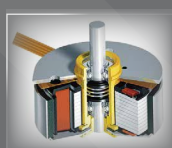




Quality

Appearance

Service



High performance
brushless motor



Precision machining
technology



Industrial grade component



Precise transmission

Electric Actuator

Intelligent PID Product Instruction

Made in china Global service



Product overview

- ⊙ Rated voltage: power input AC/DC24V, battery input DC28V
- ⊙ Rated torque: 20-100N.m
- ⊙ Install valves: DN15-DN200 ball valve or butterfly valve
- ⊙ Communication model:
NB_IOT,4G, WiFi, Modbus RS485,4-20mA,0-10V,LORA,Bluetooth
- ⊙ Sensor signal input:
2 way 4-20mA (1 way flow or 2 way pressure sensor output) ,
2 way PT1000 Temp signal
- ⊙ Near-field operation: controlled via Bluetooth(mobile phone APP.)
- ⊙ Indicator function:
1.3" inch OLED screen:displays current status, pressure, temperature and other parameters.
- ⊙ Local Operation:
Simply modify product parameters via keys.
Enter password via keys for local valve on/off control.
Manual function – operate via tools on power failure.
Note: Slowly move the wrench during operation.
- ⊙ PID function:
Achieve balance via on-site PID calculation
based on selected pressure, flow rate or temperature parameter.
- ⊙ Adopted high-performance brushless motor,with built-in overload protection.
- ⊙ It can be used 20,000 times.*1
- ※ Note for PID product use: Unused analog input channels should be connected to analog input ground(GND).
e.g. Unused flow sensor: Its input port should be connected to signal GND; same for unused pressure sensor.
For customer-specified unused signals (flow, pressure, etc.), the actuator will be automatically connected to the corresponding GND signal by default at the factory .



PID Actuator Configuration Introduction

- ⊙ TC Intelligent PID product can equipped with two 2 temperature sensors (supply_water temp & return_water temp) ,
2 pressure sensors (supply_water press &return_water press) and 1 channel flow sensor, The sensors support
analog signal-Type and 485 signal-Type.
- ⊙ PID product supports analog signal control input, Supported types:
4-20mA Mode Input
0-20mA Mode Input
2-10V Mode Input
0-10V Mode Input 【default】
0-135Ω Mode Input
- ⊙ PID with Bluetooth: Control the actuator via TC's Bluetooth app.
- ⊙ PID product supports 485/TCPIP/NBIOT/4G(CAT1)/LORANWAN/WiFi &other communication modes.
- ⊙ PID available in: 20NM/50MN/80MN/110MN/200MN/400MN
- ⊙ Low-power sleep function, enabling smart energy saving.

Technical data

Electrical data

Rated voltage	AC/DC24V					
Working voltage range	AC18-26V/DC22-32V					
Rated torque	20Nm	50Nm	80Nm	110Nm	200Nm	400Nm
Maximum power consumption	15W	25W	60W	100W	50W	80W
Operating power consumption	9.6W	9.6W	19.2W	19.2W	19.2W	19.2W
Maintain power consumption	1.6W	2.5W	2.5W	2.5W	2.4W	2.4W
Peak current@5ms	0.75A	1.0A	2.5A	4.17A	2.0A	3.3A
Fuse	2A	2A	4A	10A	5A	8A

Functional data

Rotation angle	90°/180°					
Max rotation angle	330±5°					
Manual operation	Hexagon wrench/Manual button					
Running time	10s	12s	10s	10s	25s	25s
Operating mode	S3-85%(DC), loading≤85% rated torque refers to IEC60034-1-2017 *1					
Sound power level	Max 65dB(A)					
Position indicator	Mechanical and screen					

Working conditions

Electricity safety level	III (safety low voltage)					
Inflaming retarding level	1.6mmHB/UL94 test method					
Enclosure	IP67 As Per En60529/GB4208-2008(all directions) Ftype Equipped with dehumidification heater					
Insulation resistance	100MΩ/500VDC					
Withstand voltage	500VAC@1minute					
Medium temperature	≤80°C can install actuator directly					
Working environment	※ >80°C need to install bracket or heat radiation stand ※ Indoor or outdoor, if exposed to the rain or sunshine, need to install protective device for actuator					
Explosion-proof level	Not explosion proof products, do not use in flammable and explosive environment					
Ambient temperature	-20°C~+60°C (60°C or <-20°C needs to be customized);					
Non-operation temperature	※ ≤-40°C or ≥80°C					
Ambient humidity	5-95%RH relative humidity, non-condensing					
Vibration shock	≤2g					
Vibration amplitude	※ 10 to 55 Hz, 1.5 mm double amplitude					
Installation note	No upside down; leave space for manual override or wiring					
Maintenance	Free maintenance					
Certification	CE					

Dimensions/weight

Dimensions (LXWXH)	See "Dimensions"					
Cable length	TC standard cable length 800mm(can be customized)					
Weight (ABS)	0.65kg	1.8kg	2.2kg	2.2kg		
Weight (die-cast aluminum)	0.78kg	2.3kg	2.5kg	2.5kg		
Weight (PC+PET)					6.0kg	6.0kg

PID Product Work Mode Introduction

- ◎ Position mode control: analog signal or Network signal (485/bluetooth/TCPIP/NBIOT/CAT14G/LORANWAN) to control the actuators. (Position Mode only sends commands to control the actuator's operations, adjust parameters/settings, etc., without involving PID regulation.)
- ◎ Intelligent PID Regulation Mode Type :
 - ① PID_TempOut PID Return water temperature Control Mode
 - ② PID_TempIN PID Supply water temperature Control Mode
 - ③ PID_TempDiff PID Temperature Difference Control Mode

Note: The above three temperature control modes switchable between Supply (heating mode) and Make Cold (cooling mode)

 - ④ PID_FlowMode PID Flow Control Mode
 - ⑤ PID_PRESSIN PID Supply water pressure Mode
 - ⑥ PID_PRESSOut PID Return water pressure Mode
 - ⑦ PID_PRESSDiff PID PRESS Difference Control Mode
 - ⑧ POSIAndTempOut DDC Position + Return_Water Temperature Dual PID Mode
 - ⑨ POSIAndTempDiff DDC Position+Temperature Difference Dual PID Mode
 - ⑩ FlowAndTempOut DDC Flow+Out_Water Temperature Dual PID Mode
 - ⑪ FlowAndTempDiff DDC Flow+Temperature Difference Dual PID Mode
 - ⑫ Energy Mode

PID Algorithm Type Introduction (Only Valid in Intelligent PID Regulation Mode)

- ◎ PID_Normal Standard PID Algorithm 【Default】
 - ◎ One_StepMode Step Ping Algorithm Mode
 - ◎ MultistepMode Intelligent Stepping Mode
 - ◎ TLD_TempOut Customized Return Temperature Algorithm
 - ◎ PID_KD_Before Derivative-First Standard PID Algorithm
 - ◎ PID_KD_Incomplete Incomplete Derivative Standard PID Algorithm
- ※Note: The customized return temperature algorithm is only applicable when the valve operation mode is set to PID temperature_out control mode.

Bluetooth APP Interface Introduction

1、Download APP

Please contact Tcrystal for download APP—CLOUD SYS.Install under the guidance of qualified personnel.

2、Main Interface Introduction

After installation enter the main interface

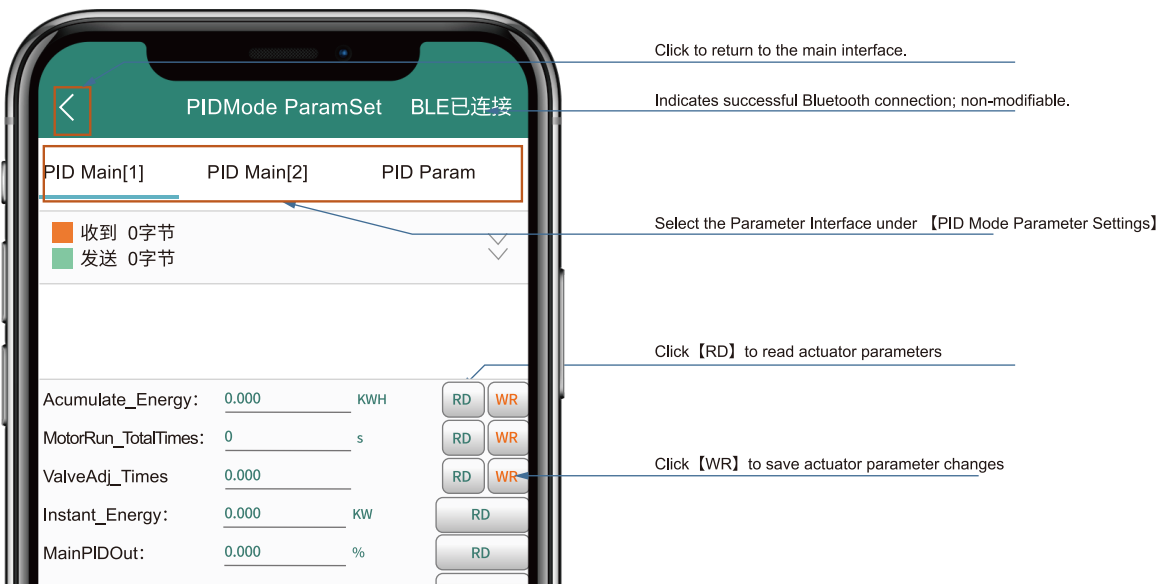


Figure: The App has 10 subinterfaces; customers configure each interface as needed. No initialization required; pre-configured per customer requirements before leaving the factory.

Main Interface Function Description

- ①Click to find device: Search for nearby Bluetooth devices and select customer product Bluetooth
- ②Select & Configure Subinterface: Choose subinterface to configure per customer requirements.
- ③Apply Parameters: PID product parameters are modifiable based on customer requirements.
- ④Found Devices: Bluetooth search successful; displays product info.

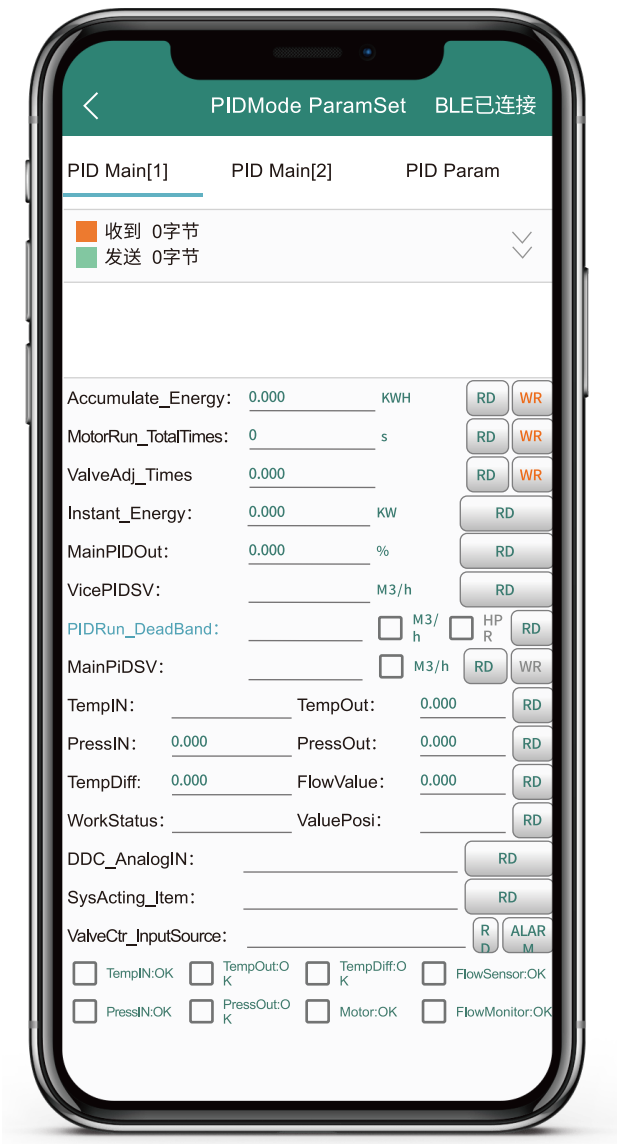
APP-Subinterface Introduction



※ Note: 【RD】 = key to read actuator parameters; 【WR】 = key to write modify actuator parameters.
Recommend Clicking 【RD】 to read the actuator actual parameters before modification; Clicking 【WR】 to modify parameters after modification.

APP-PIDMode ParameterSet

Interface1



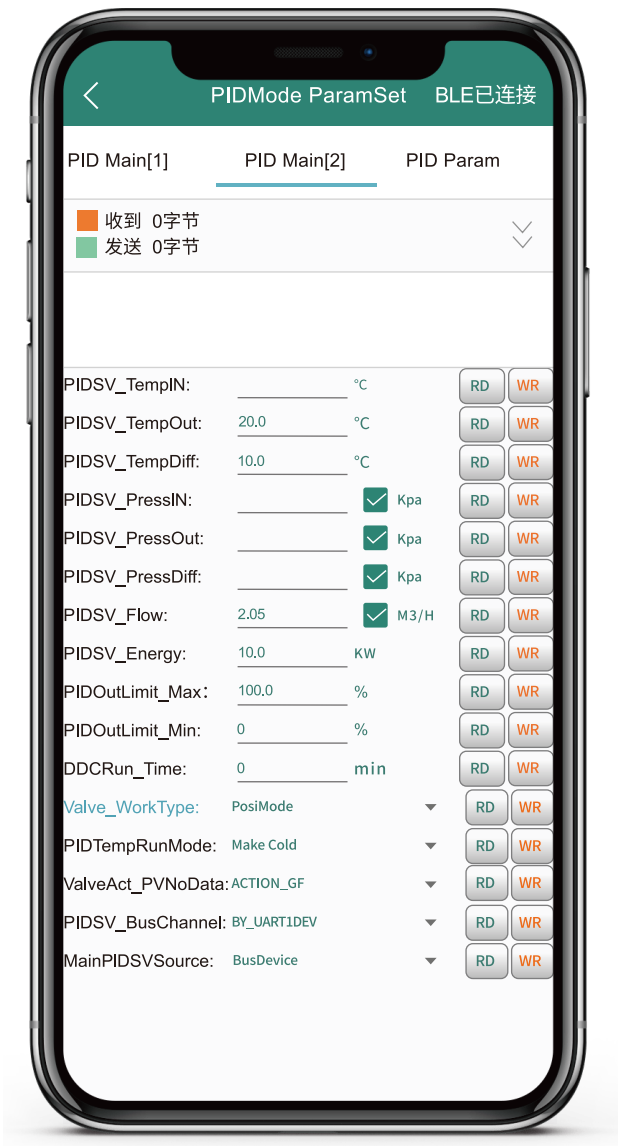
PIDMode ParameterSet

PIDMode ParameterSet: Read or modify functional parameters in Intelligent PID Mode

【Accumulate_Energy】	Total calculated energy : TempDiffer+Flow+Time
【MotorRun_TotalTimes】	Readable or modifiable Motor Running Time
【ValveAdj_Times】	Readable or modifiable times of valve adjustment
【Instant_Energy】	Read Flow Signal of the Flow Sensor
【MainPIDOut】	Main PID calculation result output
【VicePIDSV】	Vice PID set value (CC) in DDC mode
【PIDRun_DeadBand】	PID Control accuracy
【MianPIDSV】	Mian PID Set Value
【TempIN】	Read Temperature values of two-channel sensors
【PressIN】	Read Pressure values of two-channel sensors
【TempDiff】	Read the Differ between TempIN and TempOUT
【WorkStatus】 【ValvePosi】	Read ValvePosi and WorkStatus In RealTime
【DDC_AnalogIN】	DDC Analog Signal Input
【SysActing_item】	Readable executed control mode
【ValveCtr_inputSource】	Readable valve position control mode

APP-PIDMode ParameterSet

Interface2



Dropdown Option

【Workmode】Selectable:

PosiMode	Position Control Mode	PosiAndTempOut	Position+TempOut	PID_PRESSDIFF	PressDiffer ControlMode
PID_TempOut	TemoOutControl Mode	PosiAndTempDiff	Position+TempDiffer	PID_PRESSIN	PressIN ControlMode
PID_TempDiff	TempDifferControl Mode	FlowAndTempOut	Flow+TempOut	PID_PRESSOUT	PressOut ControlMode
PID_FlowMode	FlowControl Mode	FlowAndTempDiff	Flow+TempDiffer	PID_TEMPIN	TempIN ControlMode
				PID_ENERGY	Energy Mode

【PIDTempRunMode】Selectable:

Supply Heat	Heating Mode	Make Cold	Cooling Mode
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【ValveAct_PVNoData】Selectable:

ACTION_KF	OpenValve Command	ACTION_KEEP	Keep Command (Default)
ACTION_GF	CloseValve Command	SWitchPosMode	Position Control Mode
ACTION_B33	B33 Control mode		

【PIDSV_BusChannel】Selectable:

BY_UART0DEV、BY_UART1DEV、BY_UART4DEV、BY_UART5DEV、BY_UARTALLDEV (Default)

【MainPIDSVSource】Selectable:

