JYZ-HW Fault Indicator	Version:	V2.0.1
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# JYZ-HW Fault Indicator User Manual





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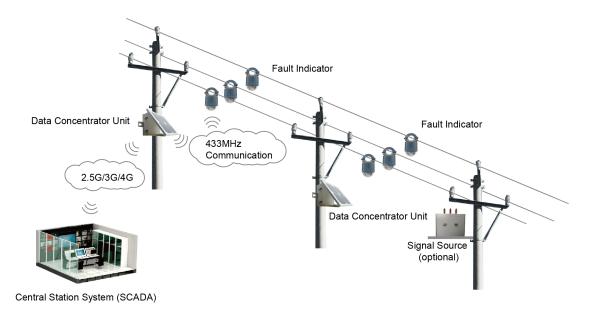
# JYZ-HW Overview

Medium voltage distribution networks which have longer lines, various load and complex topology, usually take a longer time for line maintenance. Especially when fault occurs, there is a great significance for power supply reliability to find and locate fault point as soon as possible.

The earth-fault and short-circuit fault indicator type JYZ-HW are usually used in radial medium voltage (5~38KV, can be customized by 44KV, 69KV and 110KV) overhead line distribution networks, which neutral points are ineffectively grounded. Short-circuit fault and single-phase earthed fault can be detected and indicated by three ultra-bright blinking LEDs, which can be seen from 360° sight.

The fault information and load current value can also be transmitted to the SCADA system. A data concentrator unit (DCU) will be equipped for data transmission from DCU to SCADA system by 2.5G/3G/4G networks. And the indicators talk to DCU by 433M module.

A mounting point usually have one DCU and three fault indicators (A, B, and C phase). One DCU can support 9 fault indicators at most.





# **1. Technical Specifications**

Parameter	Value
Voltage Range	5~38KV, can be customized to 44KV, 69KV and 110KV
Short-circuit trip current (phase	50~1200A adjustable, 1A step, 150A default
to phase)	
Earth-fault electrical field drop	Adjustable, 1% step, 30% default
(phase to ground)	
Earth-fault response delay	adjustable: 1s step, 30s default (minimum 1s)
	1. manual by magnet.
	2. remote reset through SCADA system
Indication unit reset	3. time reset: adjustable, 1 second step, 24h default, max. 48h
	4. Auto delay reset after repower, 1 second step, 30s default
	max 5min, only for permanent fault
Indicator Protection class	IP68
DCU Protection class	IP65
Internal type test	according to IEEE495-2007
Operation temperature range	-40~+70°C
Indicator battery	Lithium battery type AA 3.6V / 9Ah, replaceable
DCU battery	Rechargeable lithium battery 12V/7.8Ah
Life time of LED flashing	1000h
Battery life	approx. 10 years
Indicator Weight	approx. 590g
DCU Weight	approx. 3.6Kg
Load Current Accuracy	0A~300A ±3A
	300A~800A±1%
Cable diameter ranges	6mm~42mm
LED Blinking frequency	10 per minute, adjustable
LED delay	10ms default, adjustable
Max. load/fault current	1200A
Current withstand	31.5KA/4s
Communication medium	Indicator to DCU: 433MHz/2.4GHz
	DCU to SCADA: 2.5G/3G/4G
Communication Protocol	Indicator to DCU: private
	DCU to SCADA: IEC101, IEC104, DNP3.0, Modbus

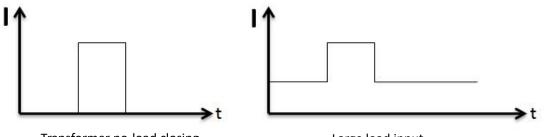


# **2.**Function Description

# **3.1 False Triggering Prevention**

#### (a) Inrush Current

Transformer of no-load closing and large load input will cause inrush current. Inrush current of overhead line is very high, regularly up to the fault current threshold, and the fault indicator can identify inrush current and ignore it automatically, and not act.

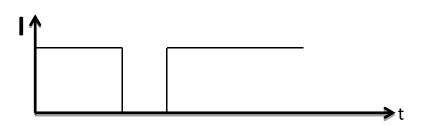


Transformer no-load closing

Large load input

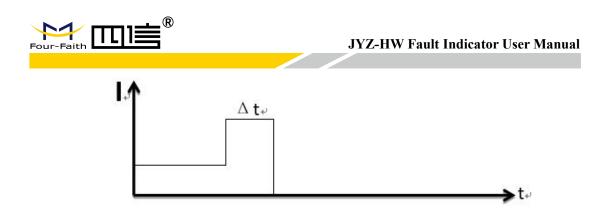
#### (b) Non-fault Line Reclosing

After fault occurs, the non-fault lines also have reclosing inrush current, and indicators can distinguish the feature, and not act.



#### (c) Heavy Load Input Manually

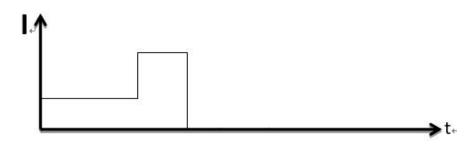
When a heavy load acted on the line, the current can increase sharply. The line will lose power under the protection mechanism. The heavy current time  $\Delta t$  is longer than the duration time of short circuit current. It can be modified based on actual situation. Indicators can distinguish the feature, and not act.



# **3.2 Short-circuit Detection**

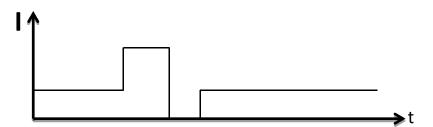
#### a) Permanent Fault

The fault indicator can detect permanent short-circuit fault by electrical field and load current change features. No matter how many automatic reclosing are operated, it is identified as a permanent fault if there is outage.



#### b) Transient Fault / Temporary Fault

If the fault is cleared by the automatic reclosing cycles and the line returns back to normal state, it is identified as a transient fault.

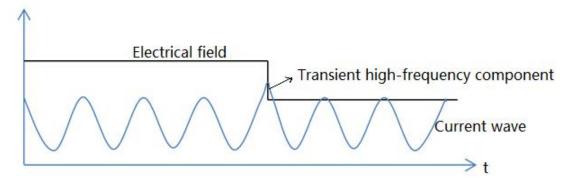




## 3.3 Earth-fault Detection

Drop of electrical field is the most important factor for earth-fault detection. The indicator can measure a bare voltage value which can reflect the change of electrical field.

After earth-fault occurs, there are a large number of transient high-frequency component and big capacitive current in the first half wave, and the electrical field will drop at the same time. This feature will be considered as an earth-fault if the transient current up to threshold value.



## 3.4 Load Current Value Upload

The indicator uploads current value to DCU and DCU uploads current value to SCADA within the configurable time (15 minutes default), and also uploads immediately when current value fluctuates at large amplitude. The fixed time and the amplitude are adjustable.

