

# Industrial Edge Gateway

## **USR-M300**

## **IEC104**

## Data acquisition



## Be Honest & Do Best Your Trustworthy Smart Industrial IoT Partner

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### 1. Product Introduction

The M300 is a high-performance, scalable, comprehensive edge gateway. The product integrates edge data acquisition, calculation, active reporting, data reading and writing, linkage control, IO acquisition and control functions, etc. The acquisition protocol includes standard Modbus protocol and a variety of common PLC protocols, as well as industry-specific protocols. Active reporting adoptsgroup reporting mode, and Json reporting template is customized to quickly realize the docking of server data formats. At the same time, the product also has routing and VPN and graphical programmingfunctions, graphical module design edge computing functions, to meet customer's own design needs. The product supports TCP/MQTT(S) protocol communication, supports multi-channel connection; supports Modbus RTU/TCP and OPC UA protocol conversion and other functions, and supports fast access to common platforms such as Renyun, Alibaba Cloud, AWS and Huawei Cloud.

The product adoptsLinuxkernel, the main frequency is up to 1.2Ghz; the network adopts WAN/LANplus 4Gcellular design, the uplink transmission is more reliable, and the LANport can beconnected to external cameras and other devices, and the function application can be realized by combining its own routing function; the hardware integrates 2-way DI, 2-wayDO, 2-way Aland 2-way RS485, which not only realizes the industrial field control and acquisition requirements, but also realizes linkage control according to various acquisition point data or status. It can be widely used in intelligent breeding, intelligent factories and other industrial intelligent solutions.

The product adopts expandable design in structure, which can be combined and applied by expanding modules with different functions, so as to better meetthe requirements of IOquantity and communication interface in different scenarios. Convenient and cost effective.

### 2. IEC104 protocol

IEC104 protocol, formally known as IEC60870-5-104, is a standard developed by the International Electrotechnical Commission (IEC) to support network communication between power system automation equipment. The protocol uses TCP/IP as the underlying communication protocol for monitoring and controlling all types of equipment in power systems, including but not limited to substations, generators, switches, etc.

## 3. Environmental preparation

USR-M3001 set One net cable 12V/1Apower adapter One

## 4. Analog Slave Software Configuration



#### 4.1. Create links

IEC104 Server Simulator software is used to simulate slave computer in this test. Click "New Connection", fill in corresponding configuration, and click OK after configuration.

·IP: Enter the IPaddressof the machine

·Server port number: custom.

K: The maximum number of retransmissions before the host receives an acknowledgement during data transmission.

W: The maximum number of unacknowledged data frames a host can send before waiting for an acknowledgement.

T0: The longest time the host waits for an acknowledgement after sending a message.

T1: The longest time the slave sends an acknowledgement after receiving a message.

T2: The longest time the host sends a life-detection request without receiving any data or acknowledgement. Note: T2 <T1

T3: The longest time the host waits for a response after sending a life-detection request.

New Connection Create Slave Open Connection	on Close Connection Edit Connection Edit Slave Communication Traffic	Command Mapping Live Chart
	New Connection - X	
	Protocol: IEC 60870-5-104 *	
	Server IP: 192.168.2.44	
N N	Server Port: 2404	
	Advanced Settings	
	Advanced Settings	
	K: 12	
	W: 8	
	t0: 10	
	t1: 15	
	t2: 10	
	t3: 20	
	Server Mode: Connection Is Redundancy Group *	
	Ok Cancel	



#### 4.2. Create Slave Station

Click on the established link, then "Create Slave Station", configure "COA" The address of the station "," the corresponding slave configuration ". Click OK after configuration. Double-click the slave station to open the interface and modify the data.

🛞 Create Slave - 🗆 🗙	
Slave Alias: SlaveAlias	
COA station address: 1	
Configuration Information Object + ×	
GroupName: Group-1	
ASDU Type: Single-point information M_SP_NA_1 *	
IOA Starting Address: 1	
IOA Quantity: 10	
GroupName: Group-2	
ASDU Type: CON<45> Single command C_SC_NA_1 +	
IOA Starting Address: 1	
IOA Quantity: 10	
	Create Slave       -       ×         Slave Alias:       Slave Alias         COA station address:       1         Configuration Information Object       +       ×         GroupName:       Group-1       .         ASDU Type:       Single-point information       M_SP_NA_1 *         IOA Starting Address:       1       .         IOA Quantity:       10       .         GroupName:       Group-2       .         ASDU Type:       CON<45> Single command       C_SC_NA_1 *         IOA Starting Address:       1       .         IOA Quantity:       10       .       .



