



User Manual

RF uplink & RS485 downlink Repeater

Model No.: CT103

Version: V1.5

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Document Map

The following documents are supplied for the Repeater installation, operation and maintenance.

CT103 Repeater User Manual

The CT103Repeater User Manual gives an introduction of Repeater, include functions operation guide and product specification.

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Safety Instructions

WARNING

Read all safety information and operating instructions before using CT103Repeater to avoid personal injury.

FCC Warning: This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning

the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

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Transport and Storage

Before you transport and storage the Repeater, read and observe the clause 4 titled “Transport and storage” in this document.

Installation

Power must be cut off before install or remove CT103Repeater.

Before you install or remove the Repeater, find and read the “Product Installation Guide” first.

Operation

1. Do not break the seal without authorized operator.
2. Never remove the Repeater cover while the Repeater is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the Repeater.
3. Repeater working voltage must less than 120% nominal voltage (120%Un). Long time over voltage can lead to fire or damage to the Repeater.
4. Before you install or change external battery, read and observe the section 2.2 titled “external battery” in this document first. Incorrect operation may cause electrical shock!!
6. Do not operate the Repeater with wet hands.

For service and technical support information, please contact:

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1 Product introduction

CT103 is a repeater with RF Uplink & RS485 downlink. It's a bridge between the Concentrator and Meter to transfer the meter's data. The Repeater comes with an RF module that connects the Repeater via the RS485 interface. The communication Repeater can provide a path for forwarding weak signals, so that the Concentrator can reliably communicate with the Repeater. The communication is not encrypted. The Repeater only implements transmit through function.

As a part of Kaifa repeater solution, the CT103 provides RS485 port and SPD detection port and integrated Repeating functions as described in section 1.3.

