列仪表可测量直流系统中的电压、电流、功率以及正反向电能等。检测的结果既可用于本地显示，又能与工控设备、计算机连接，组成测控系统。

DJSF1352-RN din-rail DC energy meter with dual DC input, mainly designed for telecom base stations, DC charging pile, solar photovoltaic and other applications, this series of meters can measure the voltage, current, power and positive and negative energy in the DC system. The test results can not only be used for local display, but also can be connected with industrial control equipment and computers to form a measurement and control system.

2 产品规格 Product Specification



注：S 功能默认标配，若选配辅助功能 K、M，则需 KM 同时选配。

Note: The S function is standard by default. If the auxiliary functions K and M are selected, both K and M must be selected simultaneously.

3 技术参数 Technical parameter

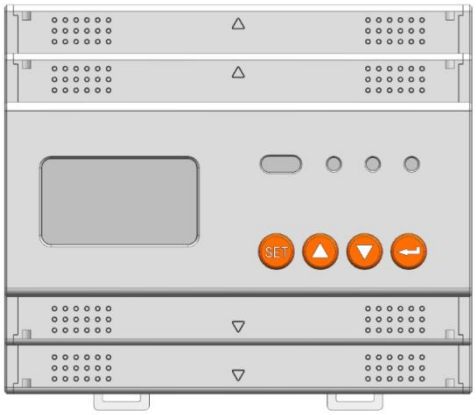
技术参数 Technical Parameters		指标 Index	
输入 Input	标称值 Nominal value	电压输入范围 Voltage input range	电流输入 Current input
		DC 0-100V、DC 0-1500V 参见实物接线图 DC 0-100V、DC 0-1500V See the physical wiring diagram	分流器：0-75mV 霍尔传感器：0-5V，0-200mA Shunt: 0-75mV Hall sensor: 0-5V, 0-200mA

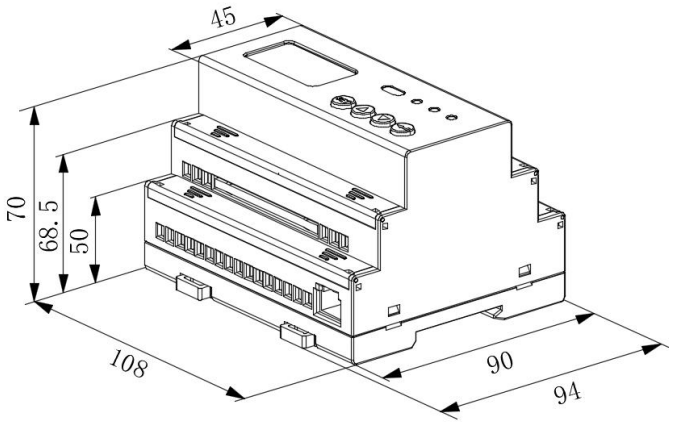
<table>
<tr><td rowspan="2"></td><td>过载
Overload</td><td colspan="2">1.2 倍可持续正常工作
1.2 times can sustain normal operation, 2 times can sustain 1 second</td></tr>
<tr><td>功耗
Power consumption</td><td colspan="2">电压：≤0.2VA，电流≤0.1VA
Voltage: ≤0.2VA, current ≤0.1VA</td></tr>
<tr><td colspan="2">精度等级
Accuracy class</td><td colspan="2">0.5 级
Class 0.5</td></tr>
<tr><td rowspan="7">功能
Function</td><td>显示
Display</td><td colspan="2">8 位段码式液晶屏（LCD）
8-bit segment LCD screen (LCD)</td></tr>
<tr><td>通讯接口
Communication Interface</td><td colspan="2">RS485（可选两路）
RS485（two options）</td></tr>
<tr><td>通讯协议
Communication protocol</td><td colspan="2">Modbus-RTU，DL/T 645-2007，DLT698</td></tr>
<tr><td rowspan="2">开关量
Switch</td><td>开关量输出(DO)
Switch output (DO)</td><td>2 路继电器输出，2A/30VDC 或 2A/250VAC
2 relay outputs, 2A/30VDC or 2A/250VAC</td></tr>
<tr><td>开关量输入(DI)
Switch input (DI)</td><td>2 路干接点输入
2 dry contact inputs</td></tr>
<tr><td>模拟量
Analog</td><td>模拟量输出(AO)
Analog output (AO)</td><td>4-20mA 输出(0.5 级)
4-20mA output (0.5 level)</td></tr>
<tr><td rowspan="2">脉冲输出
Pulse output</td><td colspan="2">两路电能脉冲输出（第二路电能脉冲可切换为秒脉冲）
Two-way power pulse output (the second power pulse can be switched to second pulse)</td></tr>
<tr><td colspan="2">见仪表菜单设置中 SYS->PULS 中显示，例：显示 100，即为 100imp/kWH
See the display in SYS->PULS in the meter menu setting, for example: display 100, which means 100imp/ kWH</td></tr>
<tr><td rowspan="2">工作电源
Working power supply</td><td>电压范围
Voltage</td><td colspan="2">AC/DC 85-265V 或 DC 12V-48V</td></tr>
<tr><td>功耗
Power consumption</td><td colspan="2">≤ 10W</td></tr>
<tr><td colspan="2">工频耐压
Power frequency withstand voltage</td><td colspan="2">电源//信号输入//RS485 通讯 4kV/1min ；
Power supply//signal input//RS485 communication 4kV/1min;
除电源、信号输入和 RS485 通讯外其他互不相连回路 2kV/1min
Except for power supply, signal input and RS485 communication, other unconnected circuits are 2kV/1min</td></tr>
<tr><td colspan="2">绝缘电阻
Insulation resistance</td><td colspan="2">≥ 100M Ω</td></tr>
</table>

平均无障碍工作时间 Average barrier-free working time		≥50000h
环境 Environment	温度 Temperature	工作温度：-25℃～+65℃ Working temperature: -25℃～+65℃ 贮存温度：-40℃～+80℃ Storage temperature: -40℃～+80℃
	湿度 Humidity	≤95%RH，不结露，不含腐蚀性气体 ≤95%RH, no condensation, no corrosive gas
	海拔 Altitude	≤3000m

4 安装指南 Installation guide

4.1 外形及安装尺寸 Shape and installation dimensions

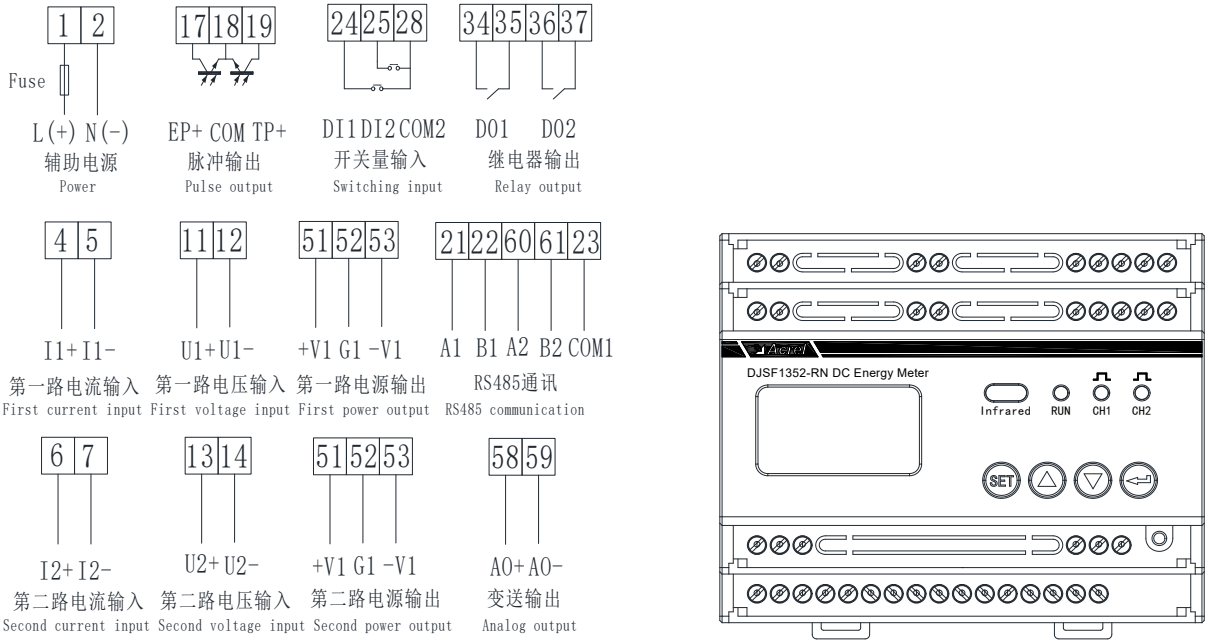


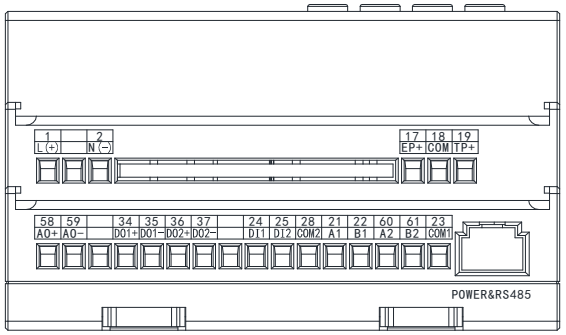


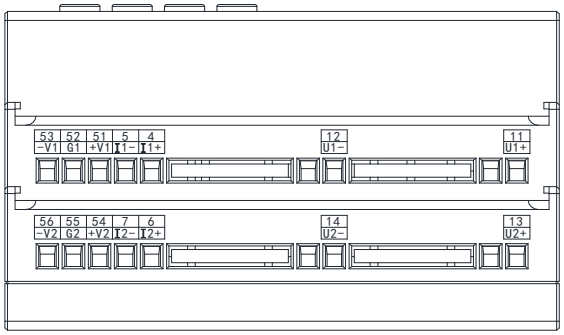
4.1.1 产品安装 Product installation

采用标准的 DIN35mm 导轨式安装 Standard DIN35mm rail mounting

4.2 端子及接线 Terminal and connection





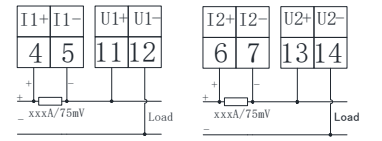


注：第二路直流输入以及 DI、DO、AO 功能均为选配功能。

Note: The second DC input and DI, DO and AO functions are optional.