🛞 IEC104 Server Simulator								9	- 0 ×
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SlaveAlias CDA:1	104	VariableName	STO SPT	STO PI	STO SP	STO NT	STO TV	Reset Value	Stop Changing
Group-2	1	Val 1au centanie	False	False	False	False	False	happed Form	A napped ro
	2		False	False	False	False	False		
	3		False	False	False	False	False		_
	4		False	False	False	False	False		
	5		False	False	False	False	False		
	6		False	False	False	False	False		
	7		False	False	False	False	False		
	1								
	SINGLE-POINT :	INFORMATION WI	TH QUALITY	DESCRIPTOR		带品质描述词的单点	信息		
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192.168.2.44:2404 Objects: 1						2025	-03-11 10:44:	44 +08:00 Receive	: 0 Send : 0 🔲

192.168.2.

#### 4.3. Open the connection

Select the corresponding link and click "Open Link".

(e) IEC104 Server Simulator												<
File Edit Display Tools Help New Connection Create Slave Open Connection Cl	2 Unlose Connection	G Edit Connection	Edit Slave	1 Communication	Traffic				Command M	lapping	S Live Ch	art
A 192.168.2.44:2404	\$ 192.168.2.4	4:2404 > SlaveAli	as > Group-1	× 😒 192.168	.2.44:2404 >	SlaveAlias > Group-	2 ×					
V SaveAlias CDA:1									Reset Value	Stop	Changing	ī
Group-1 M_SP_NA_1	TOA	VariableName	SID, SPI	SID.BL	STO, SB	SID.NT	S	10.IV	Mapped Poin	t CA I	dapped Pr	
Spidere Stores	1		False	False	False	False	F	alse				
	2		False	False	False	False	F	alse				
	3		False	False	False	False	F	alse				1
	4		False	False	False	False	F	alse				I.
	5		False	False	False	False	F	alse				I.
1	6		False	False	False	False	F	alse				
	7		False	False	False	False	F	alse				
	+				-							Ê
	SINGLE-POINT	INFORMATION W	ITH QUALITY	DESCRIPTOR		带品质描述词的单点	信息					
	SIQ SPI (0> (1> RES = RESERVE BL (0> (1> SB (0> (1> V (0> (1> IV (0> (1>	:= CP8{SP] := BS1[1] := OFF := ON := BS3[2 := BS1[5] := not blu := blocket := BS1[6] := not sul := substil := substil := topical := not top := BS1[8] := valid := invalid	I,RES,BL,SB, <01> .4]<0> <01> ocked d (01> ostituted tuted c01> l ical <01> d	NT,IV}		SIQ SPI (1) RES = RESERVE BL (2) SB (1) SB (2) (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2	:= := := := := := := := := := := := := :	P8{SPI,RES, S1[1]<01> F S S3[5]-01> 被闭锁 定闭锁 S3[6]<01> 被取代 S3[6]<01> 前值 E当前值 S3[8]<01> 下放 S3[8]<01>	BL,SB,NT,IV}			

192 168 2 44-2404 Objects: 1

2025-03-11 10:44:44 +08:00 Receive: 0 Send: 0



### 5. Configuration M300

#### 5.1. Connection

Connectthe LAN port of the M300 to the computer and enter the built-in page of the M300 through the LAN port IP (192.168.1.1) in the browser of the computer. Enter your account password (default password is admin). Then click Login.

	Welcome to Login
	Account Please enter account name Password Please enter nationard
VALUABLE CONNECTION	vesae enter password



#### 5.2. Configure data points

(1) Under the interface of "Edge Calculation"-"Data Point", click "Add" slave machine. The relevant instructions are as follows. Click "OK" after configuration.

(2) ·Slave Name: Custom.

(3) ·Slave Description: Custom.

(4) •Acquisition protocol: SelectIEC104.

(5) •Polling interval: the time interval from the completion of the current point acquisition to the acquisition of the next point.

(6) ·Combined acquisition: combining multiple consecutive points together.

(7)  $\cdot$ Slave switch: Whether to enable the slave.

(8) IP: IP address of the slave device.

(9) ASDU: Slave device COA address, i.e. slave address.

(10) Port number: The port number of the slave device.

(11) COT: The specific reason for the data transfer. default is 2

(12) CICNA: The cycle time for the master to send a message requesting all data to the slave.