AnalogIN	Analog Signal	BusDevice	Network Signal
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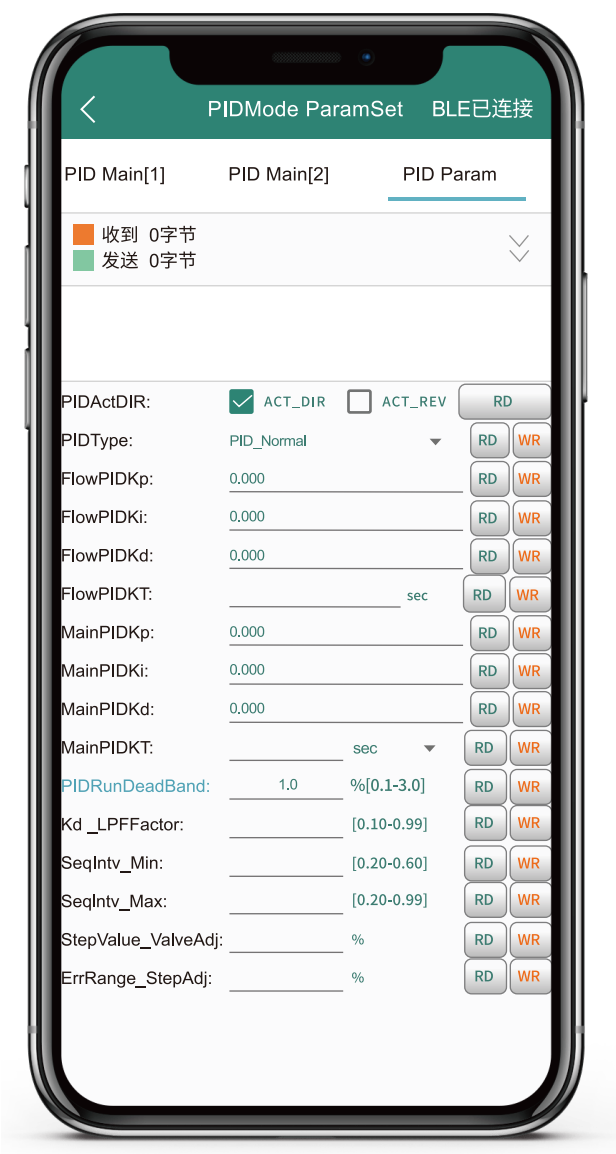
PIDMode ParameterSet

PIDMode ParameterSet: Read or modify functional parameters in Intelligent PID Mode

【PIDSV_TempIN】	PID SetValue in TempIN_Mode
【PIDSV_TempOut】	PID SetValue in TempOUT_Mode
【PIDSV_TempDiff】	PID SetValue in TempDiffer_Mode
【PIDSV_PressIN】	PID SetValue in PressIN_Mode
【PIDSV_PressOut】	PID SetValue in PressOut_Mode
【PIDSV_PressDiff】	PID SetValue in PressDiffer_Mode
【PIDSV_Flow】	PID SetValue in Flow_Mode
【PIDSV_Energy】	PID SetValue in Energy_Mode
【PIDOutLimit_Max】	Readable or modifiable maximum opening limit of actuator output
【PIDOutLimit_Min】	Readable or modifiable minimum opening limit of actuator output
【DDCRun_Time】	Running time of the secondary PID working mode in DDC mode
【Valve_WorkType】	Selectable Position Mode or PID Mode
【PIDTempRunMode】	Selectable Heating Mode or cooling Mode
【ValveAct_PVNoData】	Selectable executed command when controlled valve without signal
【PIDSV_BusChannel】	Selectable channel for controlled target
【MainPIDSVSource】	Selectable Main PID control signal input source

APP-PID Parameter Mode

Interface3



Dropdown Option

【PIDType】Selectable:

- PID_Normal

One_StepMode

Multi_StepMode
- Standard PID Mode

Stepping PID Mode

Intelligent stepping PID Mode

【主PIDKT】Selectable:

- sec

min
- second

minute

PIDMode ParameterSetting

PIDParameterSetting: Primarily for reading or modifying functional parameters under the Intelligent PID mode

【PIDActDIR:】	Selectable Direct or Reverse Action
【PIDType】	Supports selecting 6 operating modes
【FlowPIDKp:】	Read or modify sub PID-P parameter
【FlowPIDKi】	Read or modify sub PID-I parameter
【FlowPIDKd】	Read or modify sub PID-D parameter
【FlowPIDKT】	Sub-PID flow sampling time period
【MainPIDKp】	Read or modify main PID-P parameter
【MainPIDKi】	Read or modify main sub-PID-I parameter
【MainPIDKd】	Read or modify main sub-PID-D parameter
【MainPIDKT】	Supports selecting two units (second /minute) for reading or modifying the sampling time period
【PIDRunDeadBand】	Supports reading or modifying the deadband value set for the actuator
【Kd_LPFFactor】	Supports reading or modifying the differential filter coefficient value
【SeqIntv_Min】	Supports reading or modifying the minimum percentage parameter of Integral Separation
【SeqIntv_Max】	Supports reading or modifying the maximum percentage parameter of Integral Separation
【StepValue_ValveAdj】	Increment/Decrement value persetting in stepping mode Interval Setting for Switching from Standard PID to ONESTEP mode
【ErrRange_StepAdj】	Multi-Step (MULSTEP) Mode Mode Range Setting

APP-NBlotlCAT1

Interface1



NetDevice Parameter Setting

Net Device Parameter Setting: Read or Modify Parameters of Net Devices

【ConnectStatus】	Displays whether the device is connected to the network
【CloudPlatform】	Selectable Device Login Platform
【ServIP】	Server IP Address for Device Login
【ServPort】	Server Port Number for Device Login
【NetDevLoginMode】	Login via IP Address or Domain Name
【DoMain】	Server Domain Name for Device Login
【DevCode】	Device Code
【UserID】	Device used ID
【ClientID】	Device Client ID
【VerifyInfo】	Unique Code for Server Login
【VerifyType】	Selectable Feature String Verification Method
【MQTT_ClientID_Rule】	Selecting Multiple Coding Rule Type
	Supports cooling rules in multiple formats
【MQTT_UserID_Rule】	Selecting Multiple Coding Rule Type
	Supports cooling rules in multiple formats
【MQTT_VerifyInfo_Rule】	Selecting Multiple Coding Rule Type
	Supports cooling rules in multiple formats
【MQTT_Topic_Rule】	Selecting Multiple Coding Rule Type
	Supports cooling rules in multiple formats

Drop-down Options

【Login Platform】Selectable:

NBIOT_LWM2M_CTWING	NB_Telecom Platform	CAT1TCP_LWM2M	4G_TCPTelecom Platform	CATIMQTT_CUSTOM	4G_MQTTUser-Defined
NBIOT_MQTT_HDB	Customer Customization	CAT1TCP_CUSTOM	4G_TCP User-Defined	CAT1TCP_ZHIHUIHUIWU	Customer Customization
NBIOT_MQTT_CUSTOM	NB_MQTT User-Defined	WIFIMQTT_CUSTOM	WIFI_MQTT User-Defined	WIFITCP_CUSTOM	WIFI_TCPUser-Defined

【Verification Type】Selectable:

VERIFY_NONE	No Verification	VERIFY_IMEI	IMEI Verification	VERIFY_CUSTOM	User-Defined Verification
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【ClientID Coding Rules】Selectable:

FIX_AND_IMEI	IMEI Coding	FIX_AND_IMES	IMES Coding	CLIENTID_CUSTOM	User-Defined Coding
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【UserID Coding Rules】Selectable:

FIX_AND_IMEI	IMEI Coding	FIX_AND_IMES	IMES Coding	CLIENTID_CUSTOM	User-Defined Coding
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【VerifyInfo Coding Rules】Selectable:

FIX_AND_IMEI	IMEI Coding	FIX_AND_IMES	IMES Coding	VERIFYINFO_CUSTOM	User-Defined Coding
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【Topic Coding Rules】Selectable:

FIX_AND_CLIENTID	CLIENTID Coding	FIX_AND_USERID	USERID Coding
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APP-NB-IoT-CAT1

Interface2



Net Device Parameter Setting

NetDevice Parameter Setting: Read or modify the Net Device Parameter

【Login Mode】	Selectable Device Login Platform
【ConnectStatus】	Displays whether the device is connected to the network
【DeviceTopic_RealData】	Read the Pre-added Topics on the Logged-in Platform
【DeviceTopic_HeartPack】	Read the Pre-added Topics on the Logged-in Platform
【DeviceTopic_ReplyModbus】	Read the Pre-added Topics on the Logged-in Platform
【ServTopic_Modbus】	Read the Pre-added Topics on the Logged-in Platform
【ServTopic_ReplyUploadData】	Read the Pre-added Topics on the Logged-in Platform
【CardIMEI】	Read the CardMEI data
【CardIMES】	Read the CardMES data

Drop - down Options

【Login Platform】Selectable:

NB-IoT_LWM2M_CT-WING	NB_Telecom Platform	CAT1TCP_LWM2M	4G_TCPTelecom Platform	CAT1MQTT_CUSTOM	4G_MQTT User-defined
NB-IoT_MQTT_HDB	Customer Customization	CAT1TCP_CUSTOM	4G_TCP User-defined	CAT1TCP_ZHIHUIHUIWU	Customer Customization
NB-IoT_MQTT_CUSTOM	NB_MQTT User-defined	WIFIMQTT_CUSTOM	WIFI_MQTT User-defined	WIFITCP_CUSTOM	WIFI_TCP User-defined

APP-NBlotlCAT1

Interface3



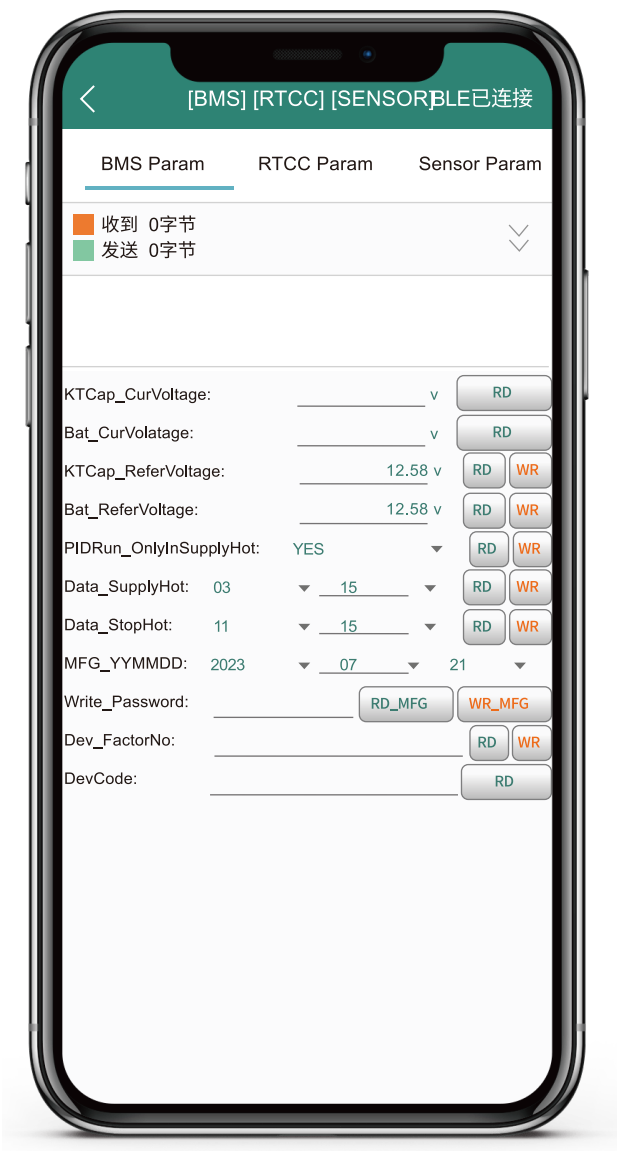
Net Device Parameter Setting

NetDevice Parameter Setting: Read or modify the parameters of Net devices

【AutoGetTime_ByConnectNet Fnable】	Automatic time acquisition. Enabled by Default
【Netdev_HeartPack_Enable】	When an instruction is sent to the server and the server fails to respond within the specified time, the device will restart. Disabled by default
【NetDev_Peroid_Upload Enable】	Timed data upload
【NetDev_UploadHistoryData_Fnable】	Disabled by default
【Netdev_ShakeHands_Enable】	If the handshake fails for the first time, the system will automatically attempt another handshake after the specified interval.
【NetDev_HeartPack_Period】	Read or modify the heartbeat cycle
【NetDev_UploadData_Period】	Read or modify the timed upload cycle
【NetDev_Reconnect_Period】	Read or modify the disconnection reconnection cycle
【BusID】	Read the Bus1D parameter
【DevRssi】	Read the DevRssi parameter
【DevRSRP】	Read the DevRSRP parameter
【DevSINR】	ead the DevSINR parameter
【DevPCI】	Read the DevPCI parameter
【DevCellID】	Read the DevCellID parameter

APP-BMSIRTCCISensor

Interface1



BMSIRTCCISensor

BMSIRTCCISensor: Battery Management / Clock Management / Sensor Parameter Configuration

【KTCap_CurVoltage】	Fail Safe Capacitor Voltage
【Bat_CurVolatage】	Fail Safe Battery Voltage
【KTCap_ReferVoltage】	Fail Safe Capacitor Voltage Reference
【Bat_ReferVoltage】	Fail Safe Battery Voltage Reference
【PIDRun_OnlyInSupplyHot】	YES (PID control is applied only in the heating period) NO (Under continuous PID control)
【Data_SupplyHot】	Read the heating date
【Data_StopHot】	Read the heating off date
【MFG_YYMMDD】	Read the Production Date
【Write_Password】	Read the password
【Dev_FactorNo】	Read the factory code
【DevCode】	Read the device code

Drop-Down Options

【PID Only During the Heating Period】Selectable:
Yes
No

APP-BMSIRTCCISensor

Interface2



BMSIRTCCISensor

BMSIRTCCISensor: Reading or Modifying Battery Management / Clock Management / Sensor Parameter Setting

【RTCC_WorkMode】	Selectable RTCC Work Mode
【WakeTime[s】	Interval between standard wake-up
【LongWakeTime[M】	Interval between long wake-up
【SleepPeroid】	Sleep Duration
	Time unit options: minute, hour, day
【MaxTime_OffPeak】	Maximum Duration for Peak Avoidance
【CurOffPeakTime】	Read the present peak avoidance duration
【SetTime[yymmdd】	Disable the current system time and reset it
【SetTime[h:mm:ss】	Disable the current system time and reset it
【CurSysTime】	Read the current system time
【CurDevTime】	Read the current device time
【AutoClear_StartTime】	Read the self-cleaning start time
【AutoClear_Peroid】	Read or modify the self-cleaning period

The interval time between each long wake-up

【RTCCWork Mode】Selectable:

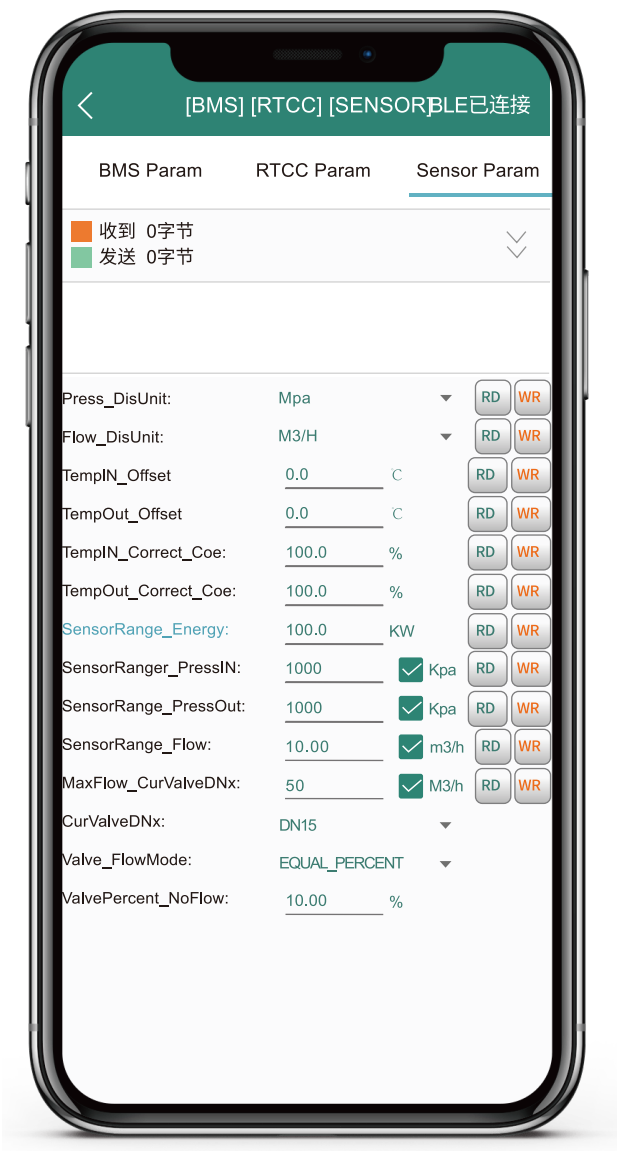
NormalWake Standard Wake-up | LongWake Long Wake-up

【Sleep Cycle】Selectable:

Min Minute | Hour Hour
Day Day

APP-BMSIRTCCISensor

Interface3



BMSIRTCCISensor

BMSIRTCCISensor: Reading or Modifying Setting
Battery Management, Clock Management, and Sensor Parameters