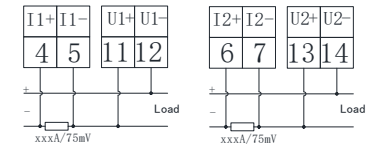
电流为分流器输入时：
When the current input mode is current shunt input:

正极电流分流器输入
Current shunt connected to the positive



First channel Second channel

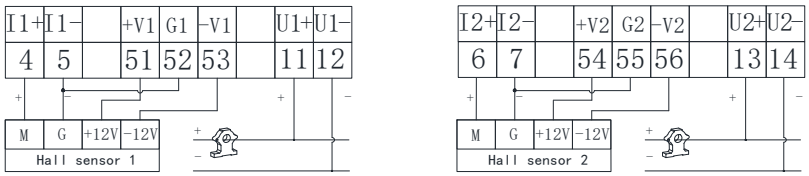
负极电流分流器输入
Current shunt connected to the negative



First channel Second channel

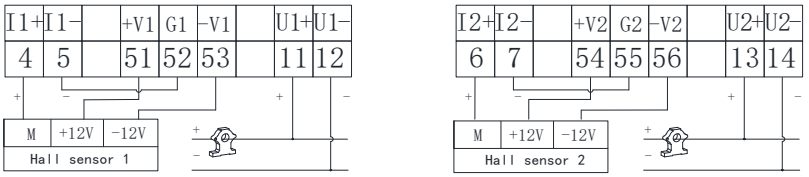
电流为霍尔传感器输入时：
When the current input mode is Hall sensor input:

(1)双电源霍尔Dual power Hall（0-5V output）：



First channel Second channel

(2)双电源霍尔Dual power Hall（0-200mA output）：



First channel Second channel

注：1.负极电流分流器输入时，需在仪表菜单将NEGt选项设置为on，详见第6节菜单编程界面，若未设置会导致电压数值为负值。

2.电压、电流输入的二次弱信号线推荐使用0.75mm²或1mm²屏蔽双绞线，且屏蔽层需要接大地。

Note: 1. When the negative current shunt is input, the option NEGt should be set to on in the instrument menu, see the menu programming interface in Section 6 for details. If it is not set, the voltage value will be negative.

2. 0.75mm2 or 1mm2 twisted pair cables are recommended for the secondary weak signal cables for voltage and current input, and the shielding layer must be connected to the ground.

4.3 注意事项 Precautions

4.3.1 电压信号输入 Voltage signal input

输入电压不得高于产品的额定输入电压的 120%，在电压输入端须安装 1A 保险丝；

The input voltage shall not be higher than 120% of the rated input voltage of the product, and 1A fuse shall be installed at the voltage input end.

4.3.2 电流信号输入 Current signal input

电流输入应使用外部分流器或霍尔电流传感器；

The current input should use an external shunt or Hall current sensor;

4.3.3 端子螺丝扭力 Terminal screws Torque

端子螺丝紧固的扭力不得超过 0.5Nm（3.5Lb-In）。

The torque of the terminal screw must not exceed 0.5Nm (3.5Lb-In).

4.3.4 通讯接口接线 Communication Interface wiring

该仪表提供异步半双工 RS485 通讯接口，采用 MODBUS-RTU 协议，各种数据信息均可在通讯线路上传送。理论上在一条线路上可以同时连接多达 128 个仪表，每个仪表均可设定其通讯地址（Addr）、通讯速率（baud）也可通过设置选择。

The instrument provides asynchronous half-duplex RS485 communication interface, using MODBUS-RTU protocol, all kinds of data information can be transmitted on the communication line. Theoretically, up to 128 meters can be connected simultaneously on a single line, and each meter can set its communication address (Addr) and communication rate (baud), which can also be selected by setting.

通讯连接建议使用三芯屏蔽线，每芯截面不小于 0.5mm2，分别接 A、B，屏蔽层接大地，布线时应使通讯线远离强电电缆或其他强电场环境。

It is recommended to use three shielded cables, each with A cross section of no less than 0.5mm2. Connect the three shielded cables to A and B, and connect the shielding layer to the ground. Keep the communication cables away from strong current cables or other strong electric fields.

建议起始端和最末端仪表的 A、B 之间均加匹配电阻，阻值范围为 20Ω～10kΩ。

It is recommended that A matching resistor be added between the A and B of the starting end and the end end of the instrument. The resistance value ranges from 20Ω～10kΩ.

5 使用指南 User guide

5.1 按键 Key

Set	测量模式下，按该键进入编程模式，仪表提示输入密码 PASS，输入正确密码后，可对仪表进行编程设置； In measurement mode, press this key to enter programming mode. The instrument prompts you to enter the password PASS. After entering the correct password, you can program the instrument. 编程模式下，用于返回上一级菜单。 In programming mode, it is used to return to the previous menu.
≪	测量模式下，用于切换显示项目，查看各项电量，具体见显示菜单； In measurement mode, it is used to switch display items and view various power items. For details, see the display menu; 编程模式下，用于切换同级菜单或个位数的减小。 In programming mode, it is used to switch menus at the same level or to reduce the number of digits .
≫	测量模式下，可查看相关参数，查看各项电量，具体见显示菜单； In the measurement mode, you can view relevant parameters and various power quantities. For details, see the display menu; 编程模式下，用于切换同级菜单或个位数的增加。 In programming mode, it is used to switch menus at the same level or increase the number of digits .
↵	编程模式下，用于菜单项目的选择确认和参数的修改确认。 In programming mode, it is used to confirm the selection of menu items and the modification of parameters.
≪+↵	编程模式下，该组合键用于百位数的减小。 In programming mode, this key combination is used to decrease the hundreds digit.
≫+↵	编程模式下，该组合键用于百位数的增加。 In programming mode, this key combination is used to increase the hundreds digit.

5.2 仪表开机画面显示为仪表软件版本信息

Meter startup screen displays the meter software version information

5.3 测量参数 Measurement parameter

5.3.1 电力参数 Power parameter

上、右键循环切换显示 如下图所示：按上、右键可如下图切换显示其它界面：电流←→电压←→功率←→正向有功电能←→历史反向有功电能←→当前日期时间←→温度←→表号高位←→表号低位。

Press up and right buttons to switch to other screens, as shown in the following figure: Current ←→ Voltage ←→ Power ←→ Forward active power ←→ Historical reverse active Power ←→ Current Date and Time ←→ Temperature ←→ High Indicator ←→ Low indicator.

注：①L1、L2 分别表示第一路、第二路直流输入，当未选配第二路直流输入时，L2 参数界面不显示；

②当功率为负值时，屏幕闪烁；

③费率电度只有在仪表带此功能时显示；

④“电力参数”界面左下角“尖”、“峰”、“平”、“谷”分别对应当前费率号尖峰平谷；

⑤在“电力参数”界面，“DI 3”上方“ON”+ 界面左下角“尖”代表当前费率号为深谷；

⑥“DI 3”上方“ON”+ “峰”、“ON”+ “平”、“ON”+ “谷”为预留的当前费率号显示，无意义。

Note: ①L1 and L2 indicate the first DC input and the second DC input respectively. If the second DC input is not configured, L2 is not displayed.

②When the power is negative, the screen flashes;

③The rate of electricity is only displayed when the meter has this function;

④The " sharp", "peak", "shoulder" and "off-peak" in the lower left corner of the "Power Parameters" interface correspond to the current rate peak and Pingvalley respectively.

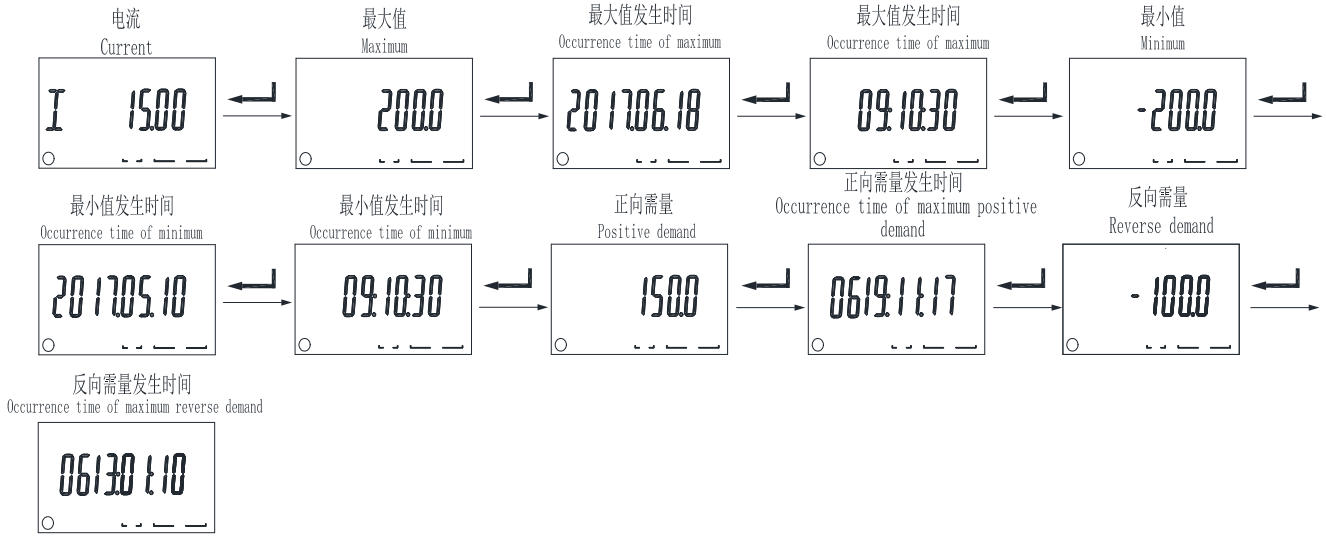
⑤On the Power Parameters page, On above DI 3 + Sharp in the lower left corner of the page indicates that the current rate number is deep valley.

⑥"DI 3" above "ON" + "shoulder" and "ON" + "shoulder", "ON", +"off-peak", according to the current rate,

reserved for meaningless.