(13) CCINA: is the cycle time for the master to send a request for all electrical data to the slave.

(14) K: The maximum number of retransmissions before the host receives an acknowledgement during data transmission.

(15) W: The maximum number of unacknowledged data frames a host can send before waiting for an acknowledgement.

(16) T0: The longest time the host waits for an acknowledgement after sending a message.

(17) T1: The longest time the slave sends an acknowledgement after receiving a message.

(18) T2: The longest time the host sends a life-detection request without receiving any data or acknowledgement. Note: T2< T1

(19) T3: The longest time the host waits for a response after sending a life-detection request.

(20) Clock synchronization: When enabled, the master sends clock synchronization requests to slave devices.

(21) ·Clock synchronization period: The time interval between the master sending a clock synchronization request to the slave.



#### USR-M300 IEC104 protocol data

Wizard	Dat	ta Point						Add		×						
Edge Mode	Data	Point						* Slave Name:	device1							
Extension IO	Slav	e						Slave Description:	Please enter					Add	Import	Export
IO Module	_							Acquisition protocol	IEC_104	$\sim$				7		
	Version:	1680844	4896					* Polling interval:	0:	ms						
Protocol	Lo	slave	D .	online	Slav	e_Status		* Merge acquisition:	Open Close							
Edge Gateway					0:off	line 1:abnormal 2:0	inline 3:st	* Slave switch:								
	pro	otocol: L	.ocal_IO		proto	col: Slave Status		* IP	192.168.2.44							
								* Port	2404							
	List	of slav	ve points					* ASDU	1							
								* COT	2	~						
								* CICNA	10							
		ID	Node n	iame D	ata Type	Decimal Number	Address	- CCINA	10		Data	Acquisition formula	Control formula	Node desc	Operati	on
		1	DOG	12	Bit	0	DO 02		12		0				Edit D	
		2	DOO	н	Bit	0	DO 01	R.	16		0				Edit D	
		3	D10:	2	Bit	0	DI 02	* W	8		0				Edit 0	
		4	DIO	1	Bit	0	DI 01	- TO	10		0				Edit D	
		5	A10.	2 32 Bi	Float(AB CE	i) 0	AI 02	• 11	15		0				Edit 0	
		6	AIO	1 32 Bi	Float(AB CE	ı) O	AJ 01	* T2	10		0				Edit 0	
								* T3	20				Total 6 15	i/page 🗠 🛛 🚛 🔥	Next	Go to 1
								* Clock switch								
								* Clock synchronization	240							
									cancel	sure						
V1.1.88																



#### USR-M300 IEC104 protocol data

(22) Add a point, click the slave that needs to establish a point, and click "Add" in the "Slave Point List". Configuration requirements are as follows. Click to configure "Sure." Then restart.

(22) ·Point Name: Custom.

(23) •Point Description: Custom.

(24) •Register: Select the register type and fill in the address according to the point you need to collect.

(25) •Data type: Select according to the points you need to collect.

(26) •Number of points: the number of points that need to be continuously established for this acquisition.

(27) •Decimal places: The number of decimal places in which data is displayed at the collection point.

(28) •Reading and writing status: Select according to the points you need to collect.

(29) • Priority: The order of priority in which points are collected.

(30) •Collection formula: The data collected at this point is displayed after being calculated by this collection formula.

(31) • Control formula: The data sent by M300 to this point needs to be calculated by this formula and sent to the slave.

(32) •Timeout time: When collecting this point, the message is not recovered from the slave, wait for this time, and then carry out the next collection.

(33) •Units: The units in which the collected data is displayed.

🛧 USR IoT	50	Overview	Network	💽 Edge Comp	uting 🔃	System Manager	ment							🚯 🕷化中文 🛛 😡 admin
Wizard		> Data Po	pint			TI th	e parameters you modify e gateway after all Setting	take effect only after yo s are complete.	ou rebool the galeway.	To avoid repeated rebo	ot, reboot reboot ×			
Edge Mode		Data Poi	int											
Extension IO		Slave											Add	Imxport Export
IO Module	~	Version: 174	41661453											
Data Point		Local	10	online	Slave	Status	offine	device1		offine				
Protocol		IO Slav	ve		Slave Sta	itus		1					2	
Edge Gateway	ÿ	protoco	bl: Local_IO		0:offline protocol:	1:abnormal 2:on Slave Status	line 3:stop	Data Sources	: 192.168.2.44:240 104 <u>2 Edit 18 Delete</u>	4		1	2	
		List of s	slave points											Add Delete
													Please enterPoint Screen	Point Screen
		= 1	ID Nod	le name	Data Type	Decimal Number	Address Read Writ	e Status	Priority	Timeout(ms)	Data	Acquisition formula	Control formula Node desc	Operation
										No data yet				
													Total 0 15/page v Last	1 Next Go to 1
V1.1.88														