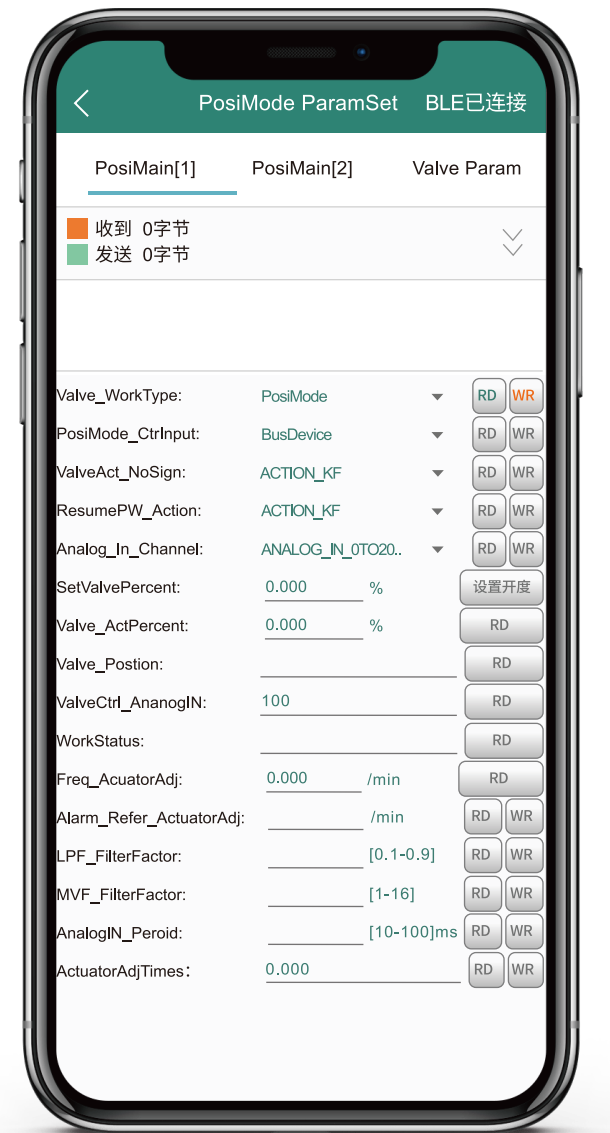
【Press_DisUnit】	Five pressure display units are provided
【Flow_DisUnit】	Three options of flow display unit are provided.
【SensorRange_Flow】	Proportionally Correct the Inlet Water Temperature Value
【TempOut_Correct_Coe】	Proportionally Correct the Return Water Temperature Value
【TempIN_Correct_Coe】	Adjustable Range in Energy Mode
【SensorRange_Energy】	Read or modify the range of the inlet water pressure sensor
【SensorRange_PressOut】	Read or modify the range of the return water pressure sensor
【SensorRange_Flow】	Read or modify the flow sensor range
【MaxFlow_CurValveDNx】	The system automatically retrieves the maximum valve flow rate corresponding to the current valve nominal diameter.
【CurValveDNx】	Select the valve nominal diameter compatible with the current actuator; it can be read or modified.
【Valve_FlowMode:】	Defaulted as EQUAL_PERCENT

Drop-down Options

- 【Pressure Display Units】Selectable:
Mpa、Kpa、Pa、m、cm
- 【Flow Display Units】Selectable:
M3/H、L/M、L/H
- 【Current Valve Nominal Diameter】Selectable:
DN15、DN20、DN25、DN32、DN40、DN50、DN65、DN80、DN100、DN125、DN150
- 【Valve Flow Mode】Selectable:
EQUAL_PERCENT (Equal Percentage Curve)、LINEAR (Customer Customization)

APP-Posi Mode Parameter

Interface 1



Dropdown options

【Work Mode】Selectable:

PosiMode	Position Mode Control	PosiAndTempOut	Position + Out_Water Temperature Control mode	PID_PRESSDIFF	PRESS Difference Control mode
PID_TempOut	OUT Temp Control mode	PosiAndTempDiff	Position+Temperature Difference Control mode	PID_PRESSIN	IN_PRESS Control mode
PID_TempDiff	Temperature Difference Control mode	FlowAndTempOut	Flow+Out_Water Temperature Control mode	PID_PRESSOUT	OUT PRESS Control mode
PID_FlowMode	Flow Control mode	FlowAndTempDiff	Flow+Temperature Difference Control mode	PID_TEMPIN	IN Temp Control mode
				PID_ENERGY	Energy Mode

【Control Way】Selectable:

AnalogIN	Analog sigant	BusDevice	Network signal
【No-Signal Command】Selectable:			
ACTION_KF	Open Valve command	ACTION_BY_UART1DEV	Command for UART 1 Device
ACTION_GF	Close Valve command	ACTION_BY_UART4DEV	Command for UART 4 Device
ACTION_B33	B33 Control way	ACTION_BY_UART5DEV	Command for UART 5 Device
ACTION_KEEP	Keep command	ACTION_BY_UARTALLDEV	Command for All UART Device
ACTION_BY_UART0DEV	Command for UART 0 Device	ACTION_BY_SPODEV	Only For CANBUS Devices

【Power-on Command】Selectable:

ACTION_KF	Open Valve command	ACTION_KEEP	Sleep Command
ACTION_GF	Close Valve command	CMDBRAKE	Brake command
ACTION_B33	B33 Control way		

【Analog Input Channel】Selectable:

ANALOG_IN_4TO20MA	4-20mA Mode INput	ANALOG_IN_0TO10V	0-10V Mode INput
ANALOG_IN_0TO20MA	0-20mA Mode INput	ANALOG_IN_0HM135	0-135Ω Mode INput
ANALOG_IN_2TO10V	2-10V Mode INput	ANALOG_IN_NONE	NONE INput
		ANALOG_IN_0TO5V	0-5V Mode INput

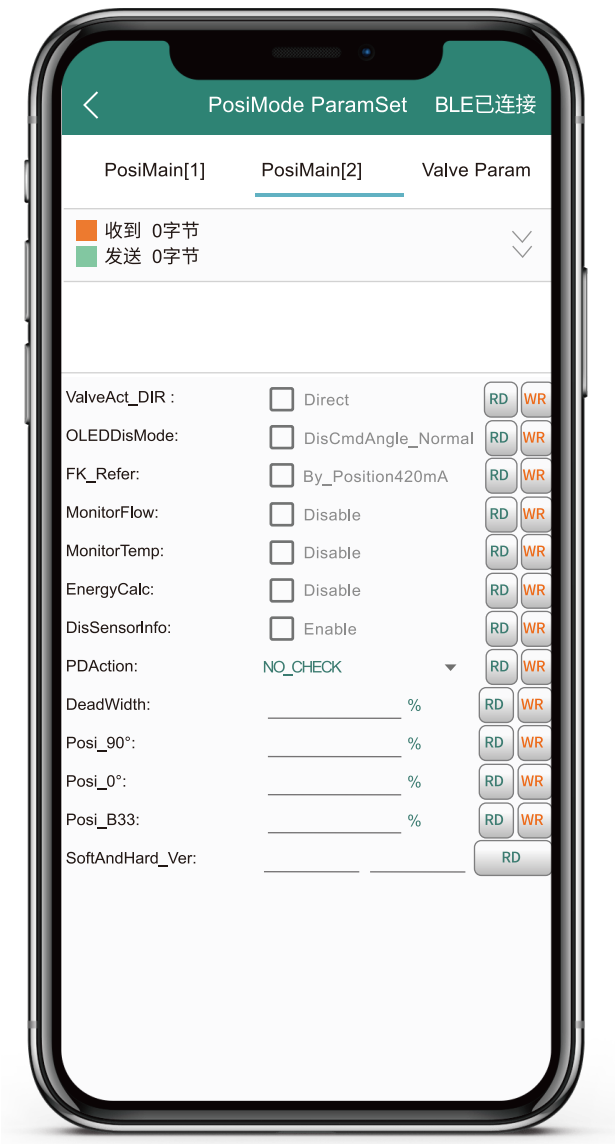
Posi Mode Parameter

Main control Position Mode: Mainly for reading or modifying functional parameters under the position control mode.

【Valve_WorkType】	Selectable Position mode or Intelligent PID Mode
【PosiMode_CtrlInput】	Select actuator control signal input source
【ValveAct_NoSign】	The executed valve command when analog signal is off
【ResumePW_Action】	Actuator action command after first power-on before new command received
【Analog_In_Channel】	Select analog channel signal type
【SetValvePercent】	Write valve opening value (0%-100%)
【Valve_ActPercent】	Read valve opening value
【Valve_Position】	Read real-time valve opening value
【ValveCtr_AnanohIN】	Input analog signal valve opening value
【WorkStatus】	Read real-time valve opening status
【Freq_AcutatorAdj】	Can read automatic adjustment frequency per minute; minute; exceed set limit triggers warning alert
【Alarm_Refer_ActuatorAdj】	Read or modify frequent alarm count
【LPF_FilterFactor】	Smaller value, better filtering effect, longer response time
【MVF_FilterFactor】	Median filtering for control signal: Larger value, better filtering effect, longer response time
【AnalogIN_Peroid】	Analog sampling period for flow value
【ActuatorAdjTimes】	Read or modify valve open/close times

APP-Posi Mode Parameter

Interface2



Dropdown Option

【Power Failure Command】Selectable:

ACTION_KF
ACTION_GF
ACTION_B33

Open valve command
Close valve command
B33 Control Mode

ACTION_KEEP
NO_CHECK

Keep command
Close command

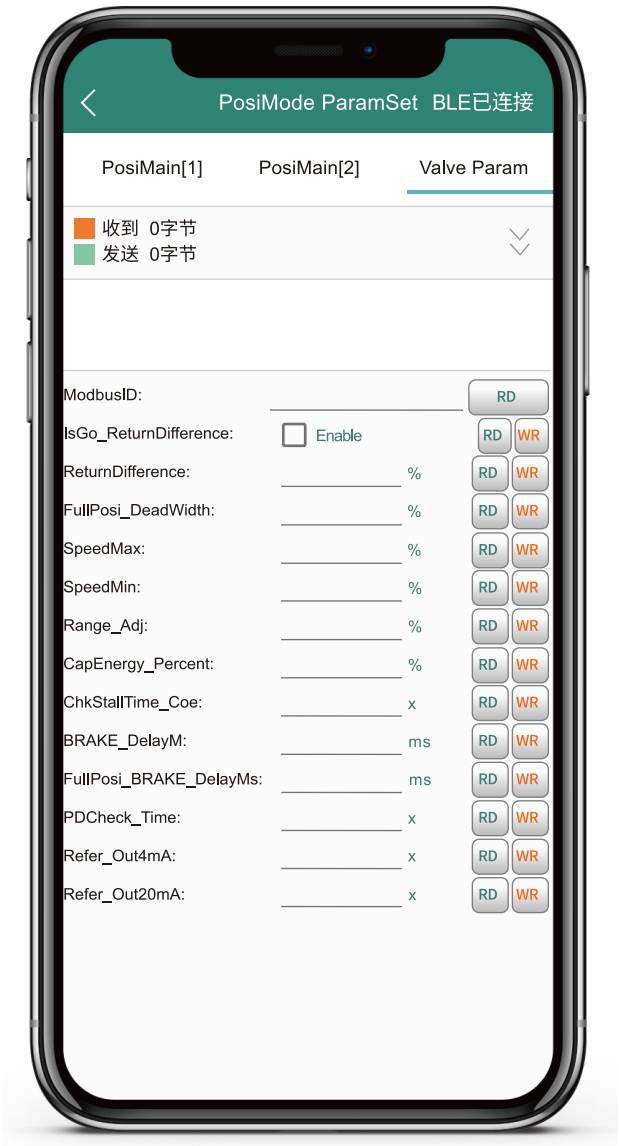
PosiMode Parameter

Main Control Position Mode：Mainly for reading or modifying functional parameters in Position Control Mode

【ValveAct_DIR】	Supports selection of Direct Action or Inverse Action
【OLEDDisMode】	Optional normal display and reverse display
【FK_Refer】	Optional to judge based on opening 0/100% or 4-20mA
【MonitorFlow】	Allows choose (Enable) or (Disable)
【MonitorTemp】	Allows choose (Enable) or (Disable)
【EnergyCalc】	Allows choose (Enable) or (Disable)
【DisSensorInfo】	Allows choose (Enable) or (Disable)
【PDAction】	Supports reading or modifying the actuator action during power-off
【DeadWidth】	Adjust the control precision of the valve
【Posi_90°】	Displays after a 90° position offset
【Posi_0°】	Displays after a 0° position offset
【Posi_B33】	Only for the third position configured under the B33 control mode
【SoftAndHard_Ver】	Supports reading the device's software and hardware version numbers

APP-Posi Mode Parameter

Interface3



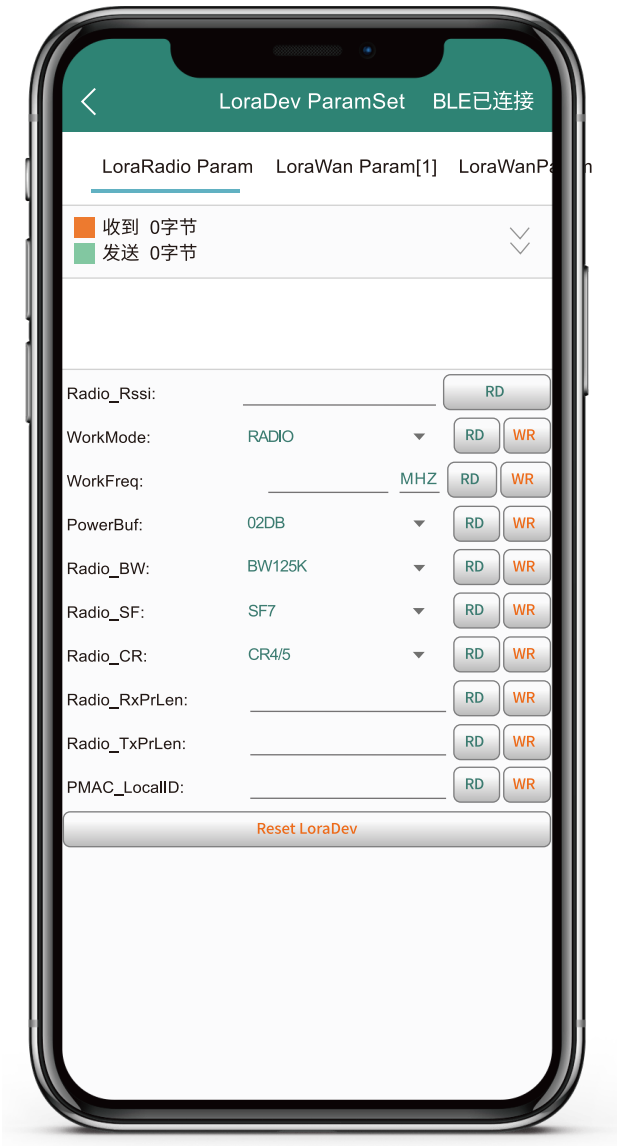
Posi Mode Parameter

Main Control Position Mode: Mainly for reading or modifying functional parameters under the position control mode.

【ModbusID】	Actuator BUS address
【IsGo_ReturnDifference】	Enable/Disable Hysteresis
【ReturnDifference】	Backlash during actuator forward/reverse switching
【FullPosi_DeadWidth】	DeadZone set at actuator fully closed position
【SpeedMax】	Actuator max operating speed: Larger value = faster speed.
【SpeedMin】	Actuator min operating speed: Smaller value = slower speed.
【Range_Adj】	Set valve deceleration range before reaching target position
【CapEnergy_Percent】	Indicates battery charge value for auto mode after power-on
【ChkStallTime_Coe】	Valve stall detection sensitivity: Smaller value = higher sensitivity; Larger value = lower sensitivity.
【BRAKE_DelayM】	Actuator stops after delay upon reaching specific position
【FullPosi_BRAKE_DelayMs】	Brake delay within full closed deadzone
【PDCheck_Time】	Apply to Fail safe product (KT)
【Refer_Out4mA】	Read or modify 4mA output current
【Refer_Out20mA】	Read or modify 20mA output current

APP-Lora Device Parameter

Interface1



Lora Device Parameter

Lora Device Parameter: Reading or modifying parameters for LoRa device parameter

【Radio_Rssi】	Readable Device Signal Strength
【WorkMode】	Reading or modifying the device's operating modes
【WorkFreq】	Reading or modifying the device's operating frequency
【PowerBuf】	In LoRaWAN operating mode, the higher the transmit power value, the wider the coverage range, the slower the response speed;
【Radio_BW】	Reading or modifying the signal bandwidth
【Radio_SF】	In Radio operating mode, the higher the Spreading Factor value, the wider the coverage range, the slower the response speed;
【Radio_CR】	Reading or modifying the error correction method
【Radio_RxPrLen】	Reading or modifying the received preamble length
【Radio_TxPrLen】	Reading or modifying the transmitted preamble length
【PMAC_LocalID】	Reading or modifying the PMAC local ID

Dropdown Options

【Work Mode】Selectable:

RADIO、PMAC、LORAWAN

【Transmit Power】Selectable:

02DB、03DB、04DB、05DB、06DB、07DB、08DB、09DB、10DB、11DB、12DB、13DB、14DB、15DB、16DB、17DB、18DB、19DB、20DB

【Signal Bandwidth】Selectable:

BW125K、BW250K、BW500K

【Spreading Factor 】Selectable:

SF7、SF8、SF9、SF10、SF11、SF12

【Error Correction Method 】Selectable:

CR4/5、CR4/6、CR4/7、CR4/8

APP-Lora Device Parameter

Interface2



Lora Device Parameter

LoraDeviPara: For reading or modifying the Lora device parameters.