# 3.5 Low Battery Alarm

The battery of indicator is replaceable and the battery voltage can be measured every 20 milliseconds. The yellow LED will flash when battery voltage is less than threshold value. The low battery alarm will be also transmitted to SCADA system to remind the operation and maintenance personnel to change the battery.

The threshold classic value is 3.2V which can be adjusted by SW tools.

# 3.6 Fault Local Indication

When there is permanent fault, transient fault or earth-fault, LED will blink, and different color of

LED shows the different fault:		
Permanent Short Circuit Fault:	Red ultra-bright LED blinking.	
Transient Short Circuit Fault:	Green ultra-bright LED blinking.	
Earth Fault:	Red and green ultra-bright LEDs blinking	g alternatively.
Low Battery Warning:	Yellow ultra-bright LED blinking.	
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## **3.7 Fault Remote Indication**

The fault information would also be transmitted and showed on SCADA system besides local display. You can find many useful information like fault type, load current value, battery value on SCADA system. Especially when fault occurs, the fault point would be located within a few minutes.

## 3.8 Indicator Reset

For permanent fault type, the indicator will be reset after a configurable time ( $0\sim5$ minutes, 1s step) when the line is re-powered. And for transient fault and earth-fault type, the indicator will keep blinking for a configurable time ( $0\sim48$  hours, 1s step), no matter if the line is re-powered or not. During the time of blinking, a new fault can be detected, and the reset time will be recalculated.



# **4** Parameters Setting Instruction

Before configuration, it is necessary to connect the PCBA of DCU with PC by the shipped RS232 conversion cable as following:



All the settings are configured through the shipped software tool (FaultIndicator.exe). It's necessary to have one PC to run this tool. After you changed the value, you need to save it and restart DCU to make the change take effect.

Open the SW tool, click "Serial Port Setting". On the serial port setting interface, there will be the parameters of present opened serial port. If the parameters of the connected data concentrator unit don't conform with the default value, please select correct one and click "open". Then you can click "initialization" on the top menu to test the link, if there is no returned error information, that means the communication between DCU and PC is normal.

Serial Port Setting TCP Setting	Initialization	Total Call	ASDU Transmit	Loading Param	Original Message
	initialization	iotal Call	ASDO Harisinic	Loading Param	Original wessage
essageInfo 🚽 👻 🕂 🗙	3			2	
onfiguration '				2	
Device Monitoring					0
Telemetry			Serial Por	tSetting	×
Teleindication			-COM set		
SOE Display					
FaultEventDoc			Se	rial  l	-
- LoadRecord			Baud	115200	-
LocalOperation			Baud	110000	
- DeviceException			Data	Bits: 8	-
Log				-	
			Chec	k None	<b>•</b>
ReadFileDoc					
Device Operate			Stop	Bits: 1	<b>_</b>
TelemetryPointTable				Dpen	Close
Time Proofread					Close
Param.Setting					
- OperatingParam			-		
- IECParam					
2 contraint		en.four-f	aith net		



# **4.1 DCU Parameters Setting**

## **4.1.1 Telemetry Parameters**

Firstly double click "Telemetry", then click "Total Call", you will see the value of telemetry. Here you can see the analog value of indicators' status

Serial Port Setting TCP Setting	Initializa	ation Total Call	ASDU Transmit Loading Param Original Message			
lessageInfo 🚽 🗸 X onfiguration		Telemetry X		3		
Device Monitoring	No.	Device Name	InfoAddr. Name	Value	Info Address	Coefficier
Telemetry 1	1		Data Concentrator Unit Battery Volt.	0.0	4001	0.001
- Teleindication	2		1st Line Phase ALoad Current- Ia	0.0	4011	0.1
SOE Display	3		1st Line Phase BLoad Current- Ib	0.0	4012	0.1
FaultEventDoc	4		1st Line Phase CLoad Current- Ic	0.0	4013	0.1
- LoadRecord	5		1st Line Phase ALine Temp Ta	0.0	4015	0.1
LocalOperation	6		1st Line Phase BLine Temp Tb	0.0	4016	0.1
	7		1st Line Phase CLine Temp Tc	0.0	4017	0.1
DeviceException	8		1st Line Phase AIndicator Batter	0.0	4019	0.001
Log	9		1st Line Phase BIndicator Batter	0.0	401a	0.001
- EncryptionDoc	10		1st Line Phase CIndicator Batter	0.0	401b	0.001
ReadFileDoc	11		1st Line Phase AFault Current-Ia	0.0	401d	0.1
Device Operate	12		1st Line Phase BFault Current-Ib	0.0	401e	0.1
TelemetryPointTable	13		1st Line Phase CFault Current-Ic	0.0	401f	0.1
	14		2nd Line Phase ALoad Current- Ia	0.0	4021	0.1
- Time Proofread	15		2nd Line Phase BLoad Current- Ib	0.0	4022	0.1
Param.Setting	16		and time Dhose CLeed Comment- To	0 0	4002	0 1

#### **4.1.2 Teleindication Parameters**

Firstly double click "Teleindication", then click "Total Call", you will see the value of teleindication. Here you can see the digital value of indicators' status

Device Monitoring	efresh	evice Name	InfoAddr. Name Data Concentrator Unit Low Battery alarm 1st Line Phase AIndicator Comm. Status 1st Line Phase APermanent Short-Cir 1st Line Phase APermanent Short-Cir	<b>3</b> 0 1 0	0002 0011 0012
Telemetry     No       Teleindication     1       2     SOE Display       3     -FaultEventDoc       4     -LoadRecord       5     LocalOperation       6     Docidestruction	.:   De	evice Name	Data Concentrator Unit Low Battery alarm 1st Line Phase AIndicator Comm. Status 1st Line Phase ATransient Short-Cir	0 1 0	0011 0012
Teleindication     1       SOE Display     3       FaultEventDoc     4       LoadRecord     5       LocalOperation     6       Prior EventSize     7			1st Line Phase AIndicator Comm. Status 1st Line Phase ATransient Short-Cir	1 0	0011 0012
- SOE Display 3 - FaultEventDoc 4 - LoadRecord 5 - LocalOperation 7			1st Line Phase ATransient Short-Cir	10° 11	0012
- FaultEventDoc 4 - LoadRecord 5 - LocalOperation 7				10° 11	
LoadRecord 5 LocalOperation 6 Device Execution 7			1st Line Phase A Permanent Short-Cir	0	
LocalOperation 6 7			IST LINE THASE A TERMANENT SHOFT-CIF	0	0013
DeviceEvention 7			1st Line Phase ALine Temp. Overheat	0	0015
Device Furgertien 7			1st Line Phase ACurrent Overloaded	0	0016
DeviceException			1st Line Phase ALow Battery Alarm	0	0017
			1st Line Phase ALine with Electricity	0	0018
Log 9			1st Line Phase AIndicator Flag		0019
- EncryptionDoc 10			1st Line Phase BIndicator Comm. Status	1	0021
ReadFileDoc 11			1st Line Phase BTransient Short-Cir	0	0022
Device Operate 12			1st Line Phase BPermanent Short-Cir	0	0023
TelemetryPointTable			1st Line Phase BEarth Fault	0	0024
Time Proofread			1st Line Phase BLine Temp. Overheat	0	0025



### 4.1.3 Time Calibration

Double click "Time Proofread", you will see the window shown as below

MessageInfo 👻 🕂 🗙	
DeviceException	
Log	
ReadFileDoc	
Device Operate	Time Proofread
Time Proofread 1	
Param.Setting	Current Time 2019-06-26 V 13:41:29 ÷
- OperatingParam	
IECParam	
- Teleindication PointTab	Apply Time Proofread Close
TelemetryPointDoc	2
- TeleControlParam	
PhoneNo	
- LoraParam	

◆ Apply: Apply time proofread, you can calibrate the time.