1.1 Front view and Rear view

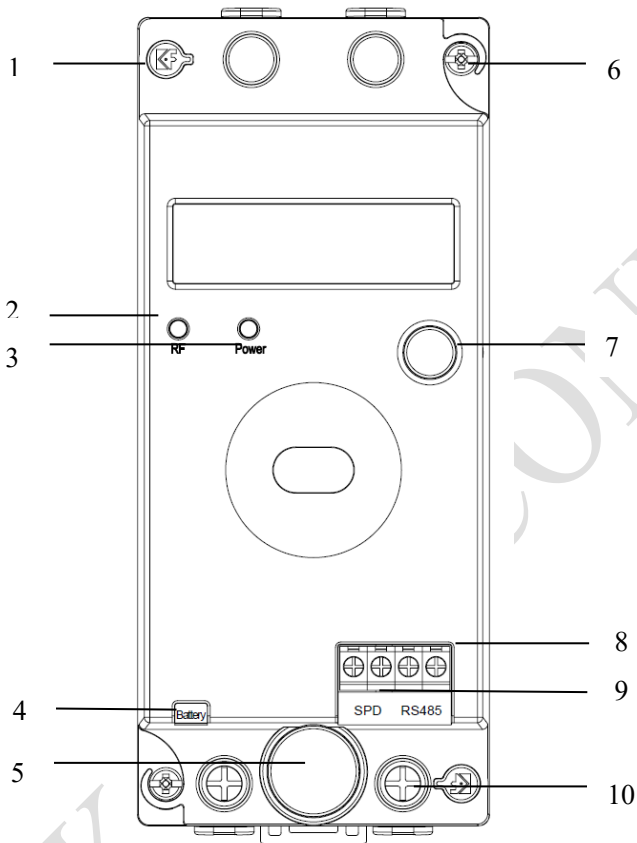


Figure 1 Front view

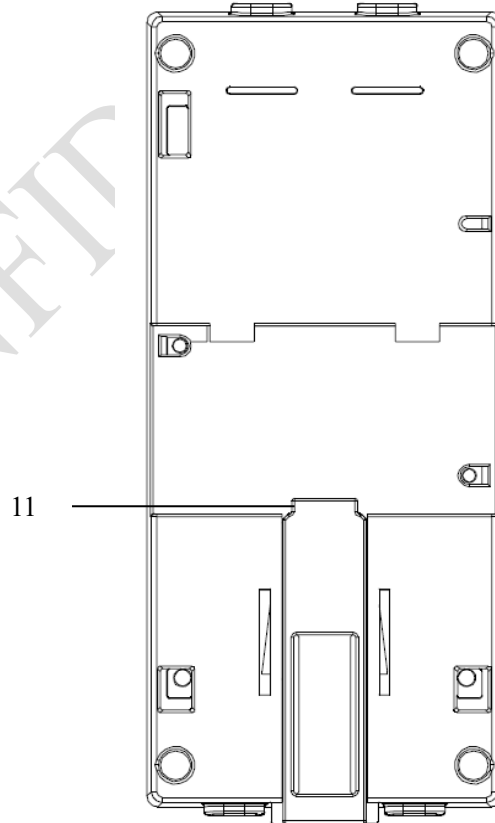


Figure 2 Rear view

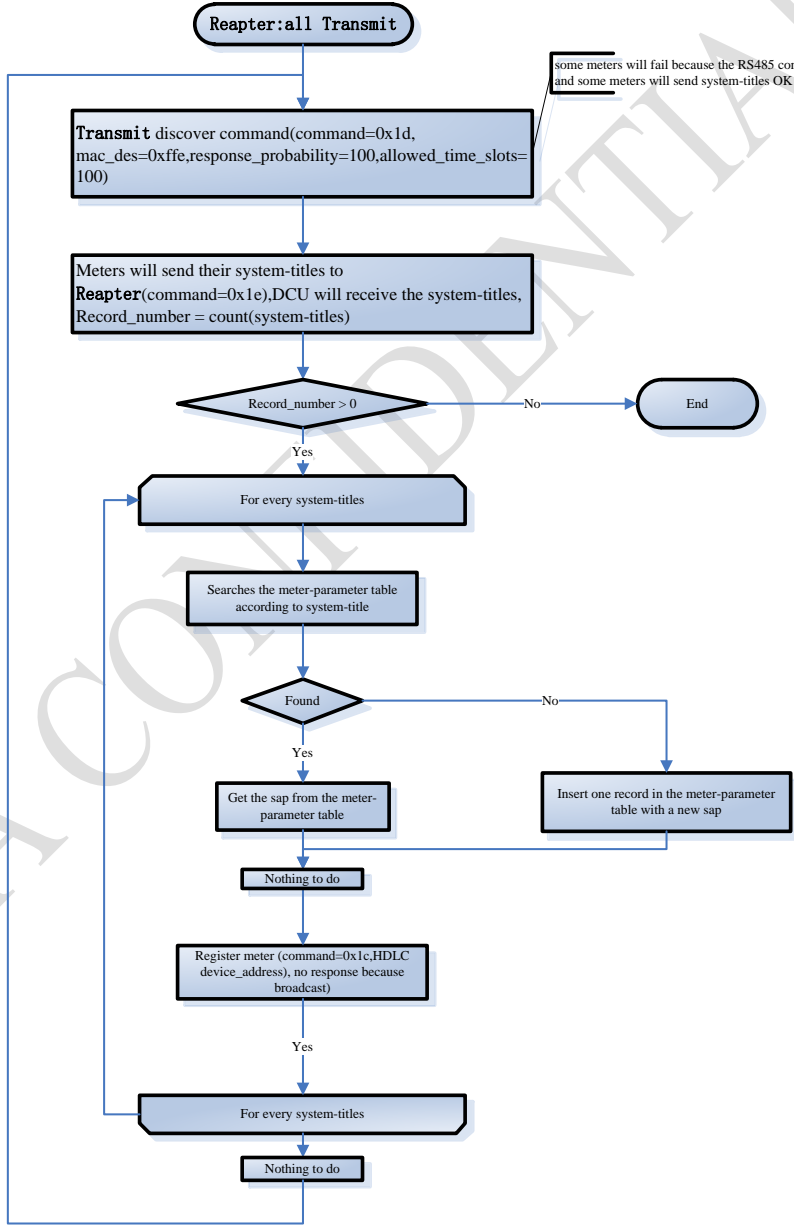
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1. Seal cap
2. RF communication LED
3. Power LED
4. Seal
5. External battery
6. Repeater cover sealing screw
7. Meter Box open detect switch
8. RS485 port
9. SPD detection port
10. Terminal screw
11. Hook