仪表上电后显示电流显示界面后，按回车键键切换显示：电流最大值→电流最大值发生时间（年、月、日）→电流最大值发生时间（时、分、秒）→电流最小值→电流最小值发生时间（年、月、日）→电流最小值发生时间（时、分、秒）→正向最大需量→正向最大需量发生时间（月、日、时、分）→反向最大需量→反向最大需量发生时间（月、日、时、分）。

After the current display interface is displayed after the meter is powered on, press Enter to switch the display: Current maximum → Current maximum occurrence time (year, month, day) → Current maximum occurrence time (hour, minute, second) → Current minimum → Current minimum occurrence time (year, month, day) → Current minimum occurrence time (hour, minute, second) → positive maximum demand → positive maximum demand occurrence time (month, day, hour, minute) → reverse maximum demand → reverse maximum demand Time of occurrence (month, day, hour, minute).



仪表上电后在电流显示界面，按右键切换到电压显示界面后，按回车键切换显示：电压最大值→电压最大值发生日期（年、月、日）→电压最大值发生时间（时、分、秒）→电压最小值→电压最小值发生日期（年、月、日）→电压最小值发生时间（时、分、秒）。

After the meter is powered on, press the right button to switch to the voltage display interface, and press Enter to switch to the display: Maximum voltage ➞ date when the maximum voltage occurs (year, month, day) ➞ Time when the maximum voltage occurs (hour, minute, second) ➞ Minimum voltage ➞ Date when the minimum voltage occurs (year, month, day) ➞ Time when the minimum voltage occurs (hour, minute, second).

仪表上电后显示电流显示界面，按左右键切换到功率显示界面后，按回车键切换显示：功率最大值→功率最大值发生日期（年、月、日）→功率最大值发生时间（时、分、秒）→功率最小值→功率最小值发生日期（年、月、日）→功率最小值发生时间（时、分、秒）→正向最大需量→正向最大需量发生时间（月、日、时、分）→反向最大需量→反向最大需量发生时间（月、日、时、分）。

After the meter is powered on, the current display interface is displayed. Press the left or right key to switch to the power display interface. Press Enter to switch the display: Maximum power ➞ Date when the maximum power occurs (year, month, and day) ➞ Time when the maximum power occurs (hour, minute, and second) ➞ Minimum power ➞ Date when the minimum power occurs (year, month, and day) ➞ Time when the minimum power occurs (hour, minute, and second) ➞ Forward maximum demand ➞ Forward maximum demand (month, day, hour, and minute) ➞ reverse maximum demand ➞ reverse maximum demand Time of occurrence (month, day, hour, minute).

注：电压、功率需量显示界面均与电流需量显示界面相同。

Note: The voltage and power demand display interface is the same as the current demand display interface.

5.3.2 费率电度 Rate electricity

仪表开机后显示电流显示界面时，按右键切换到总正向有功电能显示界面后，按回车键切换显示：总正向有功电能→总正向有功电能（尖）→总正向有功电能（峰）→总正向有功电能（平）→总正向有功电能（谷）→总正向有功电能（深谷）→总正向有功电能（预留）→总正向有功电能（预留）→总正向有功电能（预留）→总反向有功电能（尖）→总反向有功电能（峰）→总反向有功电能（平）→总反向有功电能（谷）→总反向有功电能（深谷）→总反向有功电能（预留）→总反向有功电能（预留）→总反向有功电能（预留）。

When the current display interface is displayed after the meter is turned on, press the right button to switch to the total forward active power display interface, and press Enter to switch the display: Total positive active energy → Total positive active energy (sharp) → Total positive active energy (peak) → Total positive active energy (shoulder) → Total positive active energy (off-peak) → Total positive active energy (valley)→ Total positive active energy (reserved) → Total positive active energy (reserved) → Total positive active energy (reserved) → Total positive active energy (reserved) → Total positive active energy (sharp) → Total negative active energy (peak) → Total negative active energy (shoulder) → Total negative active energy (off-peak) → Total negative active energy (deep valley) → Total negative active energy (reserved) → Total negative active energy (reserved)→ Total negative active energy (reserved) .

仪表开机后显示电流显示界面时，按右键切换到历史月电能查询显示界面后，按回车键切换显示：所查月正向有功电能（尖）→所查月正向有功电能（峰）→所查月正向有功电能（平）→所查月正向有功电能（谷）→所查月正向有功电能（深谷）→所查月正向有功电能（预留）→所查月正向有功电能（预留）→所查月正向有功电能（预留）→所查月反向有功电能（总）→所查月反向有功电能（尖）→所查月反向有功电能（峰）→所查月反向有功电能（平）→所查月反向有功电能（谷）→所查月反向有功电能（深谷）→所查月反向有功电能（预留）→所查月反向有功电能（预留）→所查月反向有功电能（预留）→查询电能的日期设置（年、月）。

When the current display interface is displayed after the meter is turned on, press the right button to switch to the historical monthly energy query display interface, and press Enter to switch the display: Positive active energy of the month (sharp) → positive active energy of the month (peak) → positive active energy of the month (shoulder) → Positive active energy of the month (off-peak) → Positive active energy of the month (deep valley) → Positive active energy of the month (reserved) → positive active energy of the month (reserved) → positive active energy of the month (reserved) → positive active energy of the month (reserved) → negative active energy of the month (total) → Checked month inverse active power (sharp) → checked month inverse active power (peak) → checked month inverse active power (shoulder) → checked month inverse active power (off-peak) → checked month inverse active power (deep valley) → checked month inverse active power (reserved) → checked month inverse active power (reserved) → checked month inverse active power (reserved) → checked month inverse active power (reserved) → checked month inverse active power (reserved) → checked month inverse active power (reserved) → checked month inverse active power (reserved) → Queried power date setting (year) , month).

注：①在“历史月份设定”界面按右键可设置所要查询的历史月份；

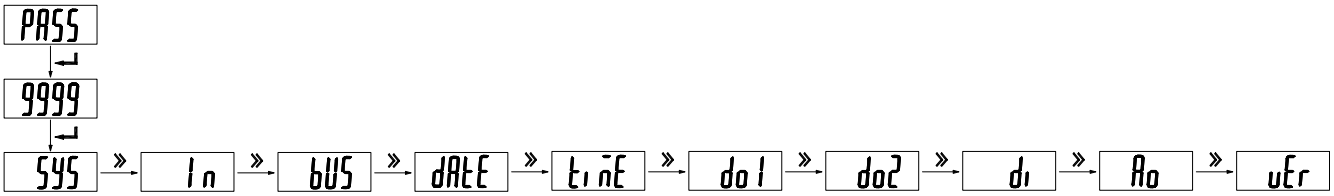
②在“费率电度”界面，“DI 4”上方“ON”+ 显示界面右上角“尖”代表深谷，对应电能为深谷电能；

③在“费率电度”界面，“DI 4”上方“ON”+“峰”、“ON”+“平”、“ON”+“谷”为预留费率号，对应费率电能为 0.

Note: ① In the "History Month Setting" interface, right-click to set the history month to be queried;
②On the Power Rate screen, On + above DI 4, the sharp in the upper right corner of the screen indicates a deep valley, and the corresponding electrical energy is the deep valley electrical energy.
③On the Power Rate screen, "DI 4" above "ON" + "peak" and "ON" + "shoulder", "ON", "off-peak" for the reserved rate, corresponding rate power of 0.

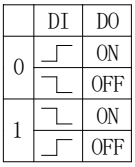
6 菜单符号及意义 Menu symbols and meanings

仪表开机后显示电流显示界面，按 SET 键切换到 PASS（按右键更改密码为 0001）进入菜单编程界面，按左右键依次显示如下：After the meter is turned on, the current display interface is displayed. Press SET key to switch to PASS (press the right button to change the password to 0001) to enter the menu programming interface. Press left and right keys to display the following in turn:



第一级菜单 First level menu	第二级菜单 Second level menu	第三级菜单 Third level menu	说明 Instructions
SYS	dISP	0001	开机显示画面选择，为零自动翻页 Selection of boot display, zero means turning automatically
	di SP.ti n	0005	开机自动翻页时间，单位 1 秒 Automatic page turning time after power on, unit: 1 second
	bLCd	0 -255 （可设）	设置为 0 时，背光常亮；设置为 1-255 时，背光在 1-255 秒后熄灭，单位：1 秒 When set to 0, the backlight is always on; when set to 1–255, the backlight is off after 1–255 seconds. Unit: 1 second
	CodE	0000-9999	密码设置（初始密码 0001） Password setting (initial password is 0001)
	ALSt	0000H	当前报警状态，十六进制显示，低位为 do1,高位为 do2,从 bit0-bit7,依次为过电压、欠电压、过流、欠载、过功率、欠功率、DI1、DI2 The current alarm status, hexadecimal display, low bits for do1, high bits for do2, from bit0-bit7, followed by overvoltage, undervoltage, overcurrent, underload, overpower, underpower, DI1, DI2
	EP.dot	2,3,4	电能小数点位置:显示小数点后 2 位,3 位,4 位 Electric energy decimal point position: Display 2, 3, 4 decimal places
	CLr.EP	000-9999 (输入 9996 后确认清除) 000-9999 (Enter 9996 to confirm clear)	清除电能 Clear energy
	CLr.dn		清除需量 Clear demand
	CLr.ni n		清除最值 Clear extremum
	CLr.di o		清除开关量动作事件记录 Clear event records of switch action