**Time Proofread:** You can read the time information from DCU





### 4.1.4 Operational Parameters

Double click "OperatingParam", then click "Query", you will see the value

MessageInfo 🗢 🕂 🗙	<b>√ C</b>	peratingParam ×			
- DeviceException		2 Query	Save	3	_
- EncryptionDoc	No.	Param. Type	ParamDescription	Value	Note
ReadFileDoc	1	Mode	Terminal type		OHL RF&UNC RF
Device Operate	2		Power Mode	Realtime	Quasi-real time & Realtim
TelemetryPointTable	3		Device Type	Remote	Local & Remote
Time Proofread	4		Indicator Type	100 Aug 200	RF001&RF003
- Param.Setting	5	TimeParam.	Fault Blocking Time (s)	0	
- OperatingParam 1	6		Monitoring Period on Indicator Sta	600	
IECParam	7		AD Acquisition Time(s)	60	
- Teleindication PointTab	8		Upload Heartbeat Time(s)	60	
- TelemetryPointDoc	9		Timing Upload Analog Value(s)	900	
	10		Resend Teleindication Interval(s)	60	
PhoneNo	11		Load Data Record Save Interval(s)	900	
LoraParam	13		Time interval (s) for detect the p	30	
DeviceLocation	17	Other Param.	Substation Addr.	14	
- RF Param	18		RF Comm. Freq. Band	6	

#### ♦ Mode Selection

Terminal Type: include overhead RF and underground cable lines RF

Power mode: Real time and quasi-real time. When set to quasi-real time, device doesn't deal with network tasks.

Device Type: Local fault indicator or remote fault indicator

Indicator Type: not used

#### ◆Time Parameter

Fault blocking time(S): When the fault occurs to the indicator, it will be reported. When the

time is out, the fault will be cleared.

Monitoring Period on Indicator Status(S): the communication period between indicator and Concentrator Unit. When the time is out it will report the status of the indicator.

AD acquisition Time(S): Interval time of solar panel voltage & battery voltage acquisition

Upload heartbeat time(S): heartbeat interval time

Timing upload analog value: Period of telemetry upload time

Resend Teleindication interval(S): when SOE timeout, retransmission time

Load Data Record Save Interval: Period of save time for load



#### • Other Parameters

Substation Addr.: ASDU/Link address of 101 communication protocol

RF Comm. Freq. Band: RF 433 communication Frequency.

Absolute Threshold of Telemetry, Relative Threshold of Telemetry: when the telemetry reaches these two conditions, will upload the telemetry to the server station.

Absolute Threshold of Temp.: not used.

#### 4.1.5 IEC Settings

For different customers' requirements, the user can set the specifications of 101 protocol. After the setting, user need to restart terminal for the setting to take effect. Specific settings are as follows:

Firstly double click "IECParam", then click "Query", you will see the value of parameters:

onfiguration /	ì	2 Query	Save	3	_
- Telemetry - Teleindication	No.	Param.Type	ParamDescription	Value	Note
	1	IEC Param.	Link Addr. Bytes:	2	
- SOE Display	2		Information Body Addr	2	
- FaultEventDoc	3		Common Addr. Byte Length	2	
LoadRecord	4		Transmission Mode	Balance	Balance&Imbalance
- LocalOperation	5		TranssReason Bytes:	Need to initialize	Need to initialize & receive normal fram
- DeviceException	6		Transmission Reason Addr.Byte Length	2	
- Log	7		Telemetry Type	Short Floating Point No	Normalized Value & Standardized Value
- EncryptionDoc	8		Teleindication Type	Single point	Single point&Double point
ReadFileDoc	9		Initialization Type	Unilateral	Unilateral&Bilateral
Device Operate					
- TelemetryPointTable					
- Time Proofread					
Param.Setting					
OperatingParam					
IECParam 1					

- Parameters "Link Addr. Bytes", "Information Body Addr", "Common Addr. Byte Length" and "Transmission Reason Addr. Byte Length" mean the length of corresponding value
- Transmission Mode: equilibrium mode or non-equilibrium mode of 101 protocol.
- Telemetry Type: data type of telemetry
- **Teleindication Type:** data type of teleindication
- Initialization Type: you can choose if only DCU is initialized or both DCU and main station are initialized



## 4.1.6 Telemetry Point List

DeviceException ^	Query	Save Update [	Data Load Data Edit			
EncryptionDoc ReadFileDoc	No.	Addr.				
Device Operate						
TelemetryPointTable	EditInfoDl	a <b>3</b>				
Param.Setting	No.	Device Name	Name	Info Address	Ratio	NewCoefficient
- OperatingParam	0		Data Concentrator Unit Ba	4001		0.001
IECParam	1		1st Line Phase ALoad C	4011		0.1
- Teleindication PointTab	2		1st Line Phase BLoad C	4012		0.1
- TelemetryPointDoc 1	3		1st Line Phase CLoad C	4013		0.1
- TeleControlParam	4		1st Line Phase ALine Te	4015		0.1
PhoneNo	5		1st Line Phase BLine Te	4016		0.1
- LoraParam	6		1st Line Phase CLine Te	4017		0.1
- DeviceLocation	7		1st Line Phase AIndicat	4019		0.001
RF Param	8		1st Line Phase BIndicat	401a		0.001
- DCU InnateDoc	9		1st Line Phase CIndicat	401b		0.001
- DCU RunDoc	10		1st Line Phase AFault C	401d		0.1

Firstly double click "TelemetryPointDoc", then click "Edit", you will see interface window as below. You can check, add and modify Name and Info Address of the under-surveillance object.