1.2 Features List

Nominal Voltage	230V
Voltage range	AC(80%Un to 120%Un)
Quiescent Power Consumption	≤3 W
Quiescent Consumption Current	<20uA
Degree of Water Protection	IP51
Degree of Insulation Protection	II 级
Communicate mode	Transparent transmission
Communicate with Concentrator	Modulation: Lora Frequency : 915.25M~917.75M TX power: ≤20dbm RX sensitivity: ≤-119dbm (@SF=8, BW=500KHz, Data rate=12500bps) 6 dB BW: ≥500KHz
Communicate with Repeater	RS485(9600bps)
Data retention	20 years (minimum) in case of power failure. Annual failure rate<0.5%
Battery	Replaceable 3.6V/1200mAh lithium battery
Environmental	Repeater install in Meter Box, the Meter Box is mounted outdoors Can resist external electromagnetic attack. Operating temperature range: +10℃~ +85℃(in Meter Box) Storage and transport temperature range: -45℃~ +85℃ Relative Humidity: 75%~100%
Certification	ERC
Reference standard	Comply with relevant standards requirements for ISM wireless device in FCC,NTC
Special Technological requirements	ROHS

1.3 Function characteristics

<p>Repeat</p>	<p>The Repeater only implements transmit through function. SPD operative mode. Meter Box open detection. Power off event (last gasp).</p>
<p>Data transfer mode</p>	<p>Via RF channel to connect the Concentrator, HD(half-duplex). Via RS485 channel to connect the Meter, HD(half-duplex).</p>
<p>Repeater networking</p>	 <pre> graph TD Start([Repeater:all Transmit]) --> Transmit[Transmit discover command(command=0x1d, mac_des=0xffe,response_probability=100,allowed_time_slots=100)] Transmit --> Send[Meters will send their system-titles to Repeater(command=0x1e),DCU will receive the system-titles, Record_number = count(system-titles)] Send --> Check{Record_number > 0} Check -- No --> End([End]) Check -- Yes --> Loop1[For every system-titles] Loop1 --> Search[Searches the meter-parameter table according to system-title] Search --> Found{Found} Found -- No --> Insert[Insert one record in the meter-parameter table with a new sap] Found -- Yes --> GetSap[Get the sap from the meter-parameter table] GetSap --> Nothing1[Nothing to do] Nothing1 --> Register[Register meter (command=0x1c,HDLc device_address), no response because broadcast] Register -- Yes --> Loop2[For every system-titles] Loop2 --> Nothing2[Nothing to do] Nothing2 --> Loop1 </pre> <p>some meters will fail because the RS485 conflict, and some meters will send system-titles OK</p>

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Event Log	Power off. SPD OK. SPD FAIL. Meter Box open. Meter Box close.
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2 Repeater Installation

2.1 Installation guide

CT103Repeater should be installed at a dry Meter Box. Installation environment temperature must not exceed Repeater operation temperature range (+10°C~ +85°C); Working voltage must in the range of 184Vac~276Vac, 60±5%Hz.

Please see Meter Box installation guide for details.

2.2 External battery

External changeable battery can provide backup energy for Repeater's RTC. The recommended battery size is LS14250E. Only authorize utility member can remove the battery, it is not allowable to remove battery for consumer. Please see the detailed dimension as following:

1) Power off the Repeater, open the meter box, pull off the plug, and replace the battery, close the Meter Box.

3 Event record

3.1 Repeater's event record

When the event occurred, Repeater only transfers to Concentrator through RF module, it contains:
 event_code1 **Power off**: If power off, when power up again, Repeater can detect the last power off event, and report the last gasp event with date and time to concentrator.

event_code2 **SPD OK**: SPD give a disconnect signal to Repeater (only detection in power up situation). After five seconds, the RF LED will alternating flicker and Repeater will report the SPD OK event with date and time stamp to concentrator.

event_code3 **SPD FAIL**: SPD give a connect signal to Repeater (only detection in power up situation). After five seconds, the RF LED will alternating flicker and Repeater will report the SPD FAIL event with date and time stamp to concentrator.

event_code4 **Meter Box open**: When Meter Box is opened, the RF LED will alternating flicker. After five seconds, Repeater will report the Meter Box close event with date and time stamp to concentrator.

event_code5 **Meter Box close**: If the Meter Box has been opened, When the Meter Box is closed, the RF LED will alternating flicker. After five seconds, Repeater will report the Meter Box open event with date and time stamp to concentrator.