【Radio_Rssi】	Device Signal Strength Readable
【WorkStatus】	Work Status Readable and Modifiable
【WorkMode】	Work Status Readable and Modifiable
【ISMBand】	ISMBand Readable and Modifiable
【WorkClass】	WorkClass Platform Selection Readable and Modifiable
【JoinMode】	Network Join Encryption Mode Readable and Modifiable
【TxPower】	TX Power Readable and Modifiable
【ForbidCFC】	
【TxDRx】	TX Rate Readable and Modifiable DRx
【RxDRx】	Receive Rate Readable and Modifiable DRx
【Rx2Freq】	
【TxCenterFreq】	

Dropdown options

- 【WorkStatus】Selectable：

UNCONNECT、JOIN_FAIL、JOIN_SUCC、SENDING_DATA、SENDDATA_FAIL、SENDDATA_SUCC、UNCONFIRM_SUCC、CONFIRM_SUCC
- 【WorkMode】Selectable：

RADIO、PMAC、LORAWAN
- 【ISM Frequency Band】Selectable：

EU433、CN470、CN779、EU863、RU864、IN865、US902、AU915、AS923、KR920
- 【WorkClass】Selectable：

CLASSA、CLASSB、CLASSC
- 【Network Join Mode】Selectable：

OTAA、ABP
- 【Transmit Power】Selectable：

17DB、15DB、13DB、11DB、09DB、07DB、05DB、02DB
- 【Frame Count Enable】Selectable：

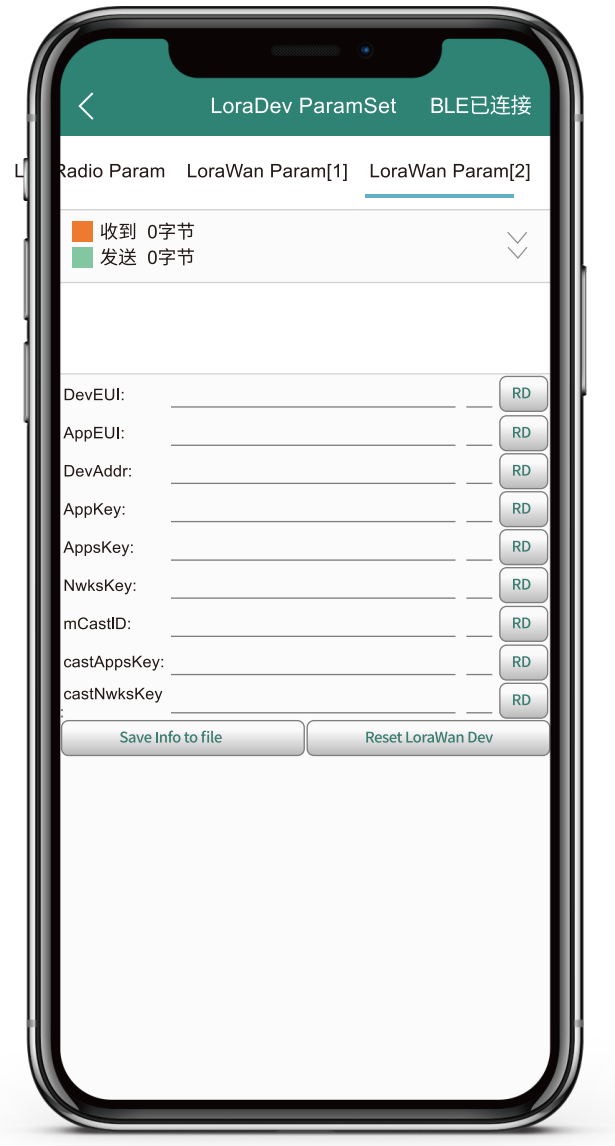
DISABLE、ENABLE
- 【Transmit Rate DRx】Selectable：

DR0_SF12BW125、DR1_SF11BW125、DR2_SF10BW125、DR3_SF9BW125、DR4_SF8BW125、DR5_SF7BW125、DR6_SF7BW125、DR7_SF7BW250、DR8_SF12BW500
- 【Receive Rate DRx】Selectable：

DR0_SF12BW125、DR1_SF11BW125、DR2_SF10BW125、DR3_SF9BW125、DR4_SF8BW125、DR5_SF7BW125、DR6_SF7BW125、DR7_SF7BW250、DR8_SF12BW500

APP-Lora Device Parameter

Interface3



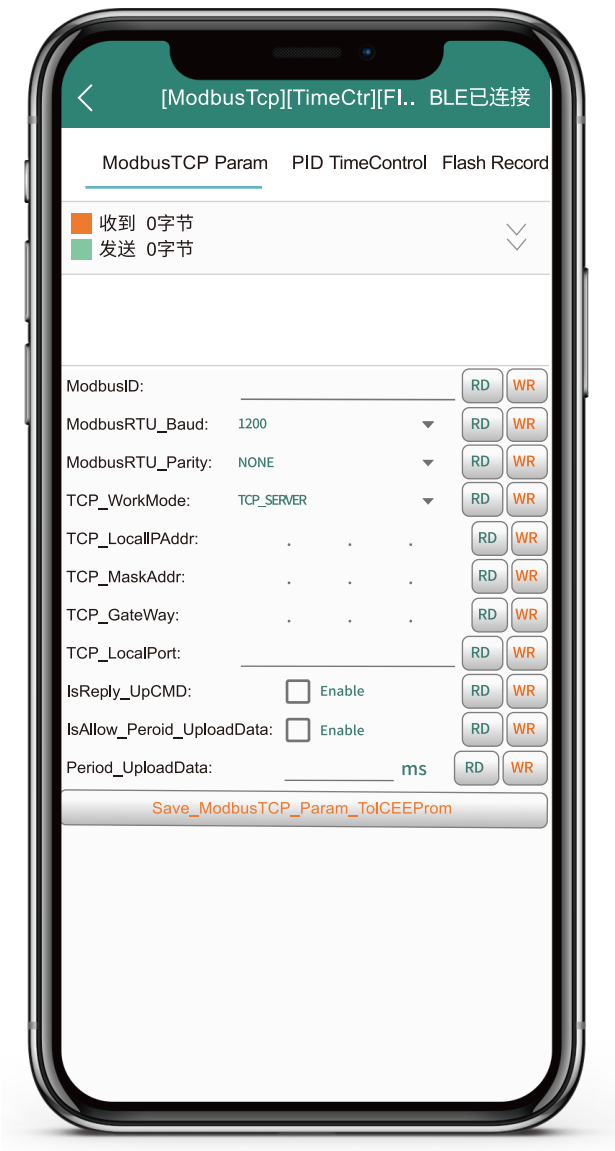
Lora Device Parameters

Lora Device Parameters: For reading or modifying the LoRa device parameters

【DevEUI】	Able to read the EUI login code of the device
【AppEUI】	Able to read the EUI login code of the APP
【DevAddr】	Able to read the address code of the device
【AppKey】	Able to read the APP password
【AppsKey】	Able to read the APP password
【NwksKey】	Able to read the mCastID
【mCastID】	Able to read the platform ID
【castAppsKey】	Able to read the castAppsKey
【castNwksKey】	Able to read the castNwksKey

APP-mTCPITimeCtrlRecord

Interface1



ModbusTcpl Time-sharing control|Record

ModbusTcplTimeCtrlRecord:For reading or modifying the Time-based Regulation Mode

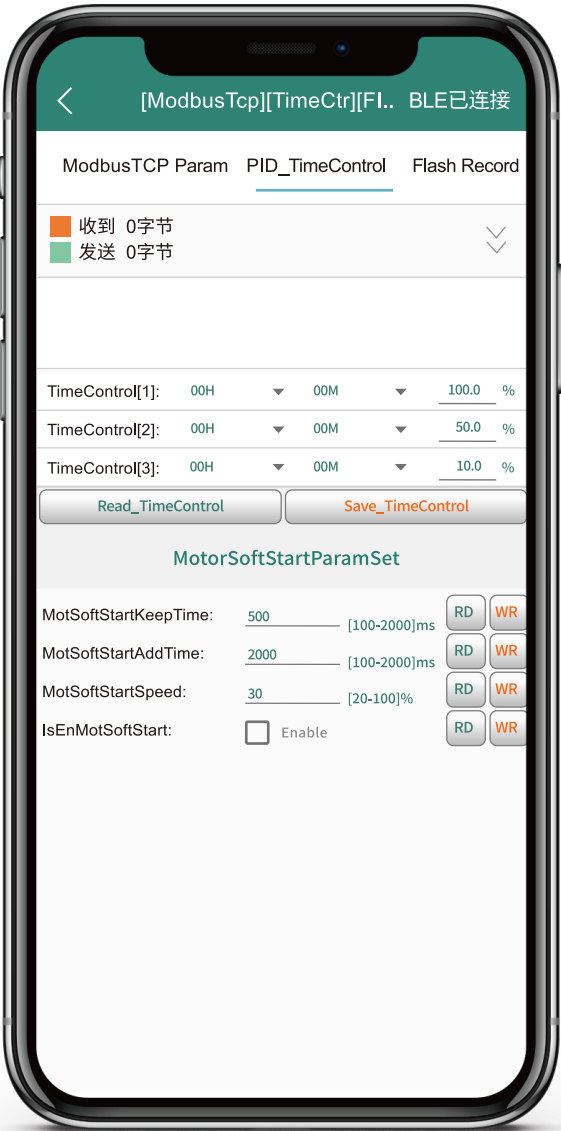
【ModbusID】	Set the ID Address of the actuator
【ModbusRTU_Baud】	Selectable different baud rates
【ModbusRTU_Parity】	Set and match according to the verification mode of the upper computer
【TCP_Work Mode】	Defaulted TCP_SERVER
【TCP_LocalIPAddr】	Local IP Address
【TCPMaskAddr】	Local Subnet Mask
【TCP_GateWay】	Local Gateway
【TCP_LocalPort】	Local Server Port Number
【IsReply_UpCMD】	Enable or Disable (selectable)
【Is Allow_Period_UploadData】	Enable or Disable (selectable)
【Period_UploadData】	Time Required for each data upload

Dropdown options

- 【RTU Baud Rate】Selectable：
1200、2400、4800、9600、19200、34800、57600、115200
- 【RTU CHECK Position】Selectable：
NONE、EVEN、ODD
- 【TCP WorkMode】Selectable：
TCP_SERVER、TCP_CLIENT、UDP_SERVER、UDP_CLIENT

APP-mTCPITimeCtrlRecord

Interface2



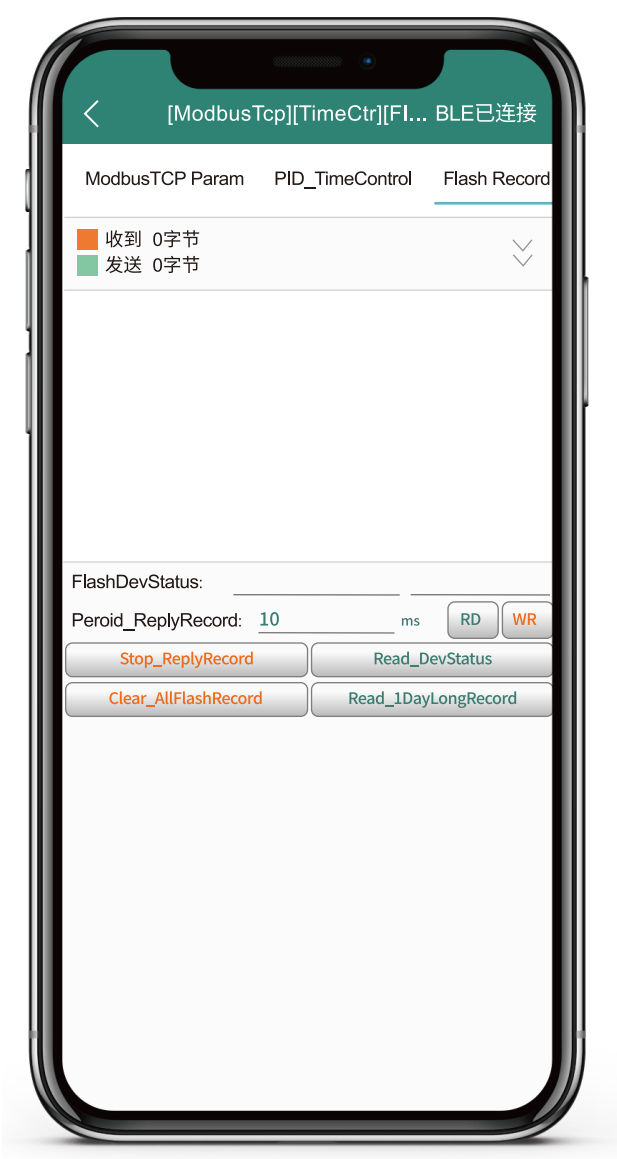
ModbusTcpl Time-sharing control|Record

ModbusTcpl Time-sharing control|Record：For reading or modification of Time-sharing Regulation Mode

【TimeControl[1]】	Time-sharing Control: Device switches from PID control to 3 user-defined time periods & corresponding positions. ※Time periods: chronological order required; positions: no restrictions。
【TimeControl[2]】	
【TimeControl[3]】	

APP-mTCP TimeCtrlRecord

Interface3



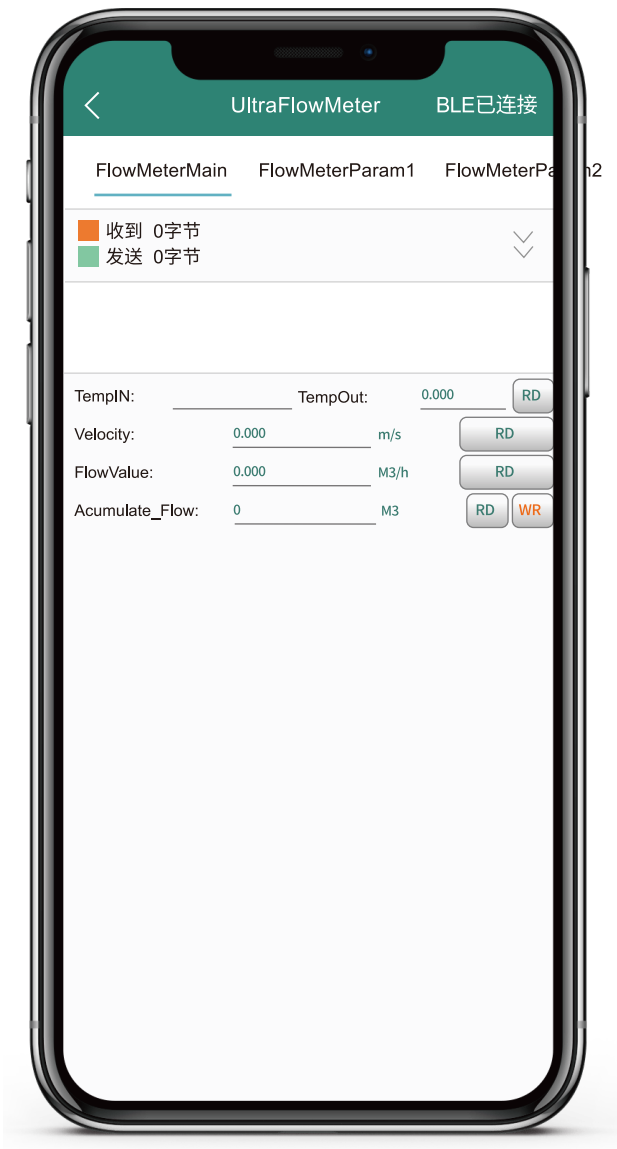
ModbusTcpITSCData

ModbusTcpITSCData: Parameter reading or modification for the time-sharing regulation mode

【Storing Equipment Status】	Displays whether the device's storage status allows re-storage
【Return Recording Interval】	Reading/modifying the return data recording interval

APP-UltraFlowMeter

Interface1



UltraFlowMeter

UltraFlowMeter:Reading or modifying functional parameters for the ultrasonic flow meter

【TempIN】	【TempOut】	2-way sensors temperature readable (ultrasonic flowmeter)
【Velocity】		Ultrasonic flowmeter flow rate readable
【FlowValue】		Ultrasonic flowmeter flow volume readable
【Acumulate_Flow】		Total Flow Volume

APP-Ultrasonic Flow Meter

Interface2



Drop-Down Options

【Acquisition Mode】Selectable:

- TIMER_ERROR
- Standard PID Mode
- VELEO_ERROR
- Customer Customization

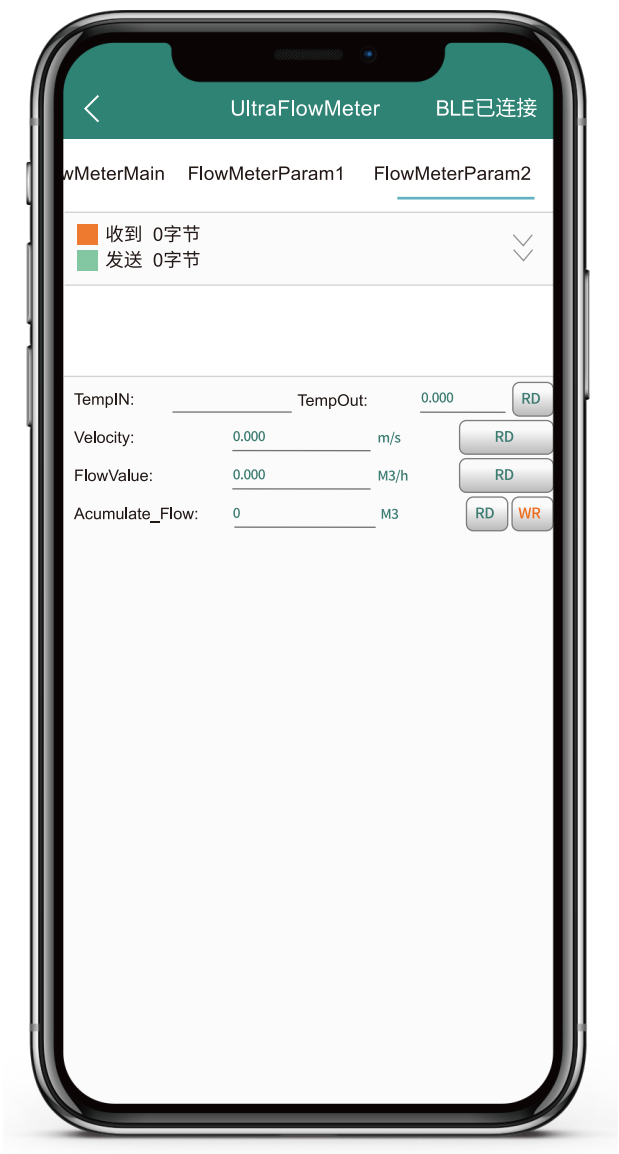
Ultrasonic Flow Meter

Ultrasonic Flow Meter: Reading or modifying functional parameters for the ultrasonic flow meter