#### USR-M300 IEC104 protocol data

K USR IoT		Network	Edge Compu	ting 🔄 System Management									<li>S) Bitritz ( admi</li>
Wizard	> Data Poir	nt		The parame the gateway	eters you modify take effect only a after all Settings are complete.	fler you reboot the gatew	ay. To avoid repeated r	boot, reboot	reboot ×				
Edge Mode	Data Poir	nt											
Extension IO	Slave				Add			×	1			Add	Import Export
IO Module	Maniana 1744				Add								
	Version. 1741	1001455		1	* Node name	text							
Protocol	IO Slave	10	online 💭	Slave_Status	Node desc	Please enter							
Edge Gateway				0:offline 1:abnormal 2:online 3:st	toj Register	M_SP_NA_1 ~	1 M_SP_NA	10001(bit)					
	protocol	: Local_IO		protocol: Slave Status	* Data Type	Bit	~						
					* Position Number	1							
	List of s	lave points			Decimal Number	0	~						Add Delete
					Read Write Status	Only Read	Read/Write						Point Screen
	10	Node	e name d	Data Type Decimal Number Address	* Priority	Level 1	~		Data	Acquisition formula	Control formula	Node desc	Operation
					Acquisition formula 🔍	Please enter							
					Control formula	Please enter							
					* Timeout	2000	ms				Total 0	15/page V Last 1	Fried Go to 1
					Unit	Please enter							
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							cancel	sure					
V1.1.88													

## 6.Result

🛧 USR IoT		Overview	💽 Network	💽 Edge Comput	ting (+) s	System Manage										
Wizard		> Data F	Point													
Edge Mede		Dette De	1-4													
Edge Mode		Data Po	oint													
Extension IO		Slave													Add	Imxport Export
IO Module	~															
Data Point		Version: 1	(41661/43													
Protocol		Loca	al_10	online	Slave_	Status	online	dev	ice1	onlin	ne					
Edan Catalogu		IO SI	ive		Slave Sta	itus 1:abnormal 2:oi	nline 3:stop	Data	Sources: 192 168 2	44-2404						
Edge Gateway		protor	ol: Local IO		protocols	Clause Status		prote	col: IEC 404	11.2.10.1						
		protoc			protocor.	Jiave Jiatus		prote	∠Edit ®De	lete						
		List of	clave points													Add Data
		Liston	slave points													Pulu Delete
															Please enterPoint Screen	Point Screen
			ID Nod	ie name E	ata Type	Decimal Number	Address Read Wr	te Status	Priority	Timeou	t(ms)	Data	Acquisition formula	Control formula	Node desc	Operation
			1	text	Bit	0	M_SP_NA, Only	Read	Level 1	200	0	1	100	5.5		Edit Delete
			🛞 IEC104 Server S	Simulator							/		- 0	× <sub>stal 1</sub>	15/page v Lest 1	Next Go to 1
			File Edit Die	splay Tools Help						/						
			New Connection	Create Slave Open	() Connection	U Clore Connectio	A Edit Connection	Edit Slave	1 Communication Tr				Command Mapping	× Chart		
			✓	4:2404	•	192.168.2	.44:2404 > SlaveAlia	s > Group-1	× 192,168.2	.44:2404 > Slave	Alias > Group-2	2 ×	command mapping to	ve chart		
			∨ 🛢 SlaveAlia:	s	COA:1	-			/				Reset Value Stop Cha	naina		
			S Group	-1	M_SP_NA_1	TOA	VariableName	STO SPT	STO BL	STO SR	STO NT	STO TV	Manned Point CA Mann	ed Po		
			S Gloup	*2	0_00_HH_1	1	10.2000000	True	False	False	False	False	hopped reality on hopp	-		
						2		False	False	False	False	False				
						3		False	False	False	False	False				
						4		False	False	False	False	False				
						5		False	False	False	False	False				
						6		False	False	False	False	False				
V1.1.88						7		False	False	False	False	False		-		

## 7.Update history

versions	update content	turnover time
V1.0.0	First edition	2025-03-11







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