	CLrFrZ		清除冻结电能 Clear frozen energy
	CLrSoE		清除时间和变成设置事件记录 Clear time and programming event logs
	PULS	0，1，10，100，1000，10000	脉冲常数（imp/kWh）， 0：自适应，具体内容参考注释 Pulse constant (imp/kWh) 0: Adaptive, refer to the notes for details
	PULS.CH	L1、L2	脉冲输出回路选择，L1 表示第一路， L2 表示第一路 Pulse output circuit selection,L1 represents the first route,L2 represents the second route
	FLASH	0=no，1=U，2=I，3=IU， 4=P，5=PU，6=PI，7=PIU	控制输入为负时闪烁显示，U 表示电压， I 表示电流,P 表示功率 Flicker when the input is negative, U means voltage, I means current, P means power
	LESS.U	0-5.0	电压零点屏蔽值设定，最大±5% Masking value setting of voltage zero point, maximum to ±5%
	LESS.I	0-5.0	电流零点屏蔽值设定，最大±5% Masking value setting of current zero point, maximum to ±5%
	LESSEP	0-2.5	启动功率屏蔽值设定，最大±2.5% Start-up power shielding value setting, maximum ±2.5%
In	InPU	0001-9999	第一路电压变比 First Voltage transformation ratio
	InPI	0001-9999	第一路电流变比（一次电流值） First current transformation ratio（Primary rated current）
	In2PI	0001-9999	第二路电流变比（一次电流值） Second current transformation ratio（Primary rated current）
	NEGt	on,off	on:负极电流分流器输入 on:Current shunt connected to the negative off:正极电流分流器输入 off:Current shunt connected to the positive
bUS	Addr	1-247	485 通讯地址，**默认 1** 485 address，**default 1**
	bAUd	4800,9600,19200	485，645 通讯波特率，**默认 9600** 485,645 Communication baud rate,**default 9600**
	nodE	None,2bit,odd,even	485，645 通信模式，**默认无校验** (无校验,2 位停止位,奇校验,偶校验)
	645Adr	000000H(12 位地址高位) 000000H (high 12-bit of address) 000001L(12 位地址低位) 000000L (low 12-bit of address)	645 表号，H 表示高 6 位表号 BCD，L 表示低 6 位表号（面板上只能读取，需用上位机软件设置） 485,645 Communication Mode (No parity, 2 stop bits, odd parity, even parity)
	bAUd2	1200,2400,4800,9600	第二路通讯波特率 The second communication baud rate
	nodE2	None,2bit,odd,even	第二路通信模式 (无校验,2 位停止位,奇校验,偶校验) The second communication mode (No parity, 2 stop bits, odd parity, even parity)

	dLt.4FE	add0，add4	回送 645 报文增加前导符 FE：0 个,4 个 Add the FE headers of sent back 645 message to: 0, 4
dAtE	17.11.22		年月日，数字闪烁即表示被选中可设置 Year, month, day, when the number is flashing, it means that it is selected and can be set
tiME	15.07.18		时分秒，数字闪烁即表示被选中可设置 Hour, minute, second, when the number is flashing, it means that it is selected and can be set
do1 do2	开关量输出设置 （详见 6.1） Switch output setting (See 6.1 for details)		
di	tYPE SoUrCE	00，01，10，11	十位表示 DI1，个位表示 DI2。 0 为常闭，1 为常开 带 DI 联动报警时有效，详见 6.1 Tens place indicates DI1 and ones place indicates DI2. 0 is normally closed and 1 is normally open (effective with DI linkage alarm. See 6.1 for details) 
Ao		1.i,1.U,1.P, 2.i,2.U,2.P,	模拟量输出关联信号： 第一路电流、第一路电压、第一路功率、 第二路电流、第二路电压、第二路功率 Analog output related signals: The first current, the first voltage, the first power, Second current, second voltage, second power
uEr	u101		软件版本 Software version

注：*事件记录菜单中无法查询，只能通过通讯读取

Note : *The event log menu cannot be queried and can only be read through communication

*仪表脉冲常数默认自适应模式（Puls 选择 0），脉冲常数根据仪表最大功率自适应，具体内容如下表所示：

*The default adaptive mode of the meter pulse constant (Puls selects 0), the pulse constant is adaptive according to the maximum power of the instrument, the specific contents are shown in the following table:

最大功率<= Maximum power <=	999.9W	10000	imp/kWh
最大功率<= Maximum power <=	9.999kW	1000	imp/kWh
最大功率<= Maximum power <=	99.99kW	100	imp/kWh

最大功率<= Maximum power <=	999.9kW	10	imp/kWh
最大功率<= Maximum power <=	9999kW	1	imp/kWh

最大功率=额定电压*电压比值*电流比值*1.2

Maximum power = rated voltage * voltage ratio * current ratio * 1.2

*修改脉冲常数：菜单修改脉冲常数参考第 6 章菜单符号及意义，通讯修改脉冲常数参考第 7 章通讯指南。
*Modify pulse constant: For menu modification of pulse constant, refer to Chapter 6 Menu Symbols and Meanings; for communication modification of pulse constant, refer to Chapter 7 Communication Guide.

6.1 开关量输出设置 Switch output Settings

仪表开关量输出采用继电器输出，有两种控制方式：1、报警方式（“SEL”选择不为零）；2、总线控制方式（“SEL”选择为“0. do”,此时“dLy”设置为 0 为电平输出方式，设置非零为脉冲方式动作后延时设置的时间自动断开）

The switching output of the meter adopts relay output, and there are two control modes: 1. Alarm mode (" SEL "is selected not to be zero); 2, bus control mode (" SEL "is set to" 0.do ", then "dLy" is set to 0 for the level output mode, and non-zero is set to the pulse mode after the delay set time automatically disconnected)

“SEL”中设置 DO 输出类型，“0. do”表示为通信控制（此时如果 DLY 设置为 0 输出为电平方式，否则为脉冲方式，如果 DLY 设置为 2，吸合后 0.02 秒自动断开），其他为报警控制（见下表）

Set the DO output type in "SEL", "0.do" represents communication control (at this time, if DLY is set to 0, the output is level mode, otherwise it is pulse mode, if DLY is set to 2, it will be automatically disconnected after 0.02 seconds of sucking), and the other is alarm control (see the following table).

“dLy”为报警延时（报警用时推荐不设置为 0 防止干扰误动。）

"dLy" is the alarm delay (it is recommended not to set to 0 when the alarm is used to prevent interference and misoperation.)

“bAnd”为不动作带设置

bAnd indicates the inactive band

do1	第一路继电器输出 First relay output	
SEL	0. do	由通信控制的 DO 输出模式，此时“dLy”为 0 则为电平控制。设置其他值为自动返回模式。DO 动作后延时“dLy”（单位为 0.01 秒）后自动断开 The DO output mode controlled by the communication, when "dLy" is 0, it is the level control. Set the other value to auto return mode. DO disconnect automatically after delay “dLy” (in 0.01 seconds) after action.
	1. AL	第一路直流电参量报警 Alarm of the first DC parameter
	2. di.AL	第一路直流电参量、联动开关量报警，逻辑为或

		Alarm of the first DC parameter and linkage switch, logic is or
	3. di 1	联动 DI1 报警 Linkage alarm DI1
	4. di2	联动 DI2 报警 Linkage alarm DI2
	5. di.12	联动 DI1、DI2 报警，逻辑状态为或 Linkage alarm DI1、DI2,logic is or
	6. AL	第二路直流电参量报警 Alarm of the second DC parameter
	7. di.AL	第二路直流电参量带开关量报警 Alarm of the second DC parameter with switch
H-rES	on	手动复归开启（在主界面按回车键使继电器触点断开，主要用于消音） Manual reset is turned on (Press the enter key on the main interface to make the relay contact open, mainly used for silence)
	oFF	手动复归关闭 Manual reset is turned off
dLY	输出延时时间：如果为 DO 输出方式，设置为 0 时，为电平控制方式，非 0 时为脉冲控制方式，延时设置的时间后断开，延时设置范围 1－255 时，单位：0.01 秒；如果为报警输出方式，延时设置范围 1－9999 时，单位：1 秒； Output delay time: If it is DO output mode, when it is set to 0, it is the level control mode; when it is not 0, it is the pulse control mode, and is disconnected after the setted delay time, the delay setting range is 1-255, unit: 0.01 seconds; if it is alarm output mode, delay setting range is 1-9999, unit: 1 second;	
bAnd	不动作带区间 Non action band	
H-U	电压高报警，按百分比进行设置 High voltage alarm, set by percentage	
L-U	电压低报警，按百分比进行设置 Low voltage alarm, set by percentage	
H-I	电流高报警，按百分比进行设置 High current alarm, set by percentage	
L-I	电流低报警，按百分比进行设置 Low current alarm, set by percentage	
H-P	功率高报警，按百分比进行设置 High power alarm, set by percentage	
L-P	功率低报警，按百分比进行设置 Low power alarm, set by percentage	
0-AL	0AL	零值报警使能 Zero alarm enable
	0oFF	零值报警关闭（低报警） Zero alarm is disabled(Low alarm)

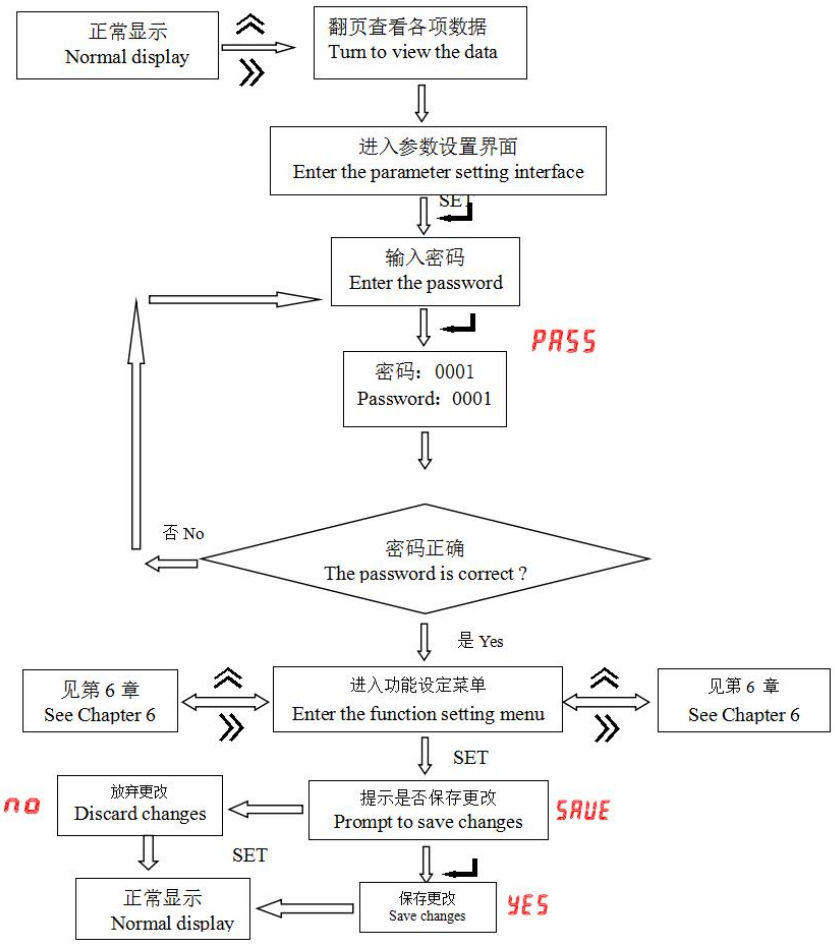
注：do2 设置同 do1

Note: do2 setting is the same as do1.