【LPF_FilterFactor】	The smaller this coefficient, the better the filtering effect and the longer the response time
【MVF_FilterFactor】	Median filtering is applied to the control signal — the larger this coefficient is, the better the filtering effect, while the longer the response time.
【Smooth_FilterCoe】	
【Refer_Out4mA】	Read or modify the 4mA output current
【Refer_Out20mA】	Read or modify the 20mA output current
【DeltaTime_StillWater】	
【SensorRange_Flow】	Read or modify the measuring range of the flow sensor
【MeterDNx】	
【CalcMode】	

APP-UltraFlowMeter

Interface3



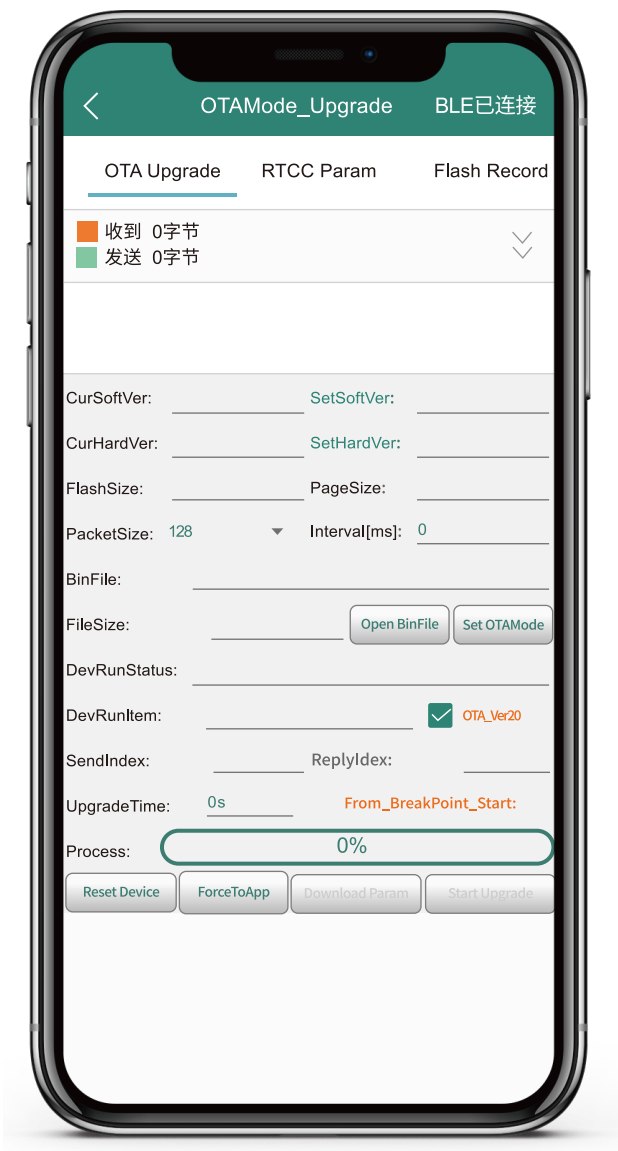
UltraFlowMeter

UltraFlowMeter:Reading or modifying functional parameters for the ultrasonic flow meter

【TempIN】	【TempOut】	2-way sensor temperature readable (ultrasonic flowmeter)
【Velocity】		Ultrasonic flowmeter flow rate readable
【FlowValue】		Ultrasonic flowmeter flow volume readable
【Acumulate_Flow】		Total flow volume

APP-OTAUpgrade2.0

Interface1



Drop-down Options

【Data Packet Size】Selectable:

128、256、512、1024、2048

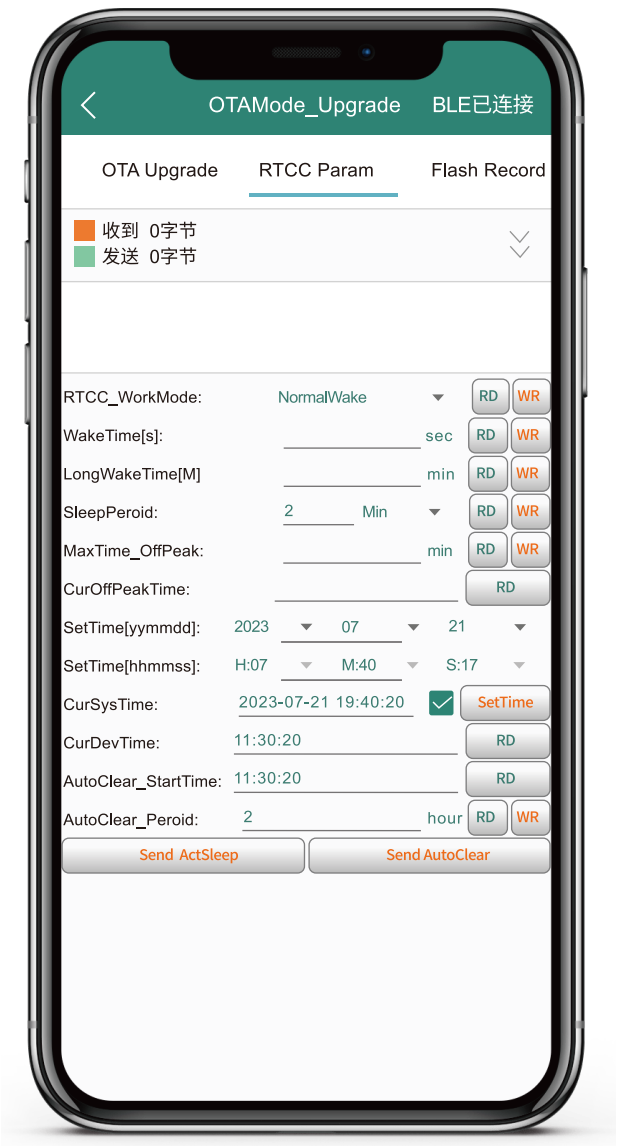
OTABluetooth Upgrade Main Control Interface

OTABluetooth Upgrade Main Control Interfac:
Reading or modifying parameters on the OTA Bluetooth Upgrade
Main Control Interface

【CurSoftVer】	Reading the device's software version number
【SetSoftVer】	Modifying the device's software version number
【CurHardVer】	Reading the device's hardware version number
【SetHardVer】	Modifying the device's hardware version number
【FlashSize】	Total flash memory storage capacity
【PageSize】	Flash memory storage page size
【PacketSize】	Selectable data packet size
【Interval】	Modifiable length of fragment inter-packet interval
【BinFile】	Software upgrade package
【FileSize】	Size of the upgrade package
【DevRunStatus】	Displays the device operating status
【DevRunItem】	Displays the names of operation items
【SendIndex】	Transmit packet sequence number
【UpgradeTime】	Displays the required time for OTA upgrade
【Process】	Displays the progress of completed upgrades

APP-OTA Update2.0

Interface2



OTA Bluetooth Update Main Control Interface

OTABluetooth Update: [Reading or modifying OTA Bluetooth update main control interface](#)

【RTCCworkMode】	Selectable RTCC Operating Mode
【Waketime[s】	Per Standard Wake-up Interval
【LongwWakeTime】	Per Long Wake-up Interval
【SleepPeroid】	Sleep Peroid
【MaxTime_OffPeak】	Selectable Time Units: min (minute), hour, day
	Peak Avoidance Maximum Time
【CurOffPeakTime】	Readable Current Peak Avoidance Time
【SetTime[yymmdd】	Disable Current System Time; Reset Time
【SetTime[hmmss】	Disable Current System Time; Reset Time
【CurSysTime】	Readable Current System Time
【CurDevTime】	Readable Current Device Time
【AutoClear_StartTime】	Readable Device Self-Cleaning Start Time
【AutoClear_Peroid】	Readable and Modifiable Device Self-Cleaning Cycle

Dropdown Option

【RTCC Workmode】Selectable:

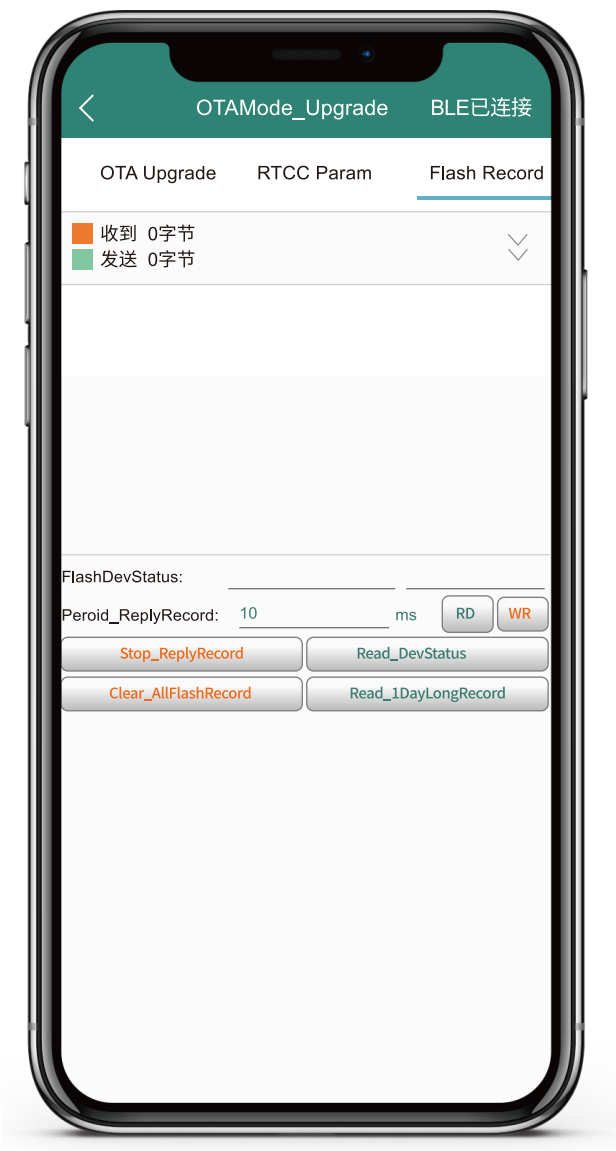
NormalWake NormalWake | LongWake LongWake

【SleepPeroid】Selectable:

Min minute | Hour Hour
Day Day

APP-OTA Upgrade2.0

Interface3



OTA Bluetooth Firmware Update - Main Control Interface

OTA Bluetooth Firmware Update - Main Control Interface:
[Read/Modify Operations](#)

【Store Device Status】	Display the Feasibility of Re-storing Stored Device Status
【Return Record Interval】	Allows reading and modifying the return record interval

APP-MQTT Client Platform

Interface1

MQTT Client Platform

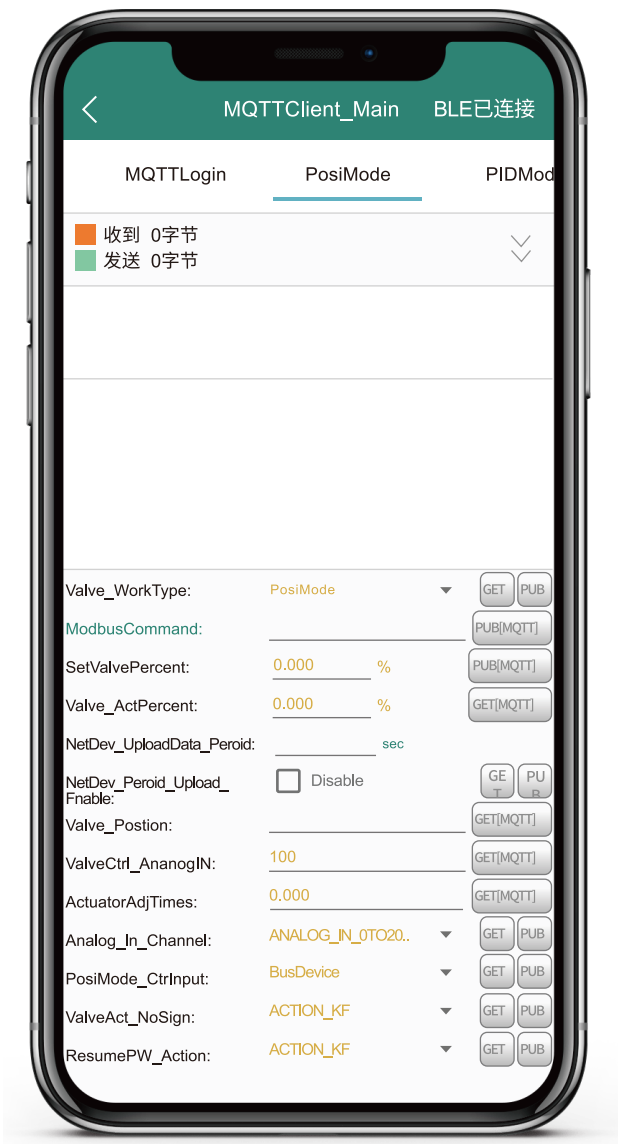
MQTT Client Platform：For reading or modifying parameters of the MQTT Client Platform

【ClientID】	Client's ID Number
【UserID】	Device ID
【Verifyinfo】	Unique code for server login
【DoMain】	Server domain name for device login
【ServIP】	Server IP address for device login
【ServPort】	Server port number for device login
【DeviceTopic_RealData】	Read the pre-added topics on the logged-in platform
【DeviceTopic_HeartPack】	Read the pre-added topics on the logged-in platform
【DeviceTopic_ReplyModbus】	Read the pre-added topics on the logged-in platform
【ServTopic_Modbus】	Read the pre-added topics on the logged-in platform
【ServTopic_ReplyUploadData】	Read the pre-added topics on the logged-in platform



APP-MQTT Client Platform

Interface2



MQTT Client Platform

MQTT Client Platform: Reading or modifying functional parameters of the MQTT Client Platform

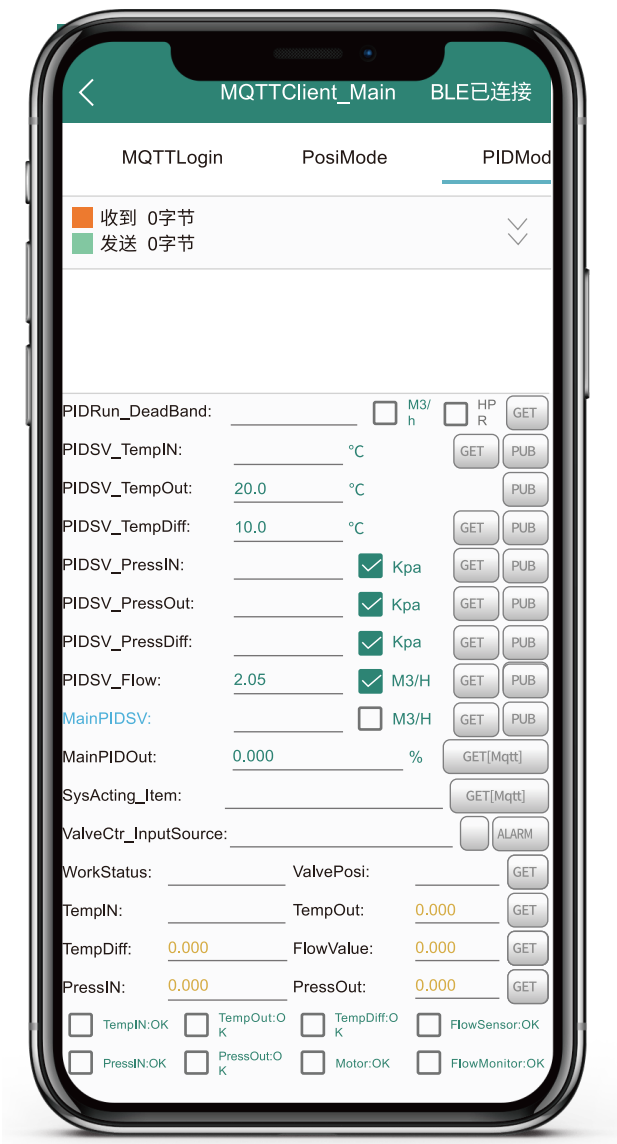
【Valve_WorkType】	Can select Position Mode or Intelligent PID Working Mode
【ModbusCommand】	Custom send Modbus commands
【SetValvePercent】	Write valve opening degree (0%-100%)
【Valve_ActPercent】	Read the value of valve opening degree
【NetDev_UploadData_Period】	Set the time required for each data upload
【NetDev_Peroid_Upload_Enable】	Select Enable or Disable
【Valve_Positon】	Read valve opening degree in real time
【ValveCtrl_AnanogIN】	Analog signal input of valve opening degree
【ActuatoeAdjTimes】	Read and modify the Times of valve on/off cycles
【Analog_In_Channel】	Select the signal type of the analog channel
【PosiMode_CtrlInput】	Select the actuator control Input_signal
【ValveAct_NoSign】	The command executed when the analog signal is off
【ResumePW_Action】	The action command of the actuator after power-on before receiving a new command