No.	Device Name	Name	Info Address	Ratio	NewCoefficient
0		Data Concentrator Unit Ba	4001		0.001
1		1st Line Phase ALoad C	4011		0.1
2		1st Line Phase BLoad C	4012		0.1
3		1st Line Phase CLoad C	4013		0.1
4		1st Line Phase ALine Te	4015		0.1
5		1st Line Phase BLine Te	4016		0.1
6		1st Line Phase CLine Te	4017		0.1
7		1st Line Phase AIndicat	4019		0.001
8		1st Line Phase BIndicat	401a		0.001
9		1st Line Phase CIndicat	401b		0.001
10		1st Line Phase AFault C	401c		0.1
11		1st Line Phase BFault C	401d		0.1
12		1st Line Phase CFault C	401e		0.1
13		2nd Line Phase ALoad C	4021		0.1
14		2nd Line Phase BLoad C	4022		0.1
15		2nd Line Phase CLoad C	4023		0.1
16		2nd Line Phase ALine T	4025		0.1
17		2nd Line Phase BLine T	4026		0.1
18		2nd Line Phase CLine T	4027		0.1
19		2nd Line Phase AIndicat	4029		0.001
20		2nd Line Phase BIndicat	402a		0.001
21		2nd Line Phase CIndicat	402b		0.001
22		2nd Line Phase AFault C	402c		0.1
23		2nd Line Phase BFault C	402d		0.1
24		2nd Line Phase CFault C	402e		0.1
25		3rd Line Phase ALoad C	4031		0.1
26		3rd Line Phase BLoad C	4032		0.1

The Operation of "Teleindication PointTable" is the same.



## 4.1.7 Phone Numbers Settings

- DeviceException ^		2 Query	Save		
- EncryptionDoc ReadFileDoc	No.	Param.Type	ParamDescription	Value	Note
	1	SMS	Phone number enables control field	1	
Device Operate	2		Phone No1		ASCII, Max 16 Bit
TelemetryPointTable	3		Phone No2		ASCII, Max 16 Bit
Time Proofread	4		Phone No3		ASCII, Max 16 Bit
Param.Setting	5		Phone No4		ASCII, Max 16 Bit
- OperatingParam	6		Phone No5		ASCII, Max 16 Bit
IECParam					
- Teleindication PointTab				3	
- TelemetryPointDoc				<u></u>	
- TeleControlParam					
PhoneNo 1					
LoraParam					
DeviceLocation					

Phone numbers activation setting: in the login window of SW FaultIndicator.exe, you need to select "Sms"

Device Type		
✓ Overhea	🗌 Cable	Waverec
Protocol Selectio	n	
	o C IEC 104 Pr	oto: 🧿 DNP3.0 prote
Function Choose		
Encryption		
Encryption	Sms	

• Phone Numbers: Enter the correct phone number and save.





### 4.1.8 RF Parameter

Double click "RF Param", then click "Query", you will see the value of parameters

Messageinfo 🗢 🗢 🛪 🗙	4 R	F Param 🗙			
DeviceException ^	12	2 Query	Save	3	
EncryptionDoc ReadFileDoc	No.	Param.Type	ParamDescription	Value	Note
Device Operate	1		Mac Addr.	0x7FFFFFFF	Hexadecimal
TelemetryPointTable	2		Line Deviation	255	
Time Proofread	3		Phase Deviation	255	
	4		Group Addr.	28	
□ Param.Setting	5		Working Freq.	28	
OperatingParam	6		Call Out Duration	10	
IECParam	7		Activate Duration	60	
- Teleindication PointTab	8		Communication Frequency Band	0	
TelemetryPointDoc	9		Call Out Frequency Band	28	
TeleControlParam	10		Call Out Distance	10	
PhoneNo	11		Wireless Rate	25	100&25
LoraParam					
- DeviceLocation					
RF Param 1					
- DCU InnateDoc					
- DCU RunDoc					
UpgradeDCUDoc					
MCDoc					

- **Group Addr.** and **Working Freq.:** these two values must be the same with DCU's, they are used for matching between indicator and DCU.
- Call out Duration: the duration of call out
- Activate Duration: the duration time of DCU after it is woken up.
- Communication Frequency Band: communication frequency is 433MHz
- Call out Frequency Band: frequency band during calling out
- **Call Out Distance:** the distance between indicator and DCU during calling out
- Wireless Rate: the speed of communication between indicator and DCU



### 4.1.9 MC Parameter

If there are DCU substations that communicate with master DCU with Lora, you can add the address of sub-DCU here

Log		Query	Save		
- EncryptionDoc ReadFileDoc	No.	Param.Type	ParamDescription	Value	Note
	1		Slave 1 sub-station address		
Device Operate	2		Slave 2 sub-station address		
<ul> <li>TelemetryPointTable</li> <li>Time Proofread</li> </ul>	3		Slave 3 sub-station address		
Param.Setting					
- OperatingParam					
IECParam					
- Teleindication PointTab					
TelemetryPointDoc					
TeleControlParam					
PhoneNo					
LoraParam					
- DeviceLocation					
- RF Param					
DCU InnateDoc					
- DCU RunDoc					
UpgradeDCUDoc					
MCDoc					



## 4.1.10 GPRS Settings

Double click "GPRSParam", then click "Query", you will see the value of GRPS parameters

	4	GPRSParam ×				
LoadRecord	2	Query Save			3	
LocalOperation	No.	Param. Type	Descri	ption	Value	Note
DeviceException	1	DNS Server IP	IP		8. 8. 8. 8	IP
Log	2		TP		114. 114. 114. 114	TP
- EncryptionDoc	3	Remote Master	IP Addr1/Do	main Name 1	169. 5. 1. 97	Array
ReadFileDoc	4		Port	: 1	9278	
Device Operate	5		IP Addr2/Do	omain Name 2		Array
TelemetryPointTable	6		Port	: 2	0	
Time Proofread	7	SIM1- GPRS Status	Module		Norma1	Norma1&Abnorma
Param.Setting	8		SIM St		Norma1	Norma1&Abnorma
	9		CSQ V	2000	8	
OperatingParam	10		Working		1800MHZ	1800MHZ&900MHZ
IECParam	11		SIM Card Acqu		169. 5. 1. 205	IP
- Teleindication PointTab	12	SIM1-GPRS SMS	SMS Receivir		Close	Close&Open
TelemetryPointDoc	13	SIM1-GPRS Dialing	Phone		*99#	
TeleControlParam	14		AP		fashion.shapn	
LoraParam	15		Dial-up u	ser name	fashion@cu.shapn	
- RF Param	1					
DCU InnateDoc	NaviBar					
DCU RunDoc	Action	Туре	Time	Message		
- UpgradeDCUDoc	Rx	TELEINDICATION TIME	2019-06-25 11:12:50	68 63 63 68 53	0E 00 1E 09 03 00 0E 00 11 0	0 01 5D 81 0C 0B 59 06
MCDoc	Tx	CONFIRM	2019-06-25 11:12:50	10 80 FF FF 7E	16	
GPRS Param.Setting	Tx	READ	2019-06-25 11:12:54	68 OF OF 68 F3	FF FF 7A 01 0D 00 00 00 00 00	01 00 05 00 7F 16
GPRSParam 1	Rx	CONFIRM	2019-06-25 11:12:54	10 00 0E 00 0E	16	
ndicator, Setting	Rx	WRITE RESPOND	2019-06-25 11:12:54	68 AE AE 68 73	OE 00 7D 01 0D 00 00 00 00 0	0 01 00 05 9F A9 00 04

#### • DNS server IP

It is used to set the DNS server IP. When the remote host uses domain name, the "value" must be fulfilled with the DNS server IP, e.g. 114.114.114.