6.2 编程流程 Programming Process

仪表菜单结构

Meter menu structure



6.3 功能设置与使用 Function Setting and Use

6.3.1 倍率更改设置 Magnification Change Settings

电压以当前额定电压为基准，电流变比是以 1A 为基准，出厂时根据用户的量程要求，确定合适的仪表量程，在外部输入此量程的信号，若电流变比都为“100”，则仪表显示 100.0A，在设定了对应的变比后，仪表将显示对应的数据。用户不得自行改变信号的输入大小。如用户定了 100A/75mV 仪表，到了工作现场发现电压变送器为 500A/75mV，电流变比由 100 改为 500，但需确定直流变送器的输出信号不得发生改变，此例中为 75mV。

The voltage is based on the current rated voltage, the current ratio is based on 1A, the factory according to the user's range requirements, determine the appropriate meter range, the external input signal of this range, if the current ratio is "100", the meter displays 100.0A, after setting the corresponding ratio, the meter will display the corresponding data. The user may not change the input size of the signal by himself. If the user sets a 100A/75mV instrument, it is found that the voltage transmitter is 500A/75mV at the work site, and the current ratio is changed from 100 to 500, but it is necessary to make sure that the output signal of the DC transmitter must not be changed, in this case, it is 75mV.

6.3.2 通讯功能及参数设置 Communication function and parameter setting

Modbus-RTU 协议：默认为“9600，8，n，1”。

Modbus-RTU: The default value is 9600,8, n, 1.

6.3.3 报警功能及参数设置 Alarm function and parameter setting

正常测量时，有报警产生，并且会在继电器输出上产生一个输出（需加配，继电器常开结点闭合），对应 DO 显示位相应显示。

During normal measurement, an alarm is generated, and an output is generated on the relay output (need to be added, the normally open node of the relay is closed), and the corresponding DO display bit is displayed accordingly.

报警状态可通讯读取，参量地址见通讯参量地址表

The alarm state can be read by communication, and the parameter address can be seen in the communication parameter address table.

报警功能默认为关闭状态，除非客户要求。

The alarm function is turned off by default unless requested by the customer.

当输入信号为零时，仪表可通过设置关闭或打开低报警功能。

When the input signal is zero, the meter can be set to turn off or turn on the low alarm function.

7 通讯指南 Communication guide

7.1 概述 Overview

DJSF1352-RN 仪表采用 Modbus-RTU 协议：“9600，8，n，1”，其中 9600 为默认波特率，可通过编程修改为 1200、2400、4800、9600 等，；8 表示有 8 个数据位；n 表示无奇偶校验位；1 表示有 1 个停止位。DJSF1352-RN energy meter adopts Modbus-RTU protocol: "9600,8, n, 1", where 9600 is the default baud rate, which can be modified by programming to 1200, 2400, 4800, 9600, etc.; 8 indicates that there are 8 data bits. n indicates no parity bit. 1 indicates that there is one stop bit.

DJSF1352-RN 仪表采用 DLT645 协议,支持 07 版本，仪表表号默认为条形码后 12 位，详见菜单设置。规约支持电压、电流、功率、正反向及组合电能的读取，复费率电能读取。

DJSF1352-RN meter adopts DLT645 protocol and supports 07 version. By default, the meter number is the last 12 digits of the bar code. For details, see menu setting. The protocol supports the reading of voltage, current, power, positive and negative and combined electric energy, and multi-rate electric energy reading.

注：当仪表选配双路直流，第二路直流测量数据读取时，通讯地址自动在第一路地址上加 1。

Note: When the meter is equipped with dual DC, when the second DC measurement data is read, the communication address automatically adds 1 to the first address.

7.2 DLT 规约 DLT protocol

7.2.1 DLT645 规约 DLT645 protocol

DJSF1352-RN 仪表采用 DLT645 协议,支持 07 版本，仪表表号默认为条形码后 12 位，详见菜单设置。规约支持电压、电流、功率、正反向及组合电能、报警状态的读取，复费率电能读取。

DJSF1352-RN meter adopts DLT645 protocol and supports 07 version. By default, the meter number is the last 12 digits of the bar code. For details, see menu setting. The protocol supports the reading of voltage, current, power, positive and negative and combined electric energy, alarm state, and multi-rate electric energy reading.

标识符	内容	长度	备注
02010100	电压 Voltage	2	无符号数，若电压超过 1000V 且读取数值 9999， 此为越界状态，使用特殊指令 02000200 读取 Unsigned number, if the voltage exceeds 1000V and the value read is

			9999, This is an out-of-bounds state. Use the special instruction 02000200 to read
02000200		4	有符号数，最高位为符号位，4 位小数点，单位 V； 例如：读数为 0xB39B3603，电压为-5003.6880V； 数据转换过程 0xB39B3603 – 0x33333333 = 0x806803D0 Signed number, the highest bit is the sign bit, 4 decimal points, unit V; For example: the reading is 0xB39B3603, the voltage is -5003.6880V; Data conversion process 0xB39B3603 – 0x33333333 =0x806803D0
02020100	电流 Current	3	有符号数，若读取数值 799999，此为越界状态， 使用特殊指令 02000100 读取 Signed number, if the value read is 799999, this is out of bounds, Use special instruction 02000100 to read
02000100		4	有符号数，最高位为符号位，4 位小数点，单位 A； 例如：读数为 0x73453383，电流为 5000.1240A 数据转换过程 0x73453383 – 0x33333333 = 0x40120050
02030000	功率 power	3	有符号数，若读取数值 799999，此为越界状态， 使用特殊指令 02000000 读取
02000000		4	有符号数，最高位为符号位，4 位小数点，单位 kw； 例如：读数为 0x69653703，功率为-5004.3236kw 数据转换过程 0x69653703 – 0x33333333 = 0x363204D0
04000101	日期 date	4	年月日，例如：读数为 24080100，日期为 2024.08.01 Year, month, and day, for example: the reading is 24080100, and the date is 2024.08.01
04000102	时间 time	3	时分秒，例如：读数为 102740，时间为 10：27：40 Hours, minutes, and seconds. For example, the reading is 102740 and the time is 10:27:40
00D00000	当前组合有功总电量 Current combined active power		十六进制数，3 位小数点，单位 kwh； Hexadecimal number, 3 decimal places, unit kwh; 例如：读数为 00000099，电能为 0.153kwh For example: the reading is 00000099, the electric energy is 0.153kwh
00D10000	当前正向总电量 Current total forward power		
00D20000	当前反向总电量 Current total reverse power		
00000000	当前组合有功总电量 Current combined active power	4	十进制数，2 位小数点，单位 kwh Decimal number, 2 decimal places, unit kwh 例如：读数为 00000015，电能为 0.15kwh For example: the reading is 00000015, the energy is 0.15kwh
00010000	当前正向总电量 Current total forward power	4	
00020000	当前反向总电量	4	

	Current total reverse power		
00E00000	当前组合有功总电量 Current combined active power	4	十进制数，3 位小数点， Decimal number, 3 decimal places, 例如：读数为 00000153，电能为 0.153kwh For example: the reading is 00000153, the electric energy is 0.153kwh
00E10000	当前正向总电量 Current total forward power	4	
00E20000	当前反向总电量 Current total reverse power	4	
004F0000	当前组合有功总电量 Current combined active power	6	十进制数，3 位小数点，单位 kwh Decimal number, 3 decimal places, unit kwh 例如：读数为 000000000153，电能为 0.153kwh or example: the reading is 000000000153, the electric energy is 0.153kwh
00500000	当前正向总电量 Current total forward power	6	
00510000	当前反向总电量 Current total reverse power	6	
005F0000	当前组合有功总电量 Current combined active power	5	十进制数，4 位小数点，单位 kwh Decimal number, 4 decimal places, unit kwh 例如：读数为 0000001532，电能为 0.1532kwh For example: the reading is 0000001532, the electric energy is 0.1532kwh
00600000	当前正向总电量 Current total forward power	5	
00610000	当前反向总电量 Current total reverse power	5	
006F0000	当前组合有功总电量 Current combined active power	6	十进制数，4 位小数点，单位 kwh Decimal number, 4 decimal places, unit kwh 例如：读数为 000000001532，电能为 0.1532kwh For example: the reading is 000000001532, the electric energy is 0.1532kwh
00700000	当前正向总电量 Current total forward power	6	
00710000	当前反向总电量 Current total reverse power	6	
04000501	DO 报警状态 DO alarm status	2	bit0 表示功率反向，bit2 表示电流反向，bit3 表示功率反向，bit8 表示 DI1，bit9 表示 DI2，bit12 表示 DO1，bit13 表示 DO2 bit0:power reversal,bit2:current reversal,bit3:power reversal, bit8:DI1,bit9:DI2,bit12:DO1,bit13:DO2
04808080	电压变比 Voltage ratio	2	一般为变送二次接入电压时使用，默认为 0001 Generally used to transmit secondary access voltage, the default value is 0001
04808081	电流变比	2	例如：200A/75mV，读数为 0200

	Current ratio		For example: 200A/75mV, the reading is 0200
04808085	设置的第 1 路 DO 对应的报警状态 Set the alarm status Corresponding to the first DO	2	设置的第 1 路 DO 对应的报警状态，使用第一组报警阈值进行报警，报警信号源于 DO1 报警源选择，DI 做报警源时双路输入时均可读到，报警状态见注 2 Set the corresponding alarm status of DO1, The first set of alarm thresholds is used to alarm. The alarm signal originates from the DO1 alarm selection. When DI is used as the alarm source, it can be read by the double input channels. The alarm status is shown in Note 2.
04808086	设置的第 2 路 DO 对应的报警状态 Set the alarm status Corresponding to the second DO	2	设置的第 2 路 DO 对应的报警状态，使用第二组报警阈值进行报警，报警信号源于 DO2 报警源选择，DI 做报警源时双路输入时均可读到，报警状态见注 2 Set the corresponding alarm status of DO2. The second set of alarm thresholds is used to alarm using. The alarm signal is sourced from the DO2 alarm source selection. When DI is used as the alarm source, it can be read by the double input channels. The alarm status is shown in Note 2.
04800008	温度 Temperature	2	1 位小数，单位℃，例如：读数为 0275，温度为 27.5℃ 1 decimal place, unit: ℃, for example: the reading is 0275, the temperature is 27.5℃
0292FF00	电参量数据块 Electrical parameter data block	16	电压（4 位小数点）、电流（4 位小数点） 功率（4 位小数点）、组合有功总电量（3 位小数点） *具体内容参考 7.2.2 DLT645 规约报文解析 Voltage (4 decimal places), current (4 decimal places) Power (4 decimal places), combined active power (3 decimal places) *For details, please refer to 7.2.2 DLT645 protocol message analysis

注:1.AAAAAAAAAAAA 使用 15H 功能写设置 645 规约地址，要求按键输入密码进入菜单后;

Note: 1.AAAAAAAAAAAA uses 15H function to write and set the 645 protocol address, and requires pressing the key to enter the password to enter the menu;

2.