Dropdown Option

【Workmode】Selectable:					
PosiMode	Position Control Mode	PosiAndTempOut	Position+TempOut	PID_PRESSDIFF	PressDiffer ControlMode
PID_TempOut	TemoOutControl Mode	PosiAndTempDiff	Position+TempDiffer	PID_PRESSIN	PressIN ControlMode
PID_TempDiff	TempDifferControl Mode	FlowAndTempDiff	Flow+TempOut	PID_PRESSOUT	PressOut ControlMode
PID_FlowMode	FlowControl Mode	FlowAndTempDiff	Flow+TempDiffer	PID_TEMPIN	TempIN ControlMode
【Analog Input_Channel】Selectable:					
ANALOG_IN_4TO20MA	4-20mA InputMode		ANALOG_IN_0TO10V	0-10VInputMode	
ANALOG_IN_0TO20MA	0-20mAInputMode		ANALOG_IN_0HM135	0-135ΩInputMode	
ANALOG_IN_2TO10V	2-10VInputMode		ANALOG_IN_NONE	NoneInput	
			ANALOG_IN_0TO5V	0-5VInputMode	
【ValvePosition Controlway】Selectable:					
AnalogIN	AnalogSignal		BusDevice	Network signal	
【ValveAct_NoSign】Selectable:					
ACTION_KF	OpenValve Command		ACTION_BY_UART1DEV	UART 1 device commands	
ACTION_GF	CloseValve Command		ACTION_BY_UART4DEV	UART 4 device commands	
ACTION_B33	B33 Control way		ACTION_BY_UART5DEV	UART 5 device commands	
ACTION_KEEP	Keep Command		ACTION_BY_UARTALLDEV	All UART device commands	
ACTION_BY_UART0DEV	UART 0 device commands		ACTION_BY_SPODEV	Only for CANBUS device use	
【ResumePW_Action】Selectable:					
ACTION_KF	OpenCommand		ACTION_KEEP	Keep Command	
ACTION_GF	CloseCommand		CMDBRAKE	Brake Command	
ACTION_B33	B33Control way				

APP-MQTT Client Platform

Interface3



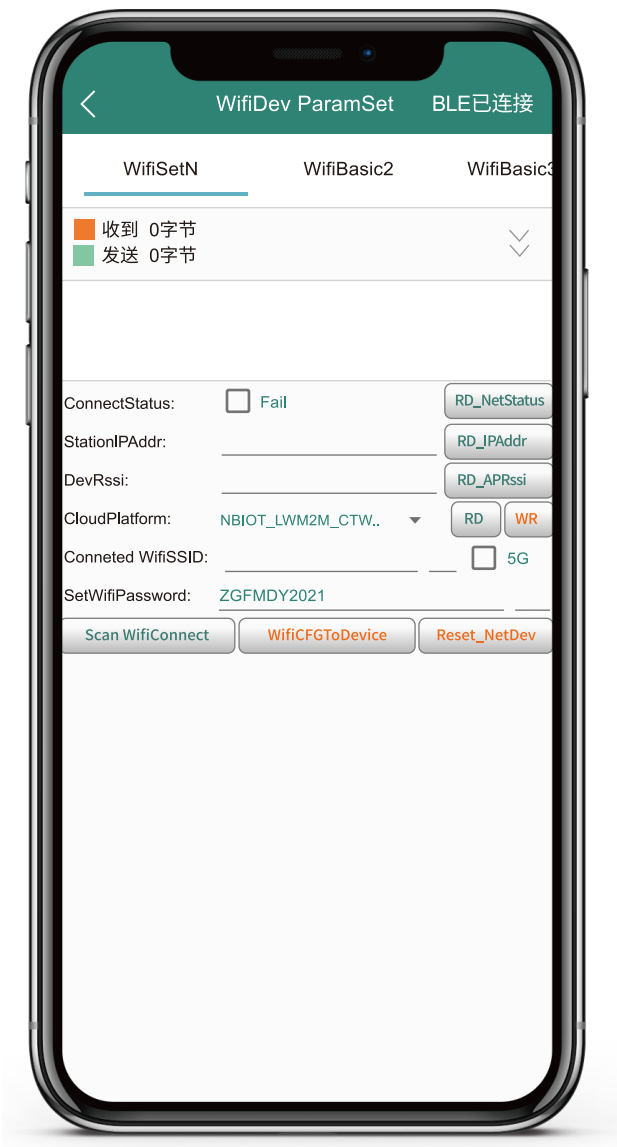
MQTT Client Platform

MQTTClient platform: Primarily for reading and modifying the functional parameters of the MQTT client platform

【PID Operation Deadzone】	Actuator Bus Address
【Inlet Temp PID Setpoint】	Readable/Modifiable Inlet Water Tempue
【Return Temp PID Setpoint】	Readable/Modifiable Inlet Water Temp
【Temp Diff PID Setpoint】	Readable/Modifiable Inlet-Return Water Temp Diff
【Inlet Pressure PID Setpoint】	Readable/Modifiable Inlet Water Pressure
【Return Pressure PID Setpoint】	Readable/Modifiable Return Water Pressure
【Pressure Difference PID Setpoint】	Readable/Modifiable Pressure Diff Between Inlet & Return
【Flow PID Setpoint】	Readable/Modifiable Flow Rate Value
【Main PID Setpoint】	Main PID Setpoint
【Main PID Output】	PID Controller Calculation Result Output
【System Execution Items】	Readable Actuator Control Mode
【Valve Control Input Source】	Readable Valve Position Control Mode
【Operating Status】	Reading the temperature values of two sensor channels
【Valve Position】	Real-Time Read Valve Pos Status & Values
【Inlet Water Temp】	Read Inlet-Return Temp Diff
【Return Water Temp】	
【TempDiff】 【Sensor Flow】	Reading the pressure values of two sensor channels
【Inlet Water Pressure】	
【Return Water Pressure】	

APP-Wifi device parameter setting

Interface1



Wifi device parameter setting

Wifi device parameter setting: Read or modify the paramter for WIFI device.

【ConnectStatus】	Show whether device is connected to the network
【StationIPAddr】	
【DevRssi】	
【CloudPlatform】	Device-selectable login platform
【Conneted WifiSSID】	
【SetWifiPassword】	

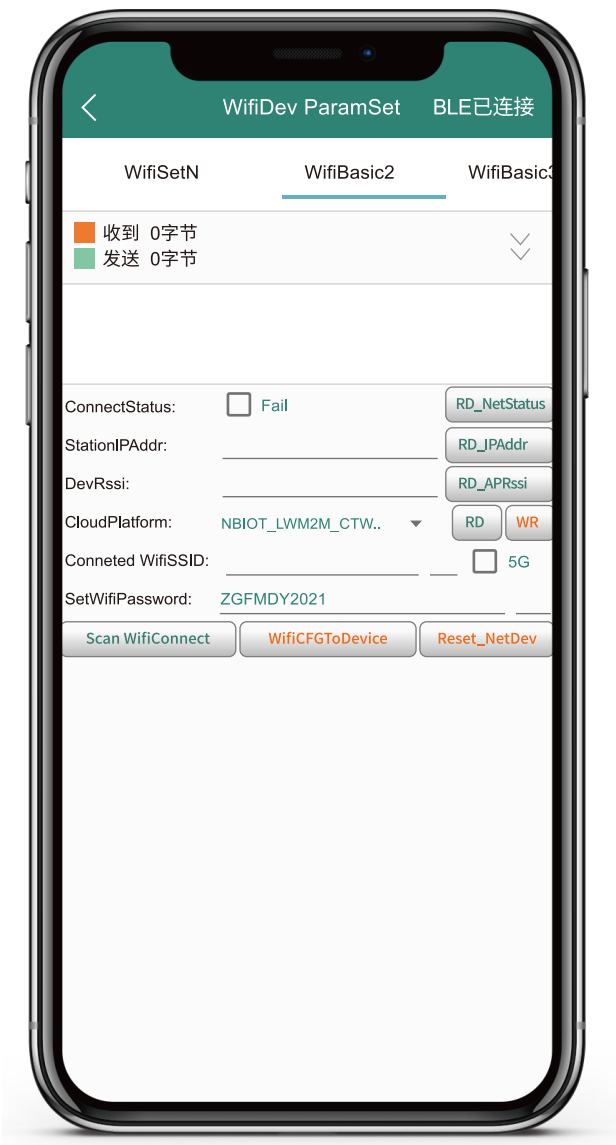
Dropdown Option

【login platform】Selectable:

NBIOT_LWM2M_CTWING	NB_CT	CAT1TCP_LWM2M	4G_TCP_CT	CATIMQTT_CUSTOM	4G_MQTT_CUSTOM
NBIOT_MQTT_HDB	CUSTOM	CAT1TCP_CUSTOM	4G_TCP_CUSTOM	CAT1TCP_ZHIHUIHUIWU	CUSTOM
NBIOT_MQTT_CUSTOM	NB_MQTT_CUSTOM	WIFIMQTT_CUSTOM	WIFI_MQTT_CUSTOM	WIFITCP_CUSTOM	WIFI_TCP_CUSTOM

APP-Wifi device parameter setting

Interface2



Wifi device parameter setting

Wifi device parameter setting: Read or modify the paramter for WIFI device

【ConnectStatus】	Displays whether the device is connected to the network.
【StationIPAddr】	
【DevRssi】	
【CloudPlatform】	The platform login for device can be selected
【Conneted WifiSSID】	
【SetWifiPassword】	

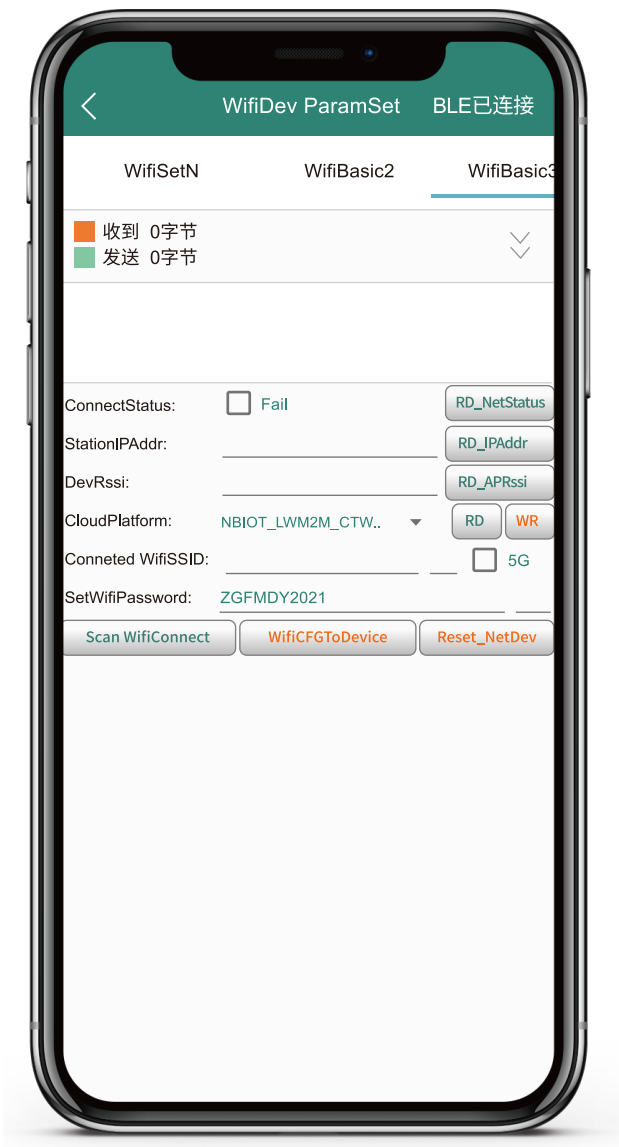
Dropdown Option

【Platform login】Selectable:

NBIOT_LWM2M_CTWING	NB_telecom platfor	CAT1TCP_LWM2M	4G_TCP telecom platform	CATIMQTT_CUSTOM	4G_MQTT user-defined
NBIOT_MQTT_HDB	Customer customization	CAT1TCP_CUSTOM	4G_TCP user-defined	CAT1TCP_ZHIHUIHUIWU	Customer customization
NBIOT_MQTT_CUSTOM	NB_MQTT user-defined	WIFIMQTT_CUSTOM	WIFI_MQTT user-defined	WIFITCP_CUSTOM	WIFI_TCP user-defined

APP-Wifi Device Parameter Setting

Interface3



Wifi device parameter setting

Wifi device parameter setting: Read or modify the paramter for WIFI device

【ConnectStatus】	Displays whether the device is connected to the network.
【StationIPAddr】	
【DevRssi】	
【CloudPlatform】	The platform login for device can be selected
【Conneted WifiSSID】	
【SetWifiPassword】	

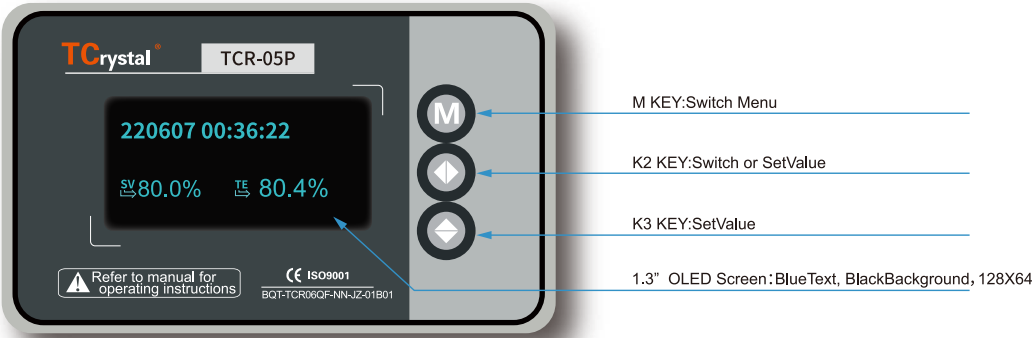
Dropdown Option

【Platform login】Selectable:

NBIOT_LWM2M_CTWING	NB_telecom platfor	CAT1TCP_LWM2M	4G_TCP telecom platform	CATIMQTT_CUSTOM	4G_MQTT user-defined
NBIOT_MQTT_HDB	Customer customization	CAT1TCP_CUSTOM	4G_TCP user-defined	CAT1TCP_ZHIHUIHUIWU	Customer customization
NBIOT_MQTT_CUSTOM	NB_MQTT user-defined	WIFIMQTT_CUSTOM	WIFI_MQTT user-defined	WIFITCP_CUSTOM	WIFI_TCP user-defined

[LoraWan_network access]Selectable:	OTAA, ABP
[Lo]Selectable:	CLASSA, CLASSB, CLASSC
[raWan_WorkClass]Selectable:	DR0_SF12BW125, DR1_SF11BW125, DR2_SF10BW125, DR3_SF9BW125, DR4_SF8BW125, DR5_SF7BW125, DR6_SF7BW125, DR7_SF7BW250, DR8_SF12BW500
[LoraWan_TxDRx]Selectable:	DR0_SF12BW125, DR1_SF11BW125, DR2_SF10BW125, DR3_SF9BW125, DR4_SF8BW125, DR5_SF7BW125, DR6_SF7BW125, DR7_SF7BW250, DR8_SF12BW500
[LoraWan_RxDRx]Selectable:	17DB, 15DB, 13DB, 11DB, 09DB, 07DB, 05DB, 02DB
[Transmit power]Selectable:	DISABLE, ENABLE

Actuator Interface



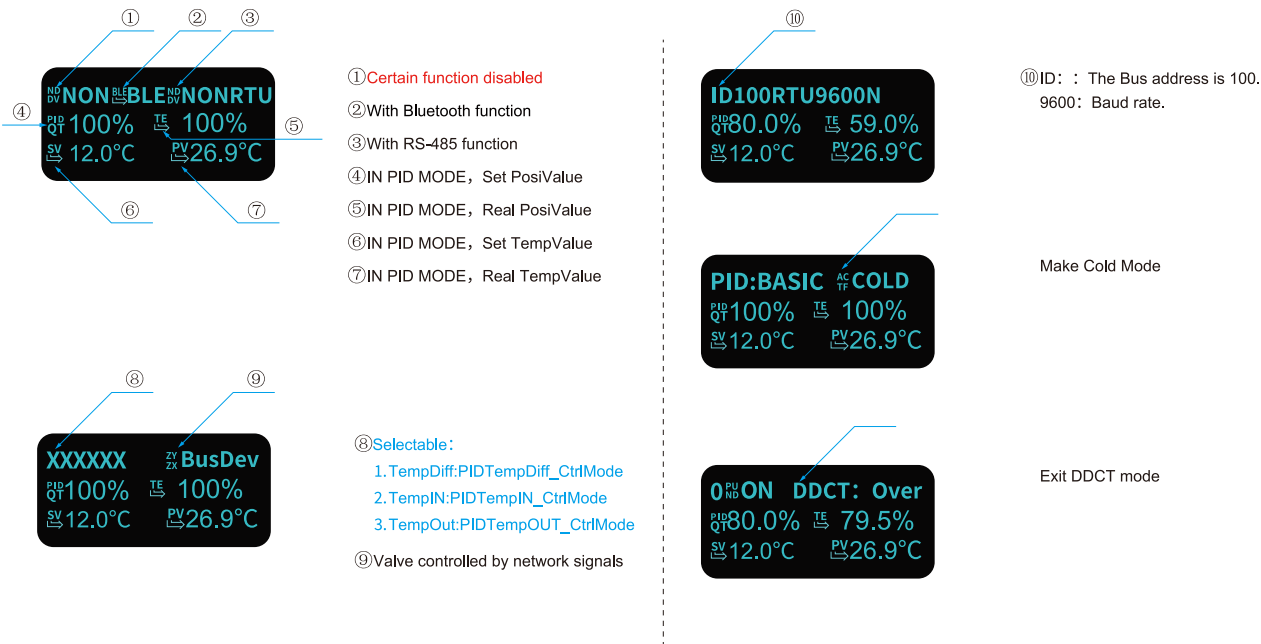
After 120 seconds of inactivity, the system automatically enters screen saver mode.



Actuator-Intelligent PID WorkMode Interface

On the APP, the actuator’s corresponding interfaces and descriptions for different working modes are as follows

□1、PID Temp_Out CtrMode/PIDTemp_IN CtrMode/PIDTempDiffer CtrMode



Actuator Interface Instruction

□2、PID Inlet-water pressure mode/PID return-water pressure mode/PID pressure control mode

① The function is turned off

② Bluetooth function

③ 485 function

④ The set position value in PID mode

⑤ The actual position value in PID mode

⑥ The set pressure value in PID mode

⑦ The actual pressure value in PID mode

⑩ ID: Product bus address is 100.
9600: The position is baud rate.