Support 2 DNS server IP, different one corresponding to different SIM card

#### • Remote Master IP and Port

It is used to set the remote host (main station) IP and port

Support 2 remote host IP or Domain name, different one corresponding to different SIM card

#### ♦ SIM1 GPRS Status

The GPRS status cannot be set. It is used to check the module conditions in the data concentrator, Module status, SIM card status, CSQ value, working frequency and the SIM card IP address are obtained by the card.

#### ♦ SIM1 GPRS SMS

It is used to set the receiving of message, "close" means OFF, "open" means ON.

#### SIM1 GPRS Dialing

If SIM card is public network, just take the default value, otherwise you need to get information from SIM card supplier

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# 4.2 Indicator Parameters Setting

#### 4.2.1 Run Parameter of Indicator

Double click "IndicatorRunParam", then select the line and phase of indicator, click "read" button, you will see the result shown as below:

Log       No.       2       Name       Address       3       Len       A         EncryptionDoc       ReadFileDoc       2       Electric Field Value       0x3000       2         ReadFileDoc       2       Electricity Value(A)       0x3001       1         eviceOperate       3       Send Time Interval T1(s)       0x3002       2         TelemetryPointTable       4       Send Time Interval T2(s)       0x3003       4         Time Proofread       5       Heartbeat Time(min)       0x3004       2         operatingParam       6       Telemetry send interval threshold(A)       0x3006       1         OperatingParam       8       Relative Choppy Value       0x3006       1         IECParam       9       Battery low pressure threshold(mv)       0x3008       2         Teleindication PointTat       10       Downtime(ms)       0x3008       1         IECParam       12       LED on time(ms)       0x3000       1         Teleindication PointTat       10       Downtime(ms)       0x3000       1         TelecontrolParam       12       LED on time(ms)       0x300C       1         Operatem       13       Number of data retransmission       0x300C	DeviceException ^	Circuit	1 -	🗌 A Mutually 🔽 B Mutua	lly 🔽 C Mutually	Read	Write		4
EncryptionDoc       1       Electric Field Value       0x3000       2         ReadFileDoc       2       Electricity Value(A)       0x3001       1         evice Operate       3       Send Time Interval T1(s)       0x3002       2         TelemetryPointTable       4       Send Time Interval T2(s)       0x3003       4         Time Proofread       5       Heartbeat Time(min)       0x3004       2         aram.Setting       6       Telemetry send interval threshold(A)       0x3006       1         OperatingParam       8       Relative Choppy Value       0x3006       1         - OperatingParam       9       Battery low pressure threshold(M)       0x3009       2         - Teleindication PointTat       10       Downtime(ms)       0x3008       2         - TelecontrolParam       12       LED on time(ms)       0x300B       1         - PhoneNo       13       Number of data retransmission       0x300D       1         - DeviceLocation       15       Retransmission interval(s)       0x300E       1         - DugadeDCUDoc       - UpgradeDCUDoc       - UpgradeDCUDoc       - UpgradeDCUDoc       - UpgradeDCUDoc       - UpgradeDCUDoc         - UpgradeDCUDoc       - UpgradeDCUDoc       -	Log	No.	2	Name		2	Len	A	В
ReadFileDoc       2       Electricity Value(A)       0x3001       1         evice Operate       3       Send Time Interval T1(s)       0x3002       2         TelemetyPointTable       4       Send Time Interval T2(s)       0x3003       4         Time Proofread       6       Telemetry send interval threshold(A)       0x3006       1         -OperatingParam       8       Relative Choppy Value       0x3006       1         -OperatingParam       9       Battery low pressure threshold(mv)       0x3008       2         -Teleindication PointTable       10       Downtime(ms)       0x3009       2         -Teleindication PointTable       11       Cycle flashing time(s)       0x3008       1         -TelecontrolParam       12       LED on time(ms)       0x3000       1         -PhoneNo       14       Permanent reset mode       0x300E       1         -DoculenateDoc       -       -       -       -         -DU InnateDoc       -       -       -       -         -DUC RunDoc       -       -       -       -       -         -UpgradeDCUDoc       -       -       -       -       -         -       -       -       -	EncryptionDoc	1				-		-	9
evice Operate     3     Send Time Interval T1(s)     0x3002     2       TelemetryPointTable     4     Send Time Interval T2(s)     0x3003     4       - Time Proofread     5     Heartbeat Time (min)     0x3004     2       aram.Setting     6     Telemetry send interval threshold(Å)     0x3005     1       - OperatingParam     6     Telemetry send interval threshold(Å)     0x3006     1       - OperatingParam     7     Absolute Choppy Value     0x3006     1       - OperatingParam     9     Battery low pressure threshold(mv)     0x3008     2       - Teleindication PointTat     10     Downtime (ms)     0x3008     2       - TelecontrolParam     12     LED on time (ms)     0x3008     1       - PhoneNo     13     Number of data retransmission     0x3000     1       - DeviceLocation     14     Permanent reset mode     0x300B     1       - RF Param     -     -     -     -     -       DCU InnateDoc     -     -     -     -     -       - UpgradeDCUDoc     -     -     -     -     -       - WCDoc     -     -     -     -     -	ReadFileDoc	2					1		5
TelemetryPointTable       4       Send Time Interval T2(s)       0x3003       4         Time Proofread       5       Heartbeat Time (min)       0x3004       2         aram.Setting       6       Telemetry send interval threshold(A)       0x3005       1         OperatingParam       8       Relative Choppy Value       0x3006       1         IECParam       9       Battery low pressure threshold(mv)       0x3008       2         Teleindication PointTat       10       Downtime(ms)       0x3008       2         Teleindication PointTat       10       Downtime(ms)       0x3000       1         TelecontrolParam       12       LED on time(ms)       0x3000       1         PhoneNo       13       Number of data retransmission       0x3000       1         DeviceLocation       15       Retransmission interval(s)       0x300E       1         DCU InnateDoc       10       Datterval(s)       0x300E       1         UpgradeDCUDoc       15       Retransmission interval(s)       0x300E       1         PBRS Param       10       10       10       10       10         DCU InnateDoc       10       10       10       10       10       10	ice Operate						2		60
6     Telemetry send interval threshold(Å)     0x3005     1       -OperatingParam     6     Telemetry send interval threshold(Å)     0x3005     1       -IECParam     9     Battery low pressure threshold(mw)     0x3007     2       9     Battery low pressure threshold(mw)     0x3008     2       -Teleindication PointTat     10     Downtime(ms)     0x3008     2       -TelecontrolParam     12     LED on time(ms)     0x3008     1       -PhoneNo     13     Number of data retransmission     0x3000     1       -DeviceLocation     14     Permanent reset mode     0x300E     1       -RF Param     -     -     -     -       -DCU InnateDoc     -     -     -     -       -DCU RunDoc     -     -     -     -       -UpgradeDCUDoc     -     -     -     -       -MCDoc     -     -     -     -	TelemetryPointTable	4			0x3003		4		300