7	6	5	4	3	2	1	0
DI2	DI1	L-P	H-P	L-I	H-I	L-U	H-U
第 2 路开关量输入 No. 2 switch input	第 1 路开关量输入 No. 1 switch input	欠功率 Under power	过功率 Overpower	欠流 Undercurrent	过流 Over current	欠压 Under voltage	过压 Over voltage
DO1 告警状态 DO1 alarm status							

7.2.2 DLT645 规约报文解析 DLT645 Protocol Packet parsing

1. 当前组合有功总电量（4 位小数点）命令解析

1. The current combined total active power (4 decimal points) command analysis

①仪表信息：645 地址 000000000001（12 位）

①Meter information: 645 address 000000000001 (12 bits)

②发送命令 Send the command：FE FE FE FE 68 01 00 00 00 00 00 68 11 04 33 33 92 33 11 16

②Send the command FE FE FE FE 68 01 00 00 00 00 00 00 68 11 04 33 33 92 33 11 11 16

③发送命令解析：Send command parsing:

FE FE FE FE 68 01 00 00 00 00 00 68 11 04

先导符 leader 两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码（读数据）Function code (read data) 数据标识长度 Data identifier length

33 33 92 33 11 16

数据标识 Data Identification+0x33 CS

④回送命令 Echo Command：68 01 00 00 00 00 00 68 91 09 33 33 92 33 8B 78 33 33 33 32 16

⑤回送命令解析 Echo command analysis：

68 01 00 00 00 00 00 68 91 09 33 33 92 33

两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码 Function code 数据长度 Data length 数据标识 Data Identification+0x33

8B 78 33 33 33 32 16

0.4558kwh CS

注：数据转换过程 Note: Data conversion process 0x333333788B – 0x3333333333 = 0x0000004558

2. 当前组合有功总电量（4 位小数点、12 位）命令解析

2.Current combined active power (4 decimal places, 12 digits) command analysis

①仪表信息：645 地址 Meter information: 645 address 101304560001（12 位）

②发送命令 Send Commands：FE FE FE FE 68 01 00 56 04 13 10 68 11 04 33 33 A2 33 9E 16

③发送命令解析 Send command analysis：

FE FE FE FE 68 01 00 56 04 13 10 68 11 04

先导符 leader 两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码（读数据）Function code (read data) 数据标识长度 Data identifier length

33 33 A2 33 9E 16

数据标识 Data Identification+0x33 CS

④回送命令 Echo Command：68 01 00 56 04 13 10 68 91 0A 33 33 A2 33 C7 6B 33 33 33 43 32 16

⑤回送命令解析：Echo command analysis

68 01 00 56 04 13 10 68 91 0A 33 33 A2 33

两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码 Function code 数据长度 Data length 数据标识 Data Identification+0x33

C7 6B 33 33 33 43 32 16

10000000.3894kwh CS

注：数据转换过程 Note: Data conversion process 0x433333336BC7 – 0x333333333333 = 0x100000003894

3. 当前正向有功总电量（3 位小数点、12 位）命令解析

3.Current total forward active power (3 decimal places, 12 digits) command analysis

①仪表信息：645 地址 Meter information: 645 address 101304560001（12 位）

②发送命令Sending Commands：FE FE FE FE 68 01 00 56 04 13 10 68 11 04 33 33 83 33 7F 16

③发送命令解析：Send command analysis

FE FE FE FE 68 01 00 56 04 13 10 68 11 04

先导符 leader 两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码（读数据）Function code (read data) 数据标识长度 Data identifier length

33 33 83 33 7F 16

数据标识 Data Identification+0x33 CS

④回送命令 Echo Command：68 01 00 56 04 13 10 68 91 0A 33 33 83 33 BC 9A 78 56 34 33 90 16

⑤回送命令解析 Echo command analysis：

68 01 00 56 04 13 10 68 91 0A 33 33 83 33

两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码 Function code 数据长度 Data length 数据标识 Data Identification+0x33

BC 9A 78 56 34 33 90 16

123456.789kwh CS

注：数据转换过程 Data conversion process 0x333456789ABC – 0x333333333333 = 0x000123456789

4.电参量数据块命令解析 Electrical parameter data block command analysis

①仪表信息：645 地址 Meter information: 645 address 043003040001（12 位）

②发送命令Sending Commands：FE FE FE FE 68 01 00 04 03 30 04 68 11 04 33 32 C5 35 80 16

③发送命令解析：Send command analysis

FE FE FE FE 68 01 00 04 03 30 04 68 11 04

先导符 leader 两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码（读数据）Function code (read data) 数据标识长度 Data identifier length

33 32 C5 35 80 16

数据标识 Data Identification+0x33 CS

④回送命令 Echo Command：68 01 00 56 04 13 10 68 91 0A 33 33 83 33 BC 9A 78 56 34 33 90 16

⑤回送命令解析 Echo command analysis：68 01 00 04 03 30 04 68 91 24 33 32 C5 35

两个 68 之间是仪表 645 地址 Between the two 68s is the address of meter 645 功能码 Function code 数据长度 Data length 数据标识 Data Identification+0x33

4C B3 33 38 8C 9A 33 36 A5 89 83 34 65 66 8B 33 B8 CC 33 38 C9 9B 33 36

500.8019V 300.6759A 150.5672kw 583.332kwh 500.9985V 300.6896A

7B 96 83 34 67 86 8A 33 B5 16

150.6348kw 575.334kwh CS

注：第一路电压 500.8019V，**第一路电流** 300.6759A，**第一路功率** 150.5672kw，**第一路组合电能** 583.332kwh，**第二路电压** 500.9985V，**第二路电流** 300.6896A，**第二路功率** 150.6348kw，**第二路组合电能** 575.334kwh。

数据转换过程：0x338A8667 – 0x33333333 = 0x00575334

Note: The first circuit voltage is 500.8019V, the first circuit current is 300.6759A, the first circuit power is

150.5672kw, the first circuit combined electric energy is 583.332kwh, the second circuit voltage is 500.9985V, the second circuit current is 300.6896A, the second circuit power is 150.6348kw, The second circuit combined electric energy 575.334kwh.
Data conversion process: 0x338A8667-0x33333333 = 0x00575334

7.2.3 DLT698 规约 DLT698 protocol

DJSF1352-RN 仪表支持 DLT698 协议,仪表表号默认为条形码后 12 位，详见菜单设置。规约支持电压、电流、功率、正反向及组合电能的读取，复费率电能读取。目前 DJSF1352RN 仅支持 GET-Request 请求服务。

读取请求的数据类型（GET-Request）定义见下表。

DJSF1352-RN meter supports DLT698 protocol, the meter number defaults to the last 12 digits of the barcode, see menu settings for details. The protocol supports reading of voltage, current, power, forward and reverse and combined energy, and multi-rate energy. Currently DJSF1352RN only supports GET-Request service.

The data type of the read request (GET-Request) is defined in the table below.

数据类型定义 Data Type Definition	说明 illustrate

GET-Request∷=CHOICE
{
读取一个对象属性请求
Read an object attribute request [1] GetRequestNormal，
读取若干个对象属性请求
Read several object attribute requests [2] GetRequestNormalList，
}	

DJSF1352RN 仪表支持以下对象标识。

The DJSF 1352 RN meter supports the following object identifiers.

对象标识 Object Identification OI	接口类 Interface Class IC	对象名称 Object Name	实例的对象属性及方法定义 Object attributes and method definitions of instances
0000	1	组合有功电能 Combined active energy	电能量∷=double-long；单位：kWh，换算：-2 Electric energy: = double-long; unit: kWh, conversion: -2
0010	1	正向有功电能 Positive active energy	电能量∷=double-long-unsigned；单位：kWh，换算：-2 Electric energy: = double-long-unsigned; unit: kWh, conversion: -2
0020	1	反向有功电能 Reverse active energy	电能量∷=double-long-unsigned；单位：kWh，换算：-2 Electric energy: = double-long-unsigned; unit: kWh, conversion: -2
2000	3	电压 Voltage	数据类型：long-unsigned，单位：V，换算：-1 Data type: long-unsigned, unit: V, conversion: -1
2001	3	电流 Current	数据类型：double-long，单位：A 换算：-3 Data type: double-long, unit: A Conversion: -3
2004	4	有功功率 Active Power	数据类型：double-long，单位：W，换算：-1 Data type: double-long, unit: W, conversion: -1

7.3 Modbus 协议 Modbus protocol

当数据帧到达终端设备时，它通过一个简单的“端口”进入被寻址到的设备，该设备去掉数据帧的“信封”（数据头），读取数据，如果没有错误，就执行数据所请求的任务，然后，它将自己生成的数据加入到取得的“信封”中，把数据帧返回给发送者。返回的响应数据中包含了以下内容：终端从机地址（Address）、被执行了的命令（Function）、执行命令生成的被请求数据（Data）和一个 CRC 校验码（Check）。发生任何

错误都不会有成功的响应，或者返回一个错误指示帧。

When the data frame reaches the terminal device, it enters the addressed device through a simple "port", the device removes the "envelope" (data header) of the data frame, reads the data, and if there are no errors, performs the task requested by the data, then it adds its own generated data to the obtained "envelope" and returns the data frame to the sender. The returned response Data contains the following contents: Address of the terminal slave, Function of the executed command, requested data generated by the executed command, and a CRC Check code (Check). Any error occurs without a successful response, or an error indication frame is returned.