⑧ Selectable:

1. PressDiff: PID Temperature difference mode

2. PressIN: PID inlet-water pressure mode

3. PressOut: PID return-water pressure mode

⑨ Valve position is controlled by network signal

Exit DDCT mode

□3、PID Flow control mode

① The function is turned off

② Bluetooth function

③ 485 function

④ The set position value in PID mode

⑤ The actual position value in PID mode

⑥ The set flow value in PID mode

⑦ The actual flow value in PID mode

⑩ ID: Product bus address is 100.
9600: The position is baud rate.

⑧ FlowMode: PID flow control mode

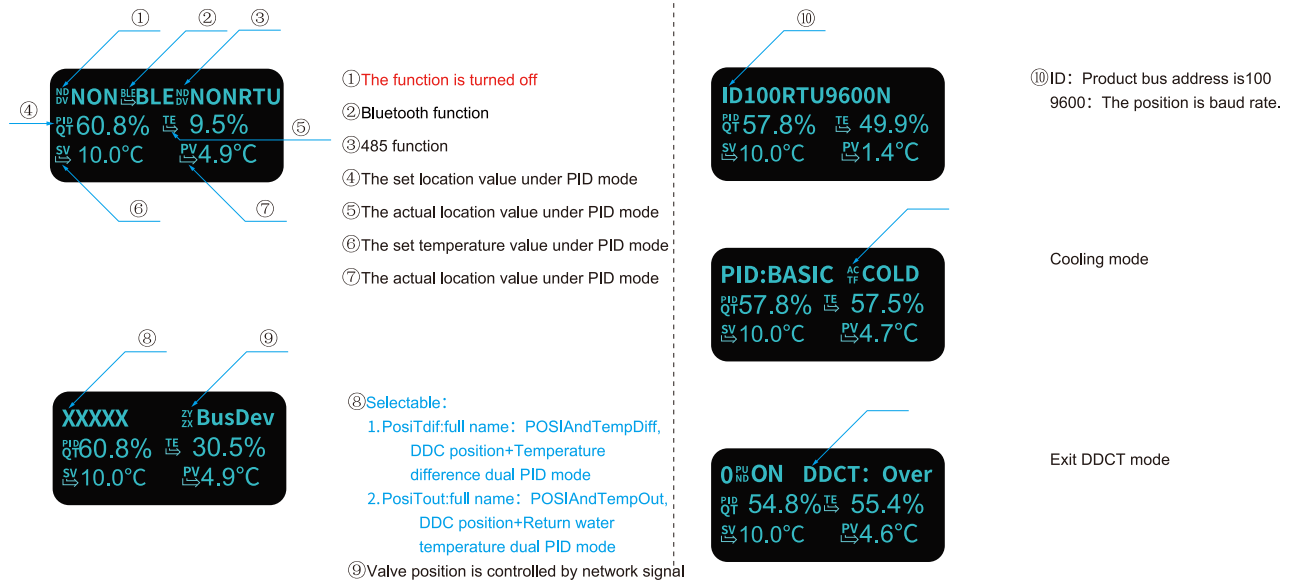
⑨ Valve position is controlled by network signal

Cooling mode

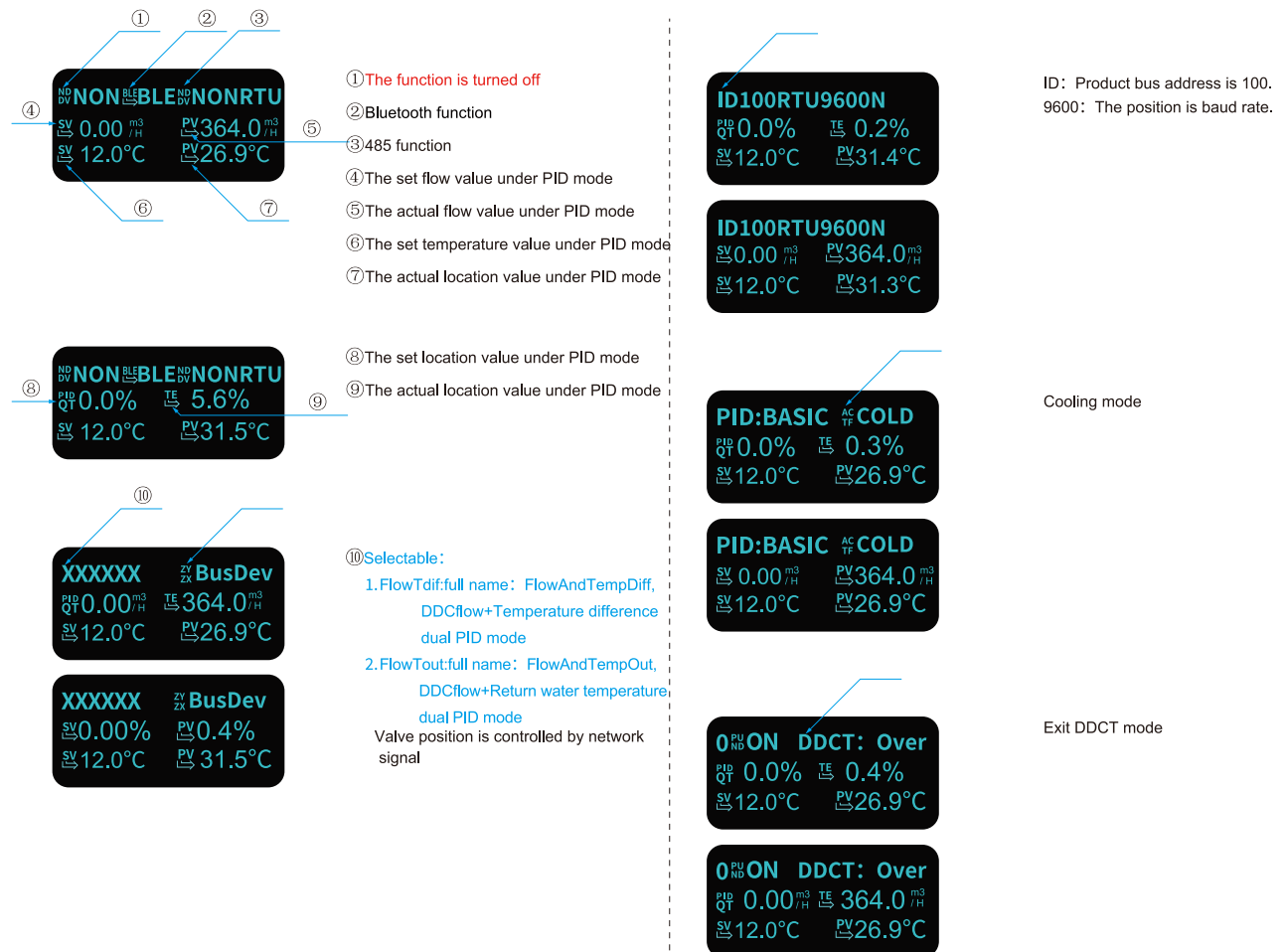
Exit DDCT mode

Actuator Interface Instruction

□4、DDC position +Temperature difference dual PID mode/DDC position+Inlet water temperature dual PID mode



□5、DDC flow+Temperature difference dual PID mode/DDC flow +Inlet water temperature dual PID mode



Introduction to the Buttons and Passwords on the Actuator Parameter Interface

1.Consult the sales staff for details

PID Product Operation Instructions

Code Note: PIDSV/SV = PID set value; PIDPV/PV = actual value of controlled object

Kp: Proportional gain; Ki: Integral gain; Kd: Derivative gain; KT: Operation cycle; Deadband: PID dead band
Kp/Ki/Kd actual values are scaled up to ensure integer set values: Kp scale factor=100; Ki/Kd=1000.

Premise 1: The unit of the flow sensor range applies to all subsequent flow-related variables.

Inlet/return water pressure sensor range units must be consistent; all pressure-related variables follow the inlet pressure range unit (inlet unit prevails if inconsistent). Other variables: set values without units, send data directly. Subsequent operation examples follow

Premise 2: Pressure scale factor=1; Flow/Temperature/Valve position=10

Pressure sensor range uses offset to distinguish Pa/Kpa;

Flow sensor range uses offset to distinguish L/H/M3/H;

PID cycle KT uses offset to distinguish min/sec.

Thus, inlet/return water pressure range, flow range, and KT values include unit characterization.

Premise 3: If selecting 4-20mA/0-10V channels for PIDSV setting, set analog input range.

Analog InputTempIN Range/Analog InputTempOutRange/Analog InputTempDiffRange/Analog Input PressINRange /Analog Input/PressOutRange、Analog Input PressDiffRange, These ranges require default values matching the respective sensor ranges. The flow measurement range means that the value corresponding to 4mA is 0, and the value corresponding to 20mA is the range of its analog input.

Important Note: All ranges must not exceed the sensor range corresponding to controlled object PV.

Meanwhile, flow rate must not exceed the maximum flow range set by the corresponding valve size

PID ProductParameterSet:

<1>First confirm actuator operating mode: Position mode or PID mode

<2.1>Position mode

->Control Valve Analog Input Channel:

Note: 4-20mA/0-20mA share one physical channel; 2-10V/0-10V share another

->Which device controls the valve when no analog input or signal loss:

Note: Confirm at purchase: RS485, ModbusTCP/IP, BLE, NB-IoT

Available combinations: BLE+RS485, BLE+ModbusTCP/IP, BLE+NB-IoT, BLE+RS485+NB-IoT

<2.2> PID mode

->PIDSVAnalog Input Channel: Can select No analog input or 4-20mA/0-10V input

Note: Shared with valve control analog input channel

->Use analog channel for SV setting: Skip if not used.

Also need set 4-20mA corresponding range: Analog Input TempIN Range, TempOut Range, TempDiff Range

Analog Input PressIN/PressOut/PressDiff Ranges - When no analog input or signal loss

Which device will controls PIDSV:

Note: Shares the same physical channel with valve control under no analog input.

->Set sensor input channel range:

Note: Temperature: No configuration required (default max range 100°C;

Two pressure sensors and flow sensor require range setting:

PressIN Sensor Range, PressOUT Sensor Range, Flow Sensor Range

->PIDAlgorithm Type:

Note: Several common PID algorithms available. More to be added in future versions.

Each with pros and cons: select for your use case or use the standard algorithm.

->Set PIDSV controlled target value

The target value is set by the corresponding different address according to the different controlled objects:

Inlet-water temperature SV, return-water temperature SV, temperature difference SV, inlet-water pressure SV, return-water pressure SV, pressure difference SV, flow SV

If the mode input channel is not used or analog input channel has no signal, the target value needs to be set. If not set, the system will automatically use the default value corresponding to the address.

If the corresponding set value is modified remotely, it will be stored by the system, the actuator will automatically use the value the next time when it is powered on. The SETV value set by 4-20mA will not be stored again.

->If the PID operation is related to temperature, its function needs to be set: heating or cooling function

Heating mode:

In temperature difference mode, set inlet-water temperature minus the return-water temperature to $SV=5^{\circ}$, the actual value to $PV=6^{\circ}$ [$SV<PV$] and increase the opening,

When the actual value is $PV=4^{\circ}$ $SV>PV$ decrease the opening. It is equivalent to a reverse action mode

In return-water mode, for example, the set value is lower than the actual return-water temperature [$SV<PV$] and decrease the opening, the set value is higher than the actual return-water temperature [$SV>PV$] and increase the opening, this is equivalent to direct action mode.

The cooling code operates on the opposite logic.

->Set PID operation mode: direct and reverse action

Direct action mode: When $SV>PV$, valve will increase the opening; $SV<PV$ valve will decrease the opening.

Reverse action mode: When $SV<PV$, valve will decrease the opening; $SV>PV$ valve will increase the opening.

->Set PID operation parameter

Note: Mainly according to some common parameter, such as $K_p, K_i, K_d, K_T, \text{DeadBand}$ (dead zone)

<2.3>Acquire the sensor data and the valve working state

Note: Here user can acquire the working state/current valve position/inlet-water temperature/return-water temperature/-temperature difference/inlet-water pressure/return-water parameter and some other parameters.

<2.4>Special function

Confirm the flow monitoring is enable or not.

Product Operating Instructions – Supplementary Command Guide

Register Address Table for Frequently Read Parameters

No.	Address	Function	R/W	Word	Code	Note
1	01 17	Supply-water temperature	R	1	0xHH LL	Temperature=(HHx256+LL)/10
2	01 19	Return-water temperature	R	1	0xHH LL	Temperature=(HHx256+LL)/10
3	01 1B	Temperature difference	R	1	0xHH LL	Temperature=(HHx256+LL)/10
4	01 1D	Inlet-water pressure	R	1	0xHH LL	Pressure=(HHx256+LL) unit is consistent with sensor range.
5	01 1F	Return-water temperature	R	1	0xHH LL	Pressure=(HHx256+LL) unit is consistent with sensor range.
6	01 65	Pressure difference	R	1	0xHH LL	Pressure=(HHx256+LL) unit is consistent with sensor range.
7	01 21	Flow	R	1	0xHH LL	Flow=(HHx256+LL)/10 unit is consistent with sensor range.
8	01 23	Instantaneous heat	R	1	0xHH LL	Heat=(HHx256+LL)/10
9	01 27	Accumulative heat	R	2	0xAA BB 0xCC DD 0xEE FF	Accumulative heat=Integer AA BB CC DD decimal= EE FF

Fault Alarm List – Start Address: 0x007B

BIT	Function	R/W	Word	Code	Note
0	NC	R	1	0x0001 indicates a faulty state 0x0000 indicates no fault	Effective in KT mode
1	NC	R	1		
2	Actuator Stall	R	1		
3	Motor Faulty	R	1		
4	NC reserved for R	R	1		
5	NC reserved for R	R	1		
6	NC reserved for R	R	1		
7	NC reserved for R	R	1		
8	Inlet-water temperature sensor with no signal or fault	R	1	0x0001 indicates no data or data exceeding 0x0000 with no fault	
9	Return-water temperature sensor with no signal or fault	R	1		
10	Temperature difference with no signal or fault	R	1		
11	Inlet-water pressure sensor with no signal or fault	R	1		
12	Return-water pressure sensor with no signal or fault	R	1		
13	No pressure difference signal or fault	R	1		
14	Flow sensor with no signal or fault	R	1		
15	Flow monitoring result	R	1		

PID Product Operating Instructions

[1] Actuator working mode: register address[0x00FB]

Send ID 0600 FB 00 XX CRCL CRCH to return data format:ID040200XX

The definition of 00XX:

= 0x00	// 【Position control type 【default】
= 0x01	// 【PID return-temperature mode】
= 0x02	// 【PID temperature difference mode】
= 0x03	// 【PID flow mode】
= 0x04	// 【PID pressure difference mode】
= 0x05	// 【PID Inlet-water temperature mode】
= 0x06	// 【PID Inlet-water pressure mode】
= 0x07	// 【PID Return-water pressure mode】

※Note:Free mode allows for user-defined PV input channels,other modes are automatically designated input channels

[2] 【Position mode】 Valve position control analog input channel register address[0x004D]

Valve position control: 4mA corresponds to 0.0% opening value 20mA corresponds to 100.0% opening value

Send ID 06 00 4D 00 XX CRCL CRCH 【written】

The definition of 00XX:

= 0x00	//4-20mA external current input control
= 0x01	//0-20mA external current input control
= 0x02	//2-10V external voltage input control
= 0x03	//0-10V external voltage input control
= 0x04	//0-135 ohmic resistance control
= 0x05	//invalid external analog input port 【default】

※Note:4mA corresponds to opening value 0.0% 20mA corresponds to opening value 100.0%

[3] 【Position mode】 Command executed by the valve without analog input register address[0x004E]

In the event of a loss or absence of the analog input signal,the valve will execute the following command(Open,Close,B33, or KEEP)and control commands from other BUS devices will not be executed.If accept control from other device,the valve will maintain its current position when the signal is lost and wait for the valve command from other device

Send ID 06 00 4E 00 XX CRCL CRCH 【written】

The definition of 00XX:

= 0x01	//executes open valve command
= 0x07	//executes close valve command
= 0xB3	//executes the pre-set B33 position
= 0xBA	//keeps the current position
= 0xD0	//only accepts the control of ModbusTCP/IP device
= 0xD1	//only accepts the control of bluetooth
= 0xD2	//only accepts the control of NBIOT
= 0xD3	//only accepts the control of ModbusRTU 485
= 0xD5	//accepts the control of above four devices 【default】

※Note:The choice is valid only when the actuator has these additional devices.

#Only when the analog input device chooses [external analog input port is invalid]

#Or choose analog input 4-20mA/2-10V,no external signal is input at this time.

The above two situation can accept the control input from above chosen devices

【Position mode】accept [Valve opening]control command sent by host computer.

[4]] Read Actuator Operating Status: Register Address[0x0001]

Send 640400010001 DataBackFormat: 64040200XX

00XX is defined as follows:

= 00AA	///Running in the open direction
= 00BB	///Running in the close direction.
= 00AC	///Open direction run completed and in position.
= 00BC	///Close direction run completed and in position.
= 0000	///System PowerOn and in Brake status
= 00EA	///ErrorAlarm means the valve fault is consistent with the subsequent installation fault signal.

※Note: This position value can be read in any mode.

[5] Read Actuator Position: Register Address[0x0014]

Send 640400140001 Read Data Format as Follows:

640402ZHXL 【This is the current valve opening value A (0-1000), representing (A/10)%】

Note: ZL=A%256, ZH=A/256.

e.g. 6404020000 Representing Opening value 0.0% 64040203E8 Representing Opening value 100.0%

※Note: This position value can be read in any Mode.