aram.Setting     6     Telemetry send interval threshold(Å)     0x3005     1       -OperatingParam     7     Absolute Choppy Value     0x3006     1       -IECParam     9     Battery low pressure threshold(mw)     0x3007     2       9     Battery low pressure threshold(mw)     0x3008     2       -Teleindication PointTat     10     Downtime(ms)     0x3008     1       -TelecontrolParam     12     LED on time(ms)     0x300E     1       -PhoneNo     13     Number of data retransmission     0x300E     1       -LoraParam     15     Retransmission interval(s)     0x300E     1       -DeviceLocation     14     Permanent reset mode     0x300E     1       -DEU InnateDoc     -DCU RunDoc     -     -     -       -UpgradeCUDoc     -     -     -     -       -MCDoc     -     -     -     -	Time Proofread	5	H	eartbeat Time(min)	0x3004		2		120
OperatingParam     7     Absolute Choppy Value     0x3006     1       IECParam     9     Battery Choppy Value(A)     0x3007     2       Teleindication PointTat     10     Downtime(ms)     0x3008     2       TelemetryPointDoc     11     Cycle flashing time(s)     0x3008     1       TelecontrolParam     12     LED on time(ms)     0x300B     1       PhoneNo     13     Number of data retransmission     0x300D     1       LoraParam     15     Retransmission interval(s)     0x300E     1       DeviceLocation     15     Retransmission interval(s)     0x300E     1       DCU InnateDoc     10     UpgradeDCUDoc     1     1		6	Telemetry	send interval threshol	d(A) 0x3005		1		20
IECParam     9     Battery low pressure threshold(mv)     0x3007     2       Teleindication PointTat     10     Downtime(ms)     0x3008     2       TelemetryPointDoc     11     Cycle flashing time(s)     0x3008     1       TelecontrolParam     12     LED on time(ms)     0x3000     1       PhoneNo     14     Permanent reset mode     0x300D     1       LoraParam     15     Retransmission interval(s)     0x300E     1       DCU InnetDoc     10     Downtime(ms)     0x300E     1       DCU RunDoc     15     Retransmission interval(s)     0x300E     1       DCU RunDoc     10     10     10     10       DCU RunDoc     10     10     10     10       MCDoc     10     10     10     10		7	Ab	solute Choppy Value	0x3006		1		10
Teleindication PointTat     10     Downtime (ms)     0x3003     2       Teleindication PointTat     10     Downtime (ms)     0x3009     2       TelecontrolParam     12     LED on time (ms)     0x300B     1       PhoneNo     13     Number of data retransmission     0x300D     1       LoraParam     15     Retransmission interval(s)     0x300E     1       DeviceLocation     15     Retransmission interval(s)     0x300E     1       DCU InnateDoc     UpgradeDCUDoc			Rela	ative Choppy Value(A)	0x3007				10
TelemetryPointDoc         11         Cycle flashing time(s)         0x300A         1           TeleControlParam         12         LED on time(ms)         0x300B         1           PhoneNo         12         Number of data retransmission         0x300C         1           LoraParam         15         Retransmission         0x300E         1           DeviceLocation         15         Retransmission interval(s)         0x300E         1           DCU InnateDoc         UpgradeDCUDoc			Battery 1						3200
TeleControlParam     12     LED on time (ms)     0x300B     1       PhoneNo     13     Number of data retransmission     0x300C     1       LoraParam     13     Permanent reset mode     0x300D     1       DeviceLocation     RF Param     0     0x300E     1       DCU InnateDoc     DCU RunDoc     0     0     0       UpgradeDCUDoc     MCDoc     0     0     0	Teleindication PointTab						2		2800
13       Number of data retransmission       0x300C       1         LoraParam       14       Permanent reset mode       0x300D       1         DeviceLocation       RF Param       0x300E       1       1         DCU InnateDoc       UpgradeDCUDoc       0x300E       1       1         MCDoc       NaviBar       1       1       1       1       1         Number of data retransmission interval(s)       0x300E       1	TelemetryPointDoc		Cyc				1		5
PhoneNo     14     Permanent reset mode     0x300D     1       LoraParam     15     Retransmission interval(s)     0x300E     1       DeviceLocation     RF Param     0     0x300E     1       DCU InnateDoc     0     0     0     0       DCU RunDoc     0     0     0     0       UpgradeDCUDoc     0     0     0     0       RS Param.Setting     NaviBar     0     0     0	TeleControlParam						1		10
LoraParam DeviceLocation RF Param DCU InnateDoc DCU RunDoc UpgradeDCUDoc MCDoc SS Param.Setting NaviBar	PhoneNo						1		5
DeviceLocation     15     Retransmission interval(s)     Ux300E     1       RF Param     DCU InnateDoc     DCU RunDoc     1     1       DQgradeDCUDoc     MCDoc     1     1       RS Param.Setting     NaviBar     1     1	oraParam						1		Both
RF Param DCU InnateDoc DCU RunDoc UpgradeDCUDoc MCDoc RS Param.Setting NaviBar		15	Retra	ansmission interval(s)	0x300E		1		2
DCU InnateDoc DCU RunDoc UpgradeDCUDoc MCDoc RS Param.Setting NaviBar									
DCU RunDoc UpgradeDCUDoc MCDoc RS Param.Setting NaviBar									
UpgradeDCUDoc MCDoc RS Param.Setting NaviBar	DCU InnateDoc								
MCDoc SS Param.Setting NaviBar	DCU RunDoc								
RS Param.Setting NaviBar	UpgradeDCUDoc								
	MCDoc								
	S Param Setting	NaviRar							
			-		1				
Action Type Time Wessage	4			Time	Message				
Indicator RunParam         Rx         TEST         2019-08-01 09:07:11         10 42 01 00 43 16           Indicator RunParam         Tx         CONFIRM         2019-08-01 09:07:11         10 80 FF FF 7E 16			1.0/1.000						

- Electric Field Value: One of base that the line powered or not. It will be adjusted according to insulated line and bare line
- Electricity Value(A): The other base that the line powered or not. It is related to short-circuit and earth-fault judgment and not recommended to modify, 5A default
- Send Time Interval T1(s): The load current upload period. When Load current value is greater than "Telemetry send interval threshold", indicator uploads load current at this interval. 60 seconds default
- Send Time Interval T2(s): The load current upload period. When Load current value less than "Telemetry send interval threshold" and greater than "Electricity value", indicator uploads load current at this interval. 300 seconds default.
- Heartbeat Time(min): The heartbeat period of outage. 120 minutes default.
- Telemetry send interval threshold(A): the current value to distinguish the interval of load current update, 20A default
- Absolute Choppy Value(A): The current absolute mutation value, 10A default
- **Relative Choppy Value:** The current relative mutation value, 10% default
- **Battery low pressure threshold(mv):** threshold value of low battery alarm, 3.2V default.