7.3.1 数据帧 Data frame

Address	Function	Data	Check
8-Bits	8-Bits	N×8-Bits	16-Bits

7.3.2 地址（Address）域 Address domain

地址域在帧首，由一个字节（8-Bits，8 位二进制码）组成，十进制为 0～255，在我们的系统中只使用 1～247，其它地址保留。这些位标明了用户指定的终端设备的地址，该设备将接收来自与之相连的主机数据。同一总线上每个终端设备的地址必须是唯一的，只有被寻址到的终端才会响应包含了该地址的查询。当终端发送回一个响应，响应中的从机地址数据便告诉了主机哪台终端正与之进行通信。

The address domain is composed of one byte (8-Bits, 8-bit binary code) at the beginning of the frame, and the decimal number is 0 ~ 255. In our system, only 1 ~ 247 are used, and other addresses are reserved. These bits indicate the address of the user-specified terminal device that will receive data from the host connected to it. The address of each terminal device on the same bus must be unique, and only the terminal addressed will respond to a query containing that address. When the terminal sends back a response, the slave address data in the response tells the host which terminal is communicating with it.

7.3.3 功能（Function）域 Function domain

功能域代码告诉了被寻址到的终端执行何种功能。下表列出了该系列仪表用到的功能码，以及它们的意义和功能。

The function domain code tells the terminal being addressed what function to perform. The following table lists the function codes used in this series of meters, as well as their meaning and function.

代码（十六进制） Code (hexadecimal)	意义 significance	行为 Behavior
03H	读取保持寄存器 Read Holding Registers	在一个或多个保持寄存器中取得当前的二进制值 Get the current binary value in one or more holding registers
10H	预置多寄存器 Preset multiple registers	把具体的二进制值装入一串连续的保持寄存器 Load specific binary values into a series of consecutive holding registers

7.3.4 数据（Data）域 Data domain

数据域包含了终端执行特定功能所需的数据或终端响应查询时采集到的数据。这些数据可能是数值、参量地址或者设置值。

The data domain contains the data that the terminal needs to perform a specific function or that the terminal collects in response to a query. This data may be numeric, parametric, or set values.

例如：功能域告诉终端读取一个寄存器，数据域则需要指明从哪个寄存器开始及读取多少个数据，内嵌的地址和数据依照类型和从机之间的不同而内容有所不同。

For example, the function domain tells the terminal to read a register, the data field needs to indicate which register to start from and how many data to read, and the embedded address and data vary according to the type and the content

between the slave machine.

7.3.5 错误校验（Check）域 Error Checking (Check) domain

该域采用 CRC16 循环冗余校验，允许主机和终端检查传输过程中的错误。有时由于电噪声和其它干扰，一组数据从一个设备传输到另一个设备时，在线路上可能会发生一些改变，错误校验能够保证主机或从机不去响应那些发生改变的数据，这就提高了系统的安全性、可靠性和效率。

The domain uses the CRC16 cyclic redundancy check, allowing hosts and terminals to check for errors during transmission. Sometimes due to electrical noise and other interference, a set of data from one device to another device may be changed on the line, error checking can ensure that the host or slave does not respond to those changed data, which improves the security, reliability and efficiency of the system.

7.3.6 错误校验的方法 Method of error checking

错误校验（CRC）域占用两个字节，包含了一个 16 位的二进制值。CRC 值由传输设备计算出来，然后附加到数据帧上，接收设备在接受数据时重新计算 CRC 值，然后与接收到的 CRC 域中的值进行比较，如果这两个值不相等，就发生了错误。

The error checking (CRC) domain takes two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmitting device and then attached to the data frame. The receiving device recalculates the CRC value as it receives the data and then compares it to the received value in the CRC domain. If the two values are not equal, an error has occurred.

CRC 运算时，首先将一个 16 位的寄存器预置为全 1，然后连续把数据帧中的每个字节中的 8 位与该寄存器的当前值进行运算，仅仅每个字节的 8 个数据位参与生成 CRC，起始位和停止位以及可能使用的奇偶位都不影响 CRC。在生成 CRC 时，每个字节的 8 位与寄存器中的内容进行异或，然后将结果向低位移位，高位则用“0”补充，最低位（LSB）移出并检测，如果是 1，该寄存器就与一个预设的固定值（0A001H）进行一次异或运算，如果最低位为 0，不作任何处理。

During CRC operation, a 16-bit register is first preset as all 1, and then 8 bits of each byte in the data frame are continuously calculated with the current value of the register. Only 8 data bits of each byte are involved in generating CRC, and the start and stop bits and parity bits that may be used do not affect CRC. When CRC is generated, the 8 bits of each byte are xOR with the contents of the register, and then the result is shifted to the low level, the high level is supplemented by "0", the lowest level (LSB) is moved out and detected, if it is 1, the register is XOR with a preset fixed value (0A001H), if the lowest level is 0, no processing is done.

7.4 Modbus 通讯说明：Modbus communication description:

7.4.1 通信地址表（Word）Communication Address Table (Word)

RO：只读 R/W：读写 RO: read-only R/W: read and write

地址 address	名称 name	类型 type	备注 Remark	word
4	断线检测指示	RO	1：断线 0：未断线	1

	Disconnection detection indication		仅电流输入为 4-20mA 型号有此功能 1: Disconnected 0: Not disconnected This function is only available for models with 4-20mA current input	
5	内部温度 Internal temperature	RO	-400~1250，小数点一位，单位℃ -400~1250, one decimal place, unit: ℃	1
12~13	总正向有功电能 Total forward active energy	RO	一次侧电能，单位 0.1wh Primary side power, unit 0.1wh	2
14~15	总反向有功电能 Total reverse active energy	RO	一次侧电能，单位 0.1wh Primary side power, unit 0.1wh	2
16	电压变比 Voltage ratio	R/W	0001---9999	1
17	额定一次电流值 Rated primary current	R/W	0001---9999	1
18	开关量输入输出状态 Switch input and output status	R/W	详见表后说明 See the description after the table for details	1
30~32	日期时间设置 Date and time settings	R/W	每个字节依次为年月日时分秒，十进制 Each byte is year, month, day, hour, minute, and second, in decimal format.	6
33 高字节	当前抄表日 Current meter reading day	RO	1-31	6
33 低字节	当前费率 Current Rates	RO	0-3 依次为尖峰平谷 0-3 are peaks, flats and valleys respectively	6
34	保留 reserve			6
35	软件版本号 Software version number	RO		
50-51	电压 Voltage	R0	电压一次值，Float，单位 V Voltage primary value, Float, unit V	2
52-53	电流 Current	R0	电流一次值，Float，单位 A Current primary value, Float, unit A	2
54-55	功率 power	R0	功率一次值，Float，单位 kw Power primary value, Float, unit kw	2
60	轮显时间 Rotation time	R/W	单位秒 Unit: Seconds	1
606	脉冲常数 Pulse constant	R/W	单位 imp/kWh Unit: imp/kWh	1

地址 （十进制） address (decimal)	名称 name	类型 type	备注 Remark	word
12288	总正向有功电能 Total forward active energy	R	32 位整型，单位 0.1wh	2

12290	总正向有功电能费率 1 Total forward active energy rate 1	R	高字节在前，低字节在后 0-999999999 32-bit integer, unit: 0.1wh High byte first, low byte last 0-999999999	2
12292	总正向有功电能费率 2 Total forward active energy rate 2	R		2
12294	总正向有功电能费率 3 Total forward active energy rate 3	R		2
12296	总正向有功电能费率 4 Total forward active energy rate 4	R		2
12298	总正向有功电能费率 5 Total forward active energy rate 5	R		2
12300	总正向有功电能费率 6 Total forward active energy rate 6	R		2
12302	总正向有功电能费率 7 Total forward active energy rate 7	R		2
12304	总正向有功电能费率 8 Total forward active energy rate 8	R		2
12306	当月总正向有功电能 Total positive active energy for the month	R		2
12308	当月正向有功电能费率 1 Forward active energy rate for the month 1	R		2
12310	当月正向有功电能费率 Forward active energy rate for the month 2	R		2
12312	当月正向有功电能费率 3 Forward active energy rate for the month 3	R		2
12314	当月正向有功电能费率 4 Forward active energy rate for the month 4	R		2
12316	当月正向有功电能费率 5 Forward active energy rate for the month 5	R		2
12318	当月正向有功电能费率 6 Forward active energy rate for the month 6	R		2
12320	当月正向有功电能费率 7 Forward active energy rate for the month 7	R		2
12322	当月正向有功电能费率 8 Forward active energy rate for the month 8	R		2
12324	总反向有功电能 Total positive active energy for the month	R		2
12326	反向有功电能费率 1 Forward active energy rate for the month 1	R		2
12328	反向有功电能费率 2 Forward active energy rate for the month 2	R		2
12330	反向有功电能费率 3 Forward active energy rate for the month 3	R		2
12332	反向有功电能费率 4 Forward active energy rate for the month 4	R		2
12334	反向有功电能费率 5	R		2

	Forward active energy rate for the month 5			
12336	反向有功电能费率 6 Forward active energy rate for the month 6	R		2
12338	反向有功电能费率 7 Forward active energy rate for the month 7	R		2
12340	反向有功电能费率 8 Forward active energy rate for the month 8	R		2
12342	当月总反向有功电能 Total reverse active energy	R		2
12344	当月反向有功电能费率 1 Reverse active energy rate 1	R		2
12346	当月反向有功电能费率 2 Reverse active energy rate 2	R		2
12348	当月反向有功电能费率 3 Reverse active energy rate 3	R		2
12350	当月反向有功电能费率 4 Reverse active energy rate 4	R		2
12352	当月反向有功电能费率 5 Reverse active energy rate 5	R		2
12354	当月反向有功电能费率 6 Reverse active energy rate 6	R		2
12356	当月反向有功电能费率 7 Reverse active energy rate 7	R		2
12358	当月反向有功电能费率 8 Reverse active energy rate 8	R		2