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4 Transport and Storage

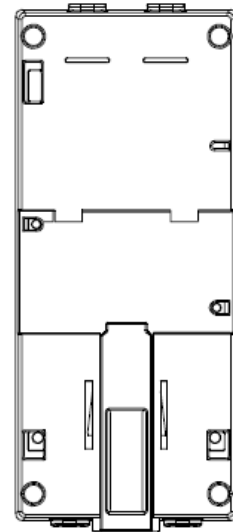
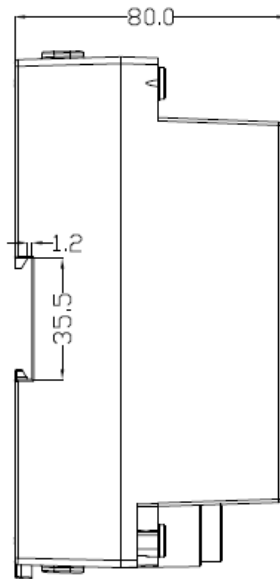
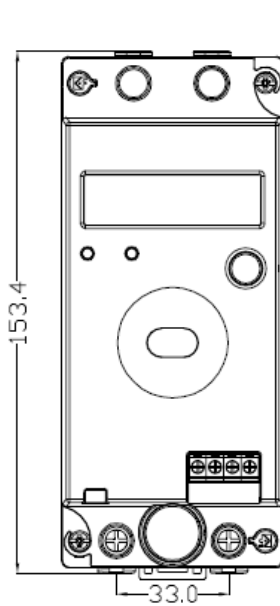
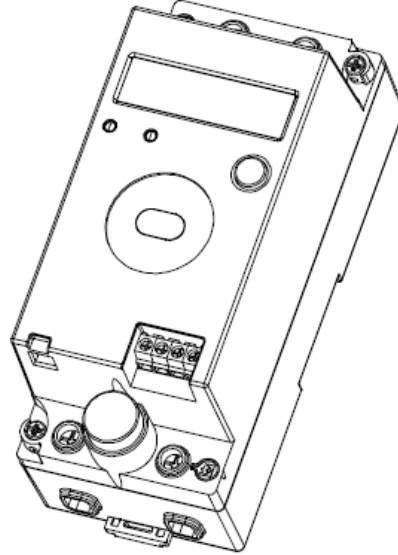
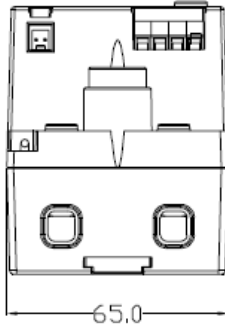
The Repeaters should be placed on kickstands and the height should not exceed 5 layers. The storage condition should be clean, with an environmental temperature of between -25°C and +70°C, relative humidity of less than 95% and with an absence of rusty matter in the air.

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Annexure I Weight and Dimension

The Repeater weighs 330g and is shaped in a box with a dimension of 65mm*153.4mm*80mm.



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Annexure II Referenced documents

No.	Standard No.	Title
1	IEC 62056-21 Ed. 1.0:2002	Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange
2	IEC 62056-46 Ed. 1.1:2007	Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol
3	IEC 62056-53 Ed. 2.0:2006	Electricity metering – Data exchange for meter reading, tariff and load control – Part 53: COSEM Application layer
4	IEC 62056-61 Ed. 2.0:2006	Electricity metering – Data exchange for meter reading, tariff and load control – Part 61: Object identification system (OBIS)
5	IEC 62056-62 Ed. 2.0:2006	Electricity metering – Data exchange for meter reading, tariff and load control – Part 62: Interface classes
6	ETSI EN301 511 V9.0.2(2003-03)	
7	ETSI EN301 489-1 V1.9.2(2011-09)	Electromagnetic compatibility and Radio spectrum Matters(ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
8	ETSI EN301 489-7 V1.3.1(2005-11)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)
9	IEC 62052	
10	IEC 62053	

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Annexure III RF Channel

Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	915.25	18	916.10	35	916.95
2	915.30	19	916.15	36	917.00
3	915.35	20	916.20	37	917.05
4	915.40	21	916.25	38	917.10
5	915.45	22	916.30	39	917.15
6	915.50	23	916.35	40	917.20
7	915.55	24	916.40	41	917.25
8	915.60	25	916.45	42	917.30
9	915.65	26	916.50	43	917.35
10	915.70	27	916.55	44	917.40
11	915.75	28	916.60	45	917.45
12	915.80	29	916.65	46	917.50
13	915.85	30	916.70	47	917.55
14	915.90	31	916.75	48	917.60
15	915.95	32	916.80	49	917.65
16	916.00	33	916.85	50	917.70
17	916.05	34	916.90	51	917.75

*****End of Document *****

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