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- **Downtime(ms):** load current measurement interval when there is no power in the line,
- Cycle flashing time(s): The period of blinking, 5 seconds default.
- LED on time(ms): The delay time of LED light up. 10 milliseconds default.
- Number of data retransmission: data re-transmitted times when communication failure. 5 default
- Permanent reset mode: The indicators reset model for permanent fault.
- Retransmission interval(s): Data re-transmitted period when communication failure. 2seconds default

#### 4.2.2 Current Parameter of Indicator

Double click "IndicatorCurrentParam", then select the line and phase of indicator, click "read" button, you will see the result shown as below:

og No.	2	Name	Address	3	Len	A	В	C
EncryptionDoc 1	Timir	ig reset delay(s)	0x3100		4		120	
ReadFileDoc		on reset delay(s)	0x3101		2		30	
ice Operate 3		it catastrophe value(A	) 0x3102		2		150	
FelemetryPointTable	Short	circuit maximum(A)	0x3103		2	4	0	
ime Proofread 5		ent setting value(A)	0x3104		2		900	
am.Setting 6		eady state time(s)	0x3105		2		10	
		osing delay(ms)	0x3106		2		3000	
0		f short circuit delay(			2		3000	
ECParam 9	Short circu	it protection delay(me	s) 0x3108		2		20	
eleindication PointTab								
TelemetryPointDoc								
eleControlParam								
honeNo								
oraParam								
DeviceLocation								
RE Param								
DCU InnateDoc								
CU RunDoc								
JpgradeDCUDoc								
MCDoc								
S Param.Setting NaviBar								
SPRSParam Action	Туре	Time	Message					
cator. Setting	WRITE RESPOND		68 3F 3F 68 73 01 00 7	D 01 0D 0	0 00 00 00 00 28	00 06 2E 00 31 04 7	8 00 00 00 01 3	02 1E 00
ndicatorRunParam <sup>1</sup> Tx	CONFIRM		10 80 FF FF 7F 16	5 5. 00 0	0 00 00 00 00 20		0 00 00 00 01 0	
ndicatorCurrentParam Rx	TELEMETRY FLOAT		68 DB DB 68 53 01 00	00 15 01	00 01 00 01 40 7	1 30 46 41 00 11 40	00 00 00 00 00 1	2 40 00 0

- Timing reset delay(s): The auto-reset delay time of permanent, transient and earth fault. 120 seconds default
- Power on reset delay(s): The auto-reset delay time of permanent fault after the line repowered. 30 seconds default
- Short circuit catastrophe value(A): The minimum change value to judge short-circuit fault, 150A default. It can be adjusted according to the real situation.
- Short circuit maximum(A): not used
- Over current setting value(A): The threshold of over-current value, 900A default
- The steady state time(s): The line power and the indicator charge time. It is necessary for fault detection. 10 seconds default.

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- Reclosing delay(ms): To distinguish permanent fault and transient fault. If the line is outage after the reclosing time, a permanent fault will be confirmed. Then otherwise, it is a transient fault. 3000 milliseconds default.
- Upper limit of short circuit delay(ms): The maximum time of short-circuit current sustains.
   3000 milliseconds default.
- Short circuit protection delay(ms): The minimum time of short-circuit current sustains. 20 milliseconds default

## 4.2.3 Ground Parameter of Indicator

Double click "IndicatorGroundParam", then select the line and phase of indicator, click "read" button, you will see the result shown as below. You can just take the default value.

Log	No.	2	Name		Address	C Len		p	С	Remark
- EncryptionDoc	<u>NO.</u>	- <u>-</u>		(91)		<u> Len</u>	A	<u>Б</u> 30	U.	Remark
ReadFileDoc	2		field descent ratio	(%)	0x3200 0x3201	2		30		
Device Operate	3		ield drop delay(s) rounding criterion		0x3201 0x3202	4		Passive		Passive&Active.
TelemetryPointTable	4		ve pulse amplitude(A)	6	0x3202	2		10		Fassive@Active.
Time Proofread	5		ulse delay 1(ms)		0x3204	2	4	800		
	6		ulse delay 2(ms)		0x3205	2		1000		
Param.Setting	7		field descent ratio	(%)	0x3206	1		10		
- OperatingParam	8		ative time error(%)		0x3207	1		5		
IECParam	9	Abso	lute time error (ms)		0x3208	ī		40		
- Teleindication PointTab	10	Passi	ve pulse amplitude(A	)	0x3209	2		10		
TelemetryPointDoc				<u>.</u>						
TeleControlParam										
PhoneNo										
- LoraParam										
- DeviceLocation										
RF Param										
- DCU InnateDoc										
- DCU RunDoc										
UpgradeDCUDoc										
MCDoc										
GPRS Param.Setting	NaviBar									
GPRSParam	and the second second	T	Time	Messac	-					
Indicator, Setting		Туре								
IndicatorRunParam	Rx	TEST	2019-08-01 10:56:14		1 00 43 16					
4	Tx	CONFIRM	2019-08-01 10:56:14		F FF 7E 16					
- IndicatorCurrentParam	Rx	TEST	2019-08-01 10:57:14		1 00 43 16					
<ul> <li>IndicatorGroundParam</li> </ul>	Ix	CONFIRM	2019-08-01 10:57:14	10 80 F	+ FF /E 16					



# **5** Online Upgrading

# **5.1 Indicator Upgrading**

The indicators can be updated online by wireless Tools. First of all, select the program file that will be wrote by "Browse file". And then load the indicator which needs to be updated. Click the button "En\_Update" to enter into update state, the LED will be blinking continuously.

File Devices	Main interface	RF para	Running para	Current	para (	Grounding pa	ara Calib	pration para	Program update	Data display	Help I	Exit	
Communication sel	lection	Parameter	r option										
	43 - Refresh	Call Time	Wait Time	Com Freq	Call Freq	Call Level	Defaul	Analog operation	Ctrl_Action	Ctrl_Return	AnalogS	Short AnalogGround	Restart
BaudRate 5760	0 *	10 Sear	30	0	14	10	Clear Mesg	Operation option	Read Frite para	LED Open Shut	Vers ion		ting lue Setting
ClosePort peration option None Load	More DCV Rf Clean Unload	V All	MAC_Addr 68-03-00-0F	Status	Update	option En_Update	Star	tUpdat	Dis_Update	Retry Time	2	Retry Num 5	Version:
25.15	MAC Addr 18-03-00-0F					path:				Brows	Clear		0

#### Before Updating

At last, click "StartUpdate" button and wait until the progress bar reaches 100% and the Status shows "OK", and the update operation finished.