地址 （十进制） address (decimal)	名称 name	类型 type	备注 Remark	word
开关量动作事件记录 Switch quantity action event record				

46	最新一次的开关量事件位置 The latest switch event location	RO	0-9 依次循环，如果为 0 即 2460 地址，1 对应 2465 地址，依次类推。 0-9 cycle in sequence. If it is 0, it corresponds to address 2460, 1 corresponds to address 2465, and so on.	1
3005	开关量事件记录 1 Switching event record 1	RO	1.开关量动作记录，bit15 为 1 表示闭合，为 0 表示断开；bit12-bit8 为 1 表示 DO，为 3 表示 DI，低 8 位为 1 表示第 1 路 例： 0x8102,表示第 2 路 DO 闭合，0x0102,表示第 2 路 DO 断开。 2. 动作时的告警状态，见告警状态寄存器 1. Switch action record, bit15 is 1 for closed, 0 for open; bit12-bit8 is 1 for DO, 3 for DI, and the lower 8 bits are 1 for the first channel For example: 0x8102 means that the 2nd DO is closed, and 0x0102 means that the 2nd DO is open. 3. 2. Alarm status during action, see alarm status register	1
3006	开关量事件时报警状态 Alarm status when switching event occurs	RO		1
3007	开关量事件（年月） Switching event (year and month)	RO		1
3008	开关量事件（日时） Switching event (day and time)	RO		1
3009	开关量事件（分秒） Switching events (minutes and seconds)	RO		1
3010-3084	开关量事件记录 2-16 组 Switching event records 2-16 groups		同上 Same as above	

address (decimal)	名称 name	类型 type	备注 Remark	word
继电器一 Relay 1				
608	设置 DO 输出类型 Set DO output type	R/W	“0. do”表示为通信控制（此时如果 DLY 设置为 0 输出为电平方式，否则为脉冲方式，如果 DLY 设置为 2，吸合后 0.02 秒自动断开），其他为报警控制 "0. do" indicates communication control (if DLY is set to 0, the output is level mode, otherwise it is pulse mode. If DLY is set to 2, it will automatically disconnect 0.02 seconds after being pulled in). Others are alarm control	1
609	输出延时时间 Output delay time	R/W	如果为 DO 输出方式，设置为 0 时，为电平控制方式，非 0 时为脉冲控制方式，延时设置的时间后断开，延时设置范围 1－255 时，单位：0.01 秒；如果为报警输出方式，延时设置范围 1－9999 时，单位：1 秒； If it is DO output mode, when it is set to 0, it is level control mode, and when it is not 0, it is pulse control mode. It will be disconnected after the delay setting time. The delay setting range is 1-255, unit: 0.01 second; if it is alarm output mode, the delay setting range is 1-9999, unit: 1 second;	1
610	不动作带区间	R/W		1

	No action zone			
611	电压高报警，按百分比进行设置 High voltage alarm, set by percentage	R/W		1
612	电压低报警，按百分比进行设置 Low voltage alarm, set by percentage	R/W		1
613	电流高报警，按百分比进行设置 High current alarm, set in percentage	R/W		1
614	电流低报警，按百分比进行设置 Low current alarm, set in percentage	R/W		1
615	功率高报警，按百分比进行设置 High power alarm, set by percentage	R/W		1
616	功率低报警，按百分比进行设置 Low power alarm, set by percentage	R/W		1
617	手动复位/零报警使能 Manual reset/zero alarm enable	R/W	高字节：手动复位低字节：零报警使能 High byte: manual reset Low byte: zero alarm enable	
继电器二 Relay 2				
618	设置 DO 输出类型 Set DO output type	R/W		1
619	输出延时时间 Output delay time	R/W		1
620	不动作带区间 No action zone	R/W		1
621	电压高报警，按百分比进行设置 High voltage alarm, set by percentage	R/W		1
622	电压低报警，按百分比进行设置 Low voltage alarm, set by percentage	R/W		1
623	电流高报警，按百分比进行设置 High current alarm, set in percentage	R/W		1
624	电流低报警，按百分比进行设置 Low current alarm, set in percentage	R/W		1
625	功率高报警，按百分比进行设置 High power alarm, set by percentage	R/W		1
626	功率低报警，按百分比进行设置	R/W		1

	Low power alarm, set by percentage			
627	手动复位/零报警使能 Manual reset/zero alarm enable	R/W		1

7.4.2 说明 Instructions

通讯地址 18:开关量输入/ 输出状态字：

Communication address 18: Switching input/output status word:

15	...	10	9	8	7	...	2	1	0
——			Di2	Di1	——			Do2	Do1
保留 reserve			开关量输入 Switch input		保留 reserve			开关量输出 Switching output	

通讯地址 19:报警状态字：

Communication address 19: Alarm status word:

15	...	8	7	6	5	4	3	2	1	0
——			DI2	DI1	L-P	H-P	L-I	H-I	L-U	H-U
同低 8 位的状态 Same as the state of the lower 8 bits			第 2 路开关量输入 Second switch input	第 1 路开关量输入 1st switch input	欠功率 Underpower	过功率 Overpower	欠流 Undercurrent	过流 Overcurrent	欠压 Undervoltage	过压 Overpressure
DO2 告警状态 DO2 alarm status			DO1 告警状态 DO1 alarm status							

说明：①“——”表示保留字或保留位。警标志位：1 为有报警，0 为无报警。

Note: ①“——” indicates a reserved word or reserved bit. Alarm flag: 1 means there is an alarm, 0 means there is no alarm.

7.5 通讯应用 Communication application

本节所举实例尽可能采用下表格式（数据为 16 进制）

The examples in this section are in the following format as much as possible (data is in hexadecimal):

	Data Start	Data#of	CRC 16

Addr	Fun	reg Hi	reg Lo	reg Hi	reg Lo	Lo	Hi
01H	03H	00H	32H	00H	02H	65H	C4H
地址 address	功能码 Function code	数据起始位 Data start bit		数据读取个数 Number of data read		循环冗余校验码 Cyclic Redundancy Check Code	

例 1：读第一路电压一次值数据

Example 1: Read the primary value data of the first voltage

查询数据帧 Querying Data Frames	01 03 00 32 00 02 65 C4
返回数据帧 Returns a data frame	01 03 04 42 C8 1B 84 65 26

说明：Illustrate:

01：从机地址(第 1 路地址)

01：Slave address (1st address)

03：功能码

03：Function code

04：十六进制，十进制为 4，表示后面有 4 个字节的数据

04：Hexadecimal, decimal is 4, indicating that there are 4 bytes of data behind

65 26：循环冗余校验码

65 26: Cyclic redundancy check code

处理如下：42 C8 1B 84(16 进制) = 100.0537415 (float 类型数据)　单位：伏（V）

Processing is as follows: 42 C8 1B 84 (hexadecimal) = 100.0537415 (float type data) Unit: Volt (V)

则仪表显示： U = 100.05V

The meter displays: U = 100.05V

读电流表数据与读电压表类似，但起始地址为 34H，查询帧：01 03 00 34 00 02 85 C5

读其它信息的查询帧与此格式相同，各信息地址见通讯参量地址表。

Reading the current meter data is similar to reading the voltage meter, but the starting address is 34H, the query frame is: 01 03 00 34 00 02 85 C5

The query frame for reading other information has the same format. For the address of each information, see the communication parameter address table.

例 2：读第二路电流一次值数据

Example 2: Read the primary value data of the second current

查询数据帧 Querying Data Frames	02 03 00 34 00 02 85 F6
返回数据帧 Returns a data frame	02 03 04 43 7A 15 94 F2 51

说明：

Illustrate:

02：从机地址(第 2 路地址)

02: Slave address (2nd address)

03：功能码

03: Function code

04：十六进制，十进制为 4，表示后面有 4 个字节的数据

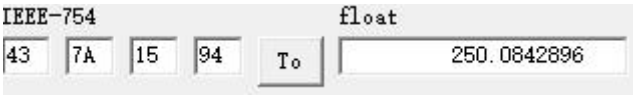
04: Hexadecimal, decimal is 4, indicating that there are 4 bytes of data behind

F2 51：循环冗余校验码

F2 51 : Cyclic redundancy check code

处理如下：43 7A 15 94 (16 进制) = 250.0842896 (float 类型数据)　单位：安培（A）

The processing is as follows: 43 7A 15 94 (hexadecimal) = 250.0842896 (float type data) Unit: Ampere (A)



则仪表显示： I = 250.08V

The meter displays: I = 250.08V

读电压表数据与读电流表类似，但起始地址为 32H，查询帧：02 03 00 32 00 02 65 F7

读其它信息的查询帧与此格式相同，各信息地址见通讯参量地址表。

注：电压、电流、功率一次值数据类型为 float 类型，通讯值须转换后与仪表显示数据对应；

Reading voltage meter data is similar to reading current meter data, but the starting address is 32H, query frame: 02 03 00 32 00 02 65 F7

The query frame for reading other information has the same format. For the address of each information, see the communication parameter address table.

Note: The data type of the primary value of voltage, current and power is float type, and the communication value must be converted to correspond to the instrument display data;

更改记录：

Change Log:

更改日期 Change Date	版本 Version	更改内容 Changes
24.08.21	V1.0	初始版本 First version
24.12.04	V1.1	修改选型说明，修改输入电压范围 Modify the selection guide and the input voltage range.

总部：安科瑞电气股份有限公司

Headquarter: Acrel Co., LTD.
地址：上海市嘉定区育绿路 253 号
Address: No.253 Yulv Road Jiading District, Shanghai，China
邮编：201801
Postcode: 201801

生产基地：江苏安科瑞电器制造有限公司
Manufacturer: Jiangsu Acrel Electrical Manufacturing Co., LTD.
地址：江苏省江阴市南闸街道东盟工业园区东盟路 5 号
Address： No.5 Dongmeng Road,Dongmeng industrial Park, Nanzha Street,Jiangyin City,Jiangsu Province,China
电话/WhatsApp：0086- 188 6162 8731
TEL/WhatsApp：0086- 188 6162 8731
网址：www.acrel-electric.uk
Web-site: www.acrel-electric.uk
邮箱： elsie.ren@email.acrel.cn
Email: elsie.ren@email.acrel.cn
邮编：214405
Postcode：214405