[6] 【Position Mode】 Set Valve Opening Value: Register Address[0x0002]/[0x0054]

Other devices can modify the current valve position via this command.

Send ID 06 00 54 HH LL CRCL CRCH

Opening Value: A Range (0.0%--100.0%) then HH=(100.0*10)/256 = 0x03; LL=(100.0*10)%256 = 0xE8

HH = (A*10)/256; LL = (A*10)%256

※Note: Device only receives opening command from host computer in 【Position Mode】 and per 【3】 conditions

[7] 【PID Mode】 Set relevant parameters**[1] Set 【PIDS】 Analog Input Channel Register Address[0x00EA]**

Select analog channel to set target SV; 4-20mA corresponds to 【0--Analog Input SV Range】

Send: ID 06 00 EA 00 XX CRCL CRCH 【WR】

00XX is defined as follows:

= 0x00	///4-20mA External Current Input Control
= 0x01	///0-20mA External Current Input Control
= 0x02	///2-10V External Voltage Input Control
= 0x03	///0-10V External Voltage Input Control
= 0x04	///0-135 Ohmic Resistance Control
= 0x05	///External Analog Input Port Invalid 【Default】

※Note: If analog channel for SV setting is not required, set to Invalid 0x05.

Since SV value rarely changes, bus device control is generally selected instead of analog input control

[2] If analog channel is selected as SV setpoint, set the corresponding analog input range

【Analog Input Temp_IN Range】 : Register Address[0x014D]

【Analog Input Temp_Out Range】 : Register Address[0x014F]

【Analog Input Temp_Diff Range】 : Register Address[0x0151]

【Analog Input Press_IN Range】 : Register Address[0x0153]

【Analog Input Press_OUT Range】 : Register Address[0x0155]

【Analog Input Press_Diff Range】 : Register Address[0x0167]

【Analog Input Flow】 : Register Address[0x0157]

If PID SV analog channel is invalid, no need to set this parameter. If not set, Temp_IN range defaults to 80.0°C,

Temp_OUT to 50.0°C, Temp_Diff to 35.0°C, Press_IN to flow sensor range 1000kPa, Press_OUT to flow sensor range 1000kPa,

Press_Diff to Press_IN sensor range 1000kPa, and flow to the maximum flow corresponding to default DN50 valve size

[3] Set 【PIDSV】 without controlled analog input device register address[0x00EC]

The PIDSV controlled object when the mode input is invalid or analog input has no signal.

Send: ID 06 00 EC 00 XX CRCL CRCH 【written】

The definition of 00XX is as follows:

= 0xD0	// only accepts ModbusTCP/IP device
= 0xD1	//only accepts bluetooth control
= 0xD2	//only accepts NBIOT control
= 0xD3	// only accepts ModbusRTU 485 control
= 0xD5	//accepts all above devices 【default】

※Note: It only can be valid when the actuator adds the device choices, #1analog input device choice 【external analog input port is invalid】

#2 If the analog input 4-20mA/2-10V are chosen, there is no external analog input, both of the above situations will accept the control inputs from the above all selected devices. 【PID mode】 can accept the 【PIDSV】 control command from host machine.

[4] PID algorithm type register address[0x00D5]

We added commonly used centralized algorithms according to actual usage situation, it can be selected according to the situation, default standard

Send: ID 06 00 D5 00 XX CRCL CRCH 【written】

The definition of 00XX is as follows:

= 0x00	//standard PID algorithm 【default】
= 0x01	//stepping algorithm mode
= 0x02	//intelligent stepping mode
= 0x03	//customized temperature recovery algorithm
= 0x04	//Standard PID algorithm with derivative pre-action
= 0x05	//standard PID algorithm with incomplete derivative

※Note: Customized temperature recovery algorithm only can be used when the valve working type is PID temperature recovery mode.

[5] When Temperature controls the PID, the optional PID function: heating or cooling register address[0x00E4]

When the controlled objects are inlet and return water temperature, the parameter will be valid in the temperature difference control mode .The calculation results of the heating and cooling mode are exactly opposite.

Send: ID 06 00 E4 00 XX CRCL CRCH 【written】

The definition of 00XX is as follows:

= 0x00	// heating mode
= 0x01	//cooling mode
= 0xFC	//turn off this function, PID input is controlled by PID action mode

※Note: This function can be turned off, the PID calculation output direction can be selected by direct and reverse actions.

This function has priority over the PID action direction. The preset action mode will be kept when switching the mode. Therefore, user needs to confirm whether the mode aligns with own actual requirement after switching the mode.

[6] If choose PID action direction register address [0x00E1]

Send: ID 06 00 E1 00 XX CRCL CRCH 【written】

The definition of 00XX is as follows:

= 0x00	// direct action
= 0x01	//reverse action

Direct action: When $SV > PV$, valve will increase the opening, $SV < PV$ valve will decrease the opening;

Reverse action: When $SV < PV$, valve will decrease the opening, $SV > PV$ valve will increase the opening.

※Note: Action mode is the direct action by default. The preset action mode will be kept when switching the mode. Therefore, user needs to confirm whether the mode aligns with own actual requirement after switching the mode.

[7] PIDSV 【Return-water temperature】 : register address [0x0369]

The parameter is valid when the valve working mode is 【PID temperature recovery mode】 controlled object is return

Send ID 06 03 69 HH LL CRCL CRCH

The set temperature range is PIDSV_TempOut (0.0-50.0°C)

$HH = (PIDSV_TempOut * 10) / 256;$

$LL = (PIDSV_TempOut * 10) \% 256;$

※Note: If the stored value in the default execution register remains unmodified after power-on, the default value will be executed; this parameter can also be set via the PIDSV 【Return Water Temperature】 address.

[8] PIDSV [temperature difference] : register address [0x036B]

The parameter is valid only when the valve working mode is **[PID temperature difference]** and the controlled object is temperature difference.

Send ID 06 03 6B HH LL CRCL CRCH

The set temperature range PIDSV_Temp Diff (0.0-50.0°C)

$HH = (PIDSV_TempDiff * 10) / 256;$

$LL = (PIDSV_TempDiff * 10) \% 256;$

※Note: The actuator will execute the stored value after power on, if it has not been modified, the actuator will execute the default value, user also can set the parameter through the PIDSV **[temperature difference]** address.

[9] PIDSV [pressure difference] : register address [0x0371]

The parameter is valid only when the valve working mode is **[PID pressure difference]** and the controlled object is pressure difference.

Send ID 06 03 71 HH LL CRCL CRCH

The set pressure range PIDSV_Press Diff (0-)Pa/Kpa

$HH = PIDSV_PressDiff / 256;$

$LL = PIDSV_PressDiff \% 256$

※Note: This unit is consistent with inlet-water pressure sensor unit, The unit cannot be changed here, exceeding the set range will return an error.

※Note: The actuator will execute the stored value after power on, if it has not been modified, the actuator will execute the default value, user also can set the parameter through the PIDSV **[pressure difference]** address.

[10] PIDSV [flow mode] : register address [0x0373]

The parameter is valid only when the valve working mode is **[PID flow difference]** and the controlled object is flow difference.

Send ID 06 03 73 HH LL CRCL CRCH

The set flow range PIDSV_Flow (0.0-The maximum flow rate is related to the valve diameter)

$HH = (PIDSV_Flow * 100) / 256;$

$LL = (PIDSV_Flow * 100) \% 256;$

※Note: This unit is consistent with flow pressure sensor unit, The unit cannot be changed here, exceeding the set range will return an error.

※Note: The actuator will execute the stored value after power on, if it has not been modified, the actuator will execute the default value, user also can set the parameter through the PIDSV address.

[11] Inlet-water pressure sensor range: register address [0x0159]**[12] Inlet-water pressure sensor range: register address [0x015B]**

Send ID 06 01 59 HH LL CRCL CRCH

Send ID 06 01 5B HH LL CRCL CRCH

A register is a setting unit that distinguishes the range by offset value

Value: **[5-14500]** indicates **[5-14500]** Kpa

Value: **[15005-65000]** after offset value 15000 indicates **[5-50000]** Pa

If the pressure is set according to Kpa, the value will not add offset value

If the pressure is set according to Pa the value will add offset value 15000.

For example, set the value 1600Kpa to PressRange = 1600

If 600Pa is PressRange = 1600 + 15000 = 16600

$HH = PressRange / 256 ; LL = PressRange \% 256;$

※Note: The return-water pressure sensor unit must be consistent with inlet-water pressure sensor range unit, if they are not consistent, the inlet-water pressure sensor unit will serve as the default pressure unit for the whole system.

[13] Flow sensor range: register address [0x015D]

Send ID 06 01 5D HH LL CRCL CRCH

A register is a setting unit that distinguishes the range by offset value **[The magnification is 10x]**

Value: **[1-30000]** corresponds to **[0.1 -3000.0]** m³/H

Value: **[35010-65000]** -after offset value 35000 corresponds to **[1.0-3000.0]** L/H

If the flow is set according to M³/H, the value will not add offset value,

If the flow is set according to L/H, the value will add offset value 35000.

For example, set the value 20m³/H to FlowRange = 20 * 10 = 200 The magnification is 10x,

For example, set the value 20L/H to FlowRange = 20 * 10 + 35000 = 35200 $HH = FlowRange / 256 ; LL = FlowRange \% 256$

※Note: Flow sensor unit will serve as the all flow related unit for the whole system.

【14】 Valve size: register address [0x0177]

The valve size parameter of the connected actuator can be set, meanwhile the system will automatically search the maximum flow rate which corresponds to the current valve size.

Send ID 06 01 77 00 XX CRCL CRCH

XXcan only take value: 15 20 25 32 40 50 65 80 100 125 150 and convert it toHEX

※Note: Other value will return an error.

【15】 The maximum flow rate corresponding to the valve size: register address [0x0378]

The maximum valve flow rate is used to the maximum valve flow monitoring, the flow monitoring also needs to be started.

Send ID 04 03 78 00 01 CRCL CRCH

Return ID 04 02 HH LL CRCL CRCH

Value = (HH*256+LL)/10 【The magnification is 10x】

※Note: Valve maximum flow unit is consistent with flow sensor unit and it only can be read.

【16】 Modify the maximum flow rate corresponding to the valve size:

The register first address [0x037A]

Valve size table 【15 20 25 32 40 50 65 80 100 125 150】

Note: DN15 corresponds to the register address [0x037A]+0 DN15 is the first one.

DN20 corresponds to the register address [0x037A]+1 and so forth

DN150 corresponds to the register address [0x037A]+10

Send: ID 06 AddrH AddrL HH LL CRCL CRCH

AddrH =0x03 AddrL = 0x70+number

HH =(maximum flow*10) /256 ;

LL =(maximum flow*10) %256 ;

※Note: Valve maximum flow unit is consistent with flow sensor unit. The flow magnification is 10x.

【8】 Flow monitoring: register address [0x0377]

Send ID 06 03 77 00 XX CRCL CRCH

00 XX = 00 01 indicates starting to monitor the flow fault, the valve will close once the fault occurs.

00 XX = 00 00 indicates canceling the monitoring.

※Note: Flow monitoring mode

Please confirm the valve is close by default when there is no flow signal. Attention this can not be modified.

2 When valve opening >20%, if the flow< 0.01m3/H, the system detects an error when the specific flag is set, and executes valve open command. Only when the flow>0.1m3/h, the alarm signal will be canceled.

3 When the valve current flow exceeds the set maximum flow rate, the actuator will stop rotating immediately and keep the current opening. Only when the current opening<the 95% maximum flow, the alarm signal will be canceled.

4 In position mode, if flow exceeds the maximum value, the remotely set valve opening is smaller than the current opening, the command will be executed or the actuator will return an error, other errors will not accept any opening command.

【9】 PV executed valve signal fault command: register address [0x00EB]

Send ID 06 00 EB 00 XX CRCL CRCH

The definition of 00XX:

= 0001	//executes full open command
= 0007	////executes full close command
= 00B3	//executes the set B33 Position
= 00BA	//without any action

※Note: It only works in 【PID mode】

[10] PID parameter Kp : register address[0x00D6]

Send ID 06 00 D6 HH LL CRCL CRCH

The **Kp** set range 【0.1-90.00】 default value 2.89

$HH=(Kp * 100)/256;$

$LL=(Kp * 100)\%256;$

※Note: It can be modified only when the PID parameters are allowed to be adjusted.

[11] Modify PID parameter Ki : register address[0x00D8]

Send ID 06 00 D8 HH LL CRCL CRCH

The **Ki** set range 【0.1-9.000】 default value 0.116, the magnification is 1000.

$HH=(Ki * 1000)/256;$

$LL=(Ki * 1000)\%256;$

※Note: It can be modified only when the PID parameters are allowed to be adjusted.

[12] PID parameter Kd : register address[0x00DA]

Send ID 06 00 DA HH LL CRCL CRCH

The **Kd** set range 【0.0-9.000】 default value 0.0, the magnification is 1000.

$HH=(Kd * 1000)/256;$

$LL=(Kd * 1000)\%256;$

※Note: It can be modified only when the PID parameters are allowed to be adjusted.

[13] PID parameter KT : register address[0x00DC]

PID calculation cycle: unit: second

Send ID 06 00 DC HH LL CRCL CRCH

When KT value > 30000, the unit is minute, 30001-31800 corresponds to 【1 minute -1800 minutes】

When KT value < 30000, the unit is second, the 【1-1800】 unit corresponds to second. For example, we need to set it to run every 30 minutes, so $KT=30+30000=30030$ $HH=KT/256=0x75$; $LL=KT\%256=0x4E$;

If user needs to set it to run every 30 seconds. So $KT=30$

$HH=KT/256=0x00$; $LL=KT\%256=0x1E$;

※Note: It can be modified only when the PID parameters are allowed to be adjusted. Also notice that the differentiation between units is achieved through offset values.

[14] PID parameter Deadband : register address[0x00E0]

PID deadband value: Maximize the numerical value to the unit percentage% while preserving the precision.

Send ID 06 00 E0 HH LL CRCL CRCH

The set DeadBand 【0.5%-9.0%】 DeadBand =0.5-9.0, the magnification is 10.

$HH=(DeadBand*10)/256;$

$LL=(DeadBand*10)\%256;$

The PIDSV maximum value & DeadBand% is the actual corresponding error value.

※Note: It can be modified only when the PID parameters are allowed to be adjusted.

[15] Actuator maximum opening amplitude: register address[0x00E7]

The PID output calculation limits the **actuator maximum opening value**: Range 70.0%-100.0%

Send ID 06 00 E7 HH LL CRCL CRCH

The set OutLimit_Max

$HH=(OutLimit_Max*10)/256;$

$LL=(OutLimit_Max*10)\%256;$

※Note: It can be modified only when the PID parameters are allowed to be adjusted.

【16】 Actuator minimum opening limit : register address[0x00E5]

The minimum actuator opening is limited by the PID calculation output.: range0.0%-30.0% default0.0%

Send ID 06 00 E5 HH LL CRCL CRCH

Set OutLimit_Min

HH=(OutLimit_Min*10)/256;

LL =(OutLimit_Min*10)%256;

※Note: It can be modified only when the PID parameters are allowed to be adjusted.

【17】 Whether the energy calculation can be open: register address[0x00FC]

Send ID 06 00 FC 00 XX CRCL CRCH

00 XX = 00 00 indicates open energy calculation.

00 XX = 00 01 indicates close energy calculation 【default】

※Note: Energy calculation is calculated by the formula.

【18】 The addresses of temperature-related parameter registers are as follows:

Send ID 04 AddrH AddrL 00 01 CRCL CRCH

Send 640400580001 returns data in the following format: 640402HHLL 【Temp=(HH*256+LL)/10) 】

For example, the returned data is 64040200EE, 00 corresponds to HH, EE corresponds to LL(The hexadecimal value EE corresponds to 238 in decimal), according to the formula(0*256+238)/10=23.8, so the current actual temperature is 23.8°

【19】 Read the pressure-related register parameter: the register address is as follows:

Send ID 04 AddrH AddrL 00 01/02 CRCL CRCH

Method1: if the length of the read data is 00 01, the returned data is as follows:

ID 04 02 HH LL CRCL CRCH, the calculation method:

Data = HH*256+ LL =2000

The unit is consistent with the pressure sensor range unit

Method 2: if the length of the read data is 00 02 , the returned data is as follows:

ID 04 02 HH LL 00 AA CRCL CRCH, the calculation method:

Data = HH*256+ LL =2000

AA indicates the unit, =0x94 indicates Pa indicates 2000Pa

=0x93 indicates Kpa indicates 2000Kpa

【20】 Read the flow register parameter: the register address is as follows:

Send ID 04 AddrH AddrL 00 01/02 CRCL CRCH

Method 1: if the length of the read data is 00 01, the returned data is as follows:

ID 04 02 HH LL CRCL CRCH, the calculation method:

Data = HH*256+ LL

The unit is consistent with the flow sensor range unit

Method 2: if the length of the read data is 00 02, the returned data is as follows:

ID 04 02 HH LL 00 AA CRCL CRCH, the calculation method:

Data = HH*256+ LL =3210

AA indicates the unit, =0x97 indicates L/H indicates 3210/10=32.1L/H

=0x95 indicates m3/H indicates 3210/10=32.1m3/H

[21] Accumulative energy: it belongs to a specific command:

Send: ID 5A 04 H4 H3 H2 H1 CRC16

H4=Accumulative heatA/65536/256

H3=Accumulative heatA/65536%256

H2=Accumulative heatA/256%256

H1=Accumulative heatA/%256

If a reset is needed, send ID 5A 00 00 00 00 CRCL CRCH

Read Accumulative flow: send ID 04 01 27 00 02 CRCL CRCH notice the read length is 2

Return four BTYE : ID 04 04 H4 H3 H3 H1 CRCL CRCH

Accumulative heatA= $H3*65536*256 + H3*65536 + H2*256 + H1$

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