File Devices Main interface	RF para	Running par	a Curren	nt para	Grounding pa	ara Calib	pration para F	rogram	update	Data	display	Help Exi	t				
Communication selection	Parameter	option															
Serialport COM43 - Refresh	Call Time	Wait Time	Com Freq	Call Freq	Call Level	Defaul	Analog operation	Ctrl	Action	Ctrl_	Return	AnalogSho	rt An	al ogGr ound	Rest	art	
BaudRate 57600	10 Searcl	30	0	14	10	Clear Hesz	Operation option	Read		LED Open	LED	Vers ion N				Manual	
ClosePort More Depration option DCV Rf None Load Clean Unload	▼ A11 ▼ 6	MAC_Addr 68-03-00-0F	Status		date option En_Upda File path:		StartUpdate		Update	400 57		ime 2	R	etry Num	5	Version:	Parag
All MAC Addr				U	pdate proce:	is .	esult Pack					DT 0W5	Liear				7, 10
	il i						peration: Pro;					package!					



# 5.2 DCU Upgrading

- 1) Disconnect the Power of DCU, connect RS232 connector and PC USB with cable
- 2) Run the SW tool "DtuDownload"

DtuDown	nload					3 <del>7–</del> 83		×
Comm:	СОМЗ 👻	Rate: 115200	▼ □ Boot	Load	Download	SetTool	RunTool	]
File:	C:\Users\Lucas\	Desktop\FI_T_JY2	_PRO104_CHILE_	CUST_CLIENT	T_2S2M_SV01.05	4_20190514.ł	•	
			0%					

3) Select correct COM and Baudrate

DtuDownload						
Comm: COM3	Rate: 1	15200 -	Boot Load	Download	SetTool	RunToo
File C:\Users\L	ucas\Desktop\F	T_T_JYZ_PRO104_	CHILE_CUST_CLIEN	T_252M_SV01.054	20190514.ł	•
rie. j					-	_
			0%			

4) Click "Load" to select the firmware

🏪 DtuDownload						-	_0		>
Comm: COM3	•	Rate: 115200	•	□ Boot	Load	Download	SetTool	RunTo	ol
File: C:\User	s\Lucas\l	Desktop\FI_T_JY	Z_PRO	104_CHILE	CUST_CLIEN	T_2S2M_SV01.0	54_20190514.ł	-	
,				0%				_	

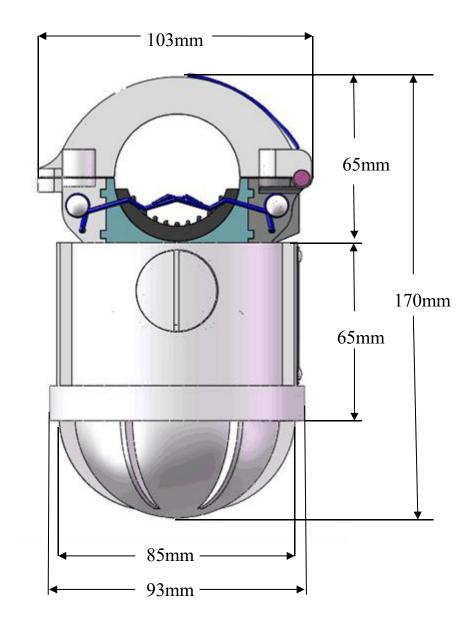
5) Click "Download" to downlaod the SW from PC

尤 DtuDownload								Х
Comm: COM3	Rate:	115200 -	□ Boot	Load	Download	SetTool	RunTo	ol
File: C:\User	s\Lucas\Deskto	p\FI_T_JYZ_PR	0104_CHILE_C	UST_CLIENT	r_2 <mark>S2M_SV01.05</mark>	4_20190514.ł	•	
			0%					
							_	



6) Connect the power of DCU. Then you could check the upgrade process run to 100%. That means the upgrade is successful.

# **6** Dimensions





# 7 Mounting and Dismounting Instruction

# 7.1 Mounting

#### Before installation in the field

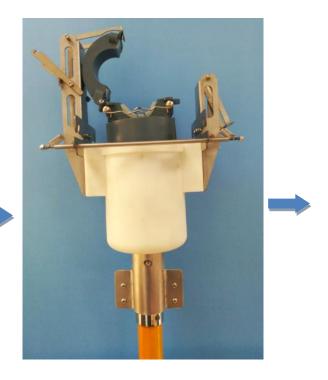
Reconfirm the communication parameters configuration of indicators and DCU before the installation in the field, such as group address, frequency, IP address, and port. And make sure the SIM card is in service and insert correctly.

#### Mounting

The indicators are mounted onto the overhead line with a special hot-stick installation tool (picture a).

First of all, put the indicator into the drum, and open the split coil CT with thumb and fix it (picture b). Secondly upwarp the spring with tool and fix them (picture c, d). Position the conductor between the open split coil CT, and with a forceful upward movement, install the indicator to the overhead line (picture e). When the indicator receives sufficient pressure, the spring will release and clamping the line, and the installation tool will separate from the indicator (picture f).





Picture (a)

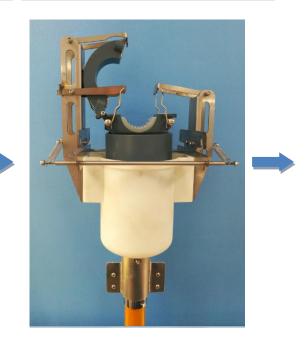
Picture (b)



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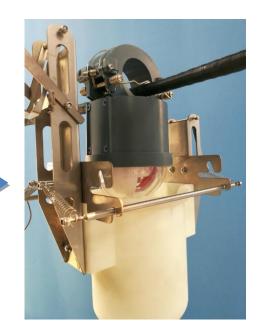
Picture (c)



Picture (d)



Picture (e)

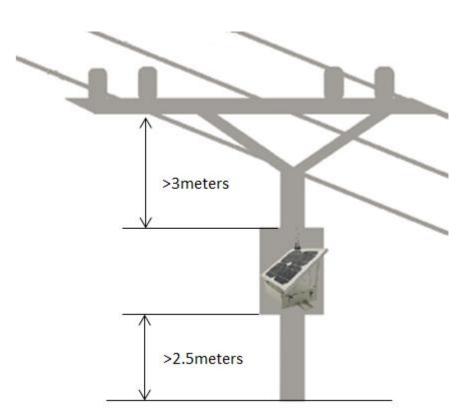


Picture (f)



#### Note:

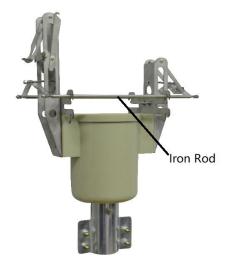
The DCU is mounted on the pole, typically 3 meters below the lines and 2.5 meters up to the ground. The solar panel should point to the direction of the sun, to make sure the sun shines most of daylight to the panel.





# 7.2 Dismounting

1) Place the small iron rods on both sides in the position shown in below picture



3) Then, the small iron rod will be stuck on the body of indicator 2) Put the tool into indicator and push the tool upwards



4) Pull the tool down, and the wire will detach from the spring of indicator



