

D10 Specification

HOMTECS CO., Ltd

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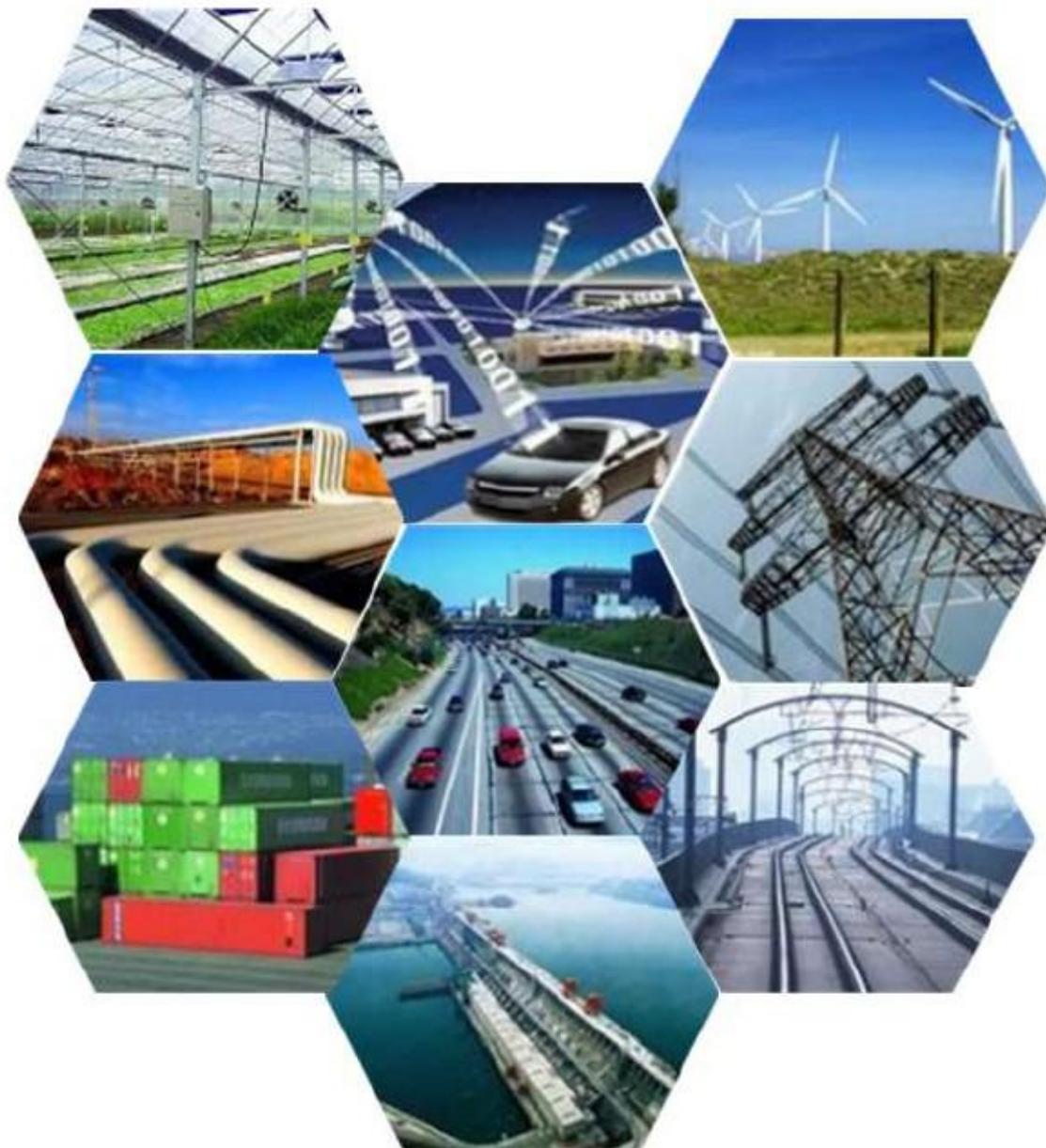


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What's DTU?

DTU is a simple and practical LTE/WCDMA/EVDO/GPRS/CDMA communications solutions for the terminal. Embedded TCP/IP protocol stack, to solve the limitation of TCP/IP missing when user use the ordinary module, by HSDPA/EVDO/GPRS/CDMA to transmit the date transparently. Meanwhile simplified the interface and designed the servo circuit, support RS-232,RS-485, TTL and kinds of interface, with the usage of industrial grade components to meet the full support of data transmission in the harsh environments. DTU allow us upgrade the exacting wired serial system to wireless communications.



HOMTECS D10 serial DTU

Our D10 promise to customer: smart、stable、excelsior

- Optional UDP or TCP transparent transmission mode
- Self-defined heart-beating data frame, automatic redial and keep-alive while the line dropped
- Data triggered online
- Support remote control, ensure the update in time, work better and better, meanwhile no conflict with the transparent transmission



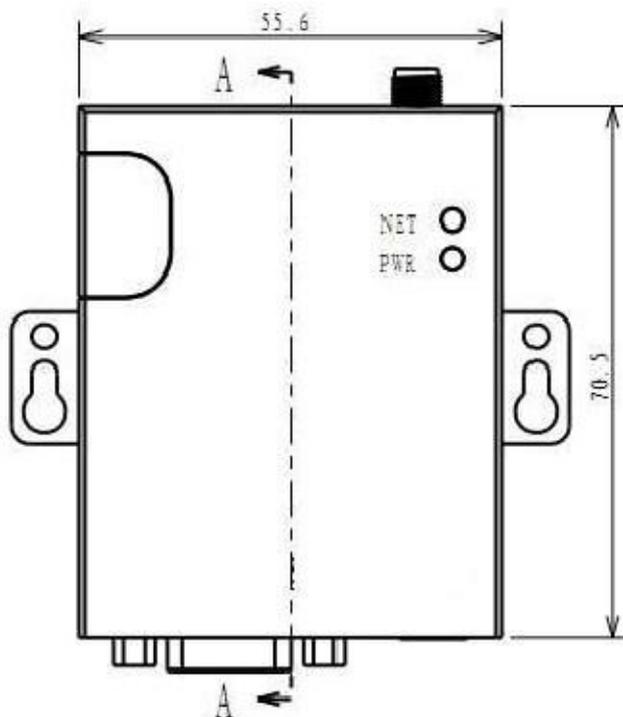
P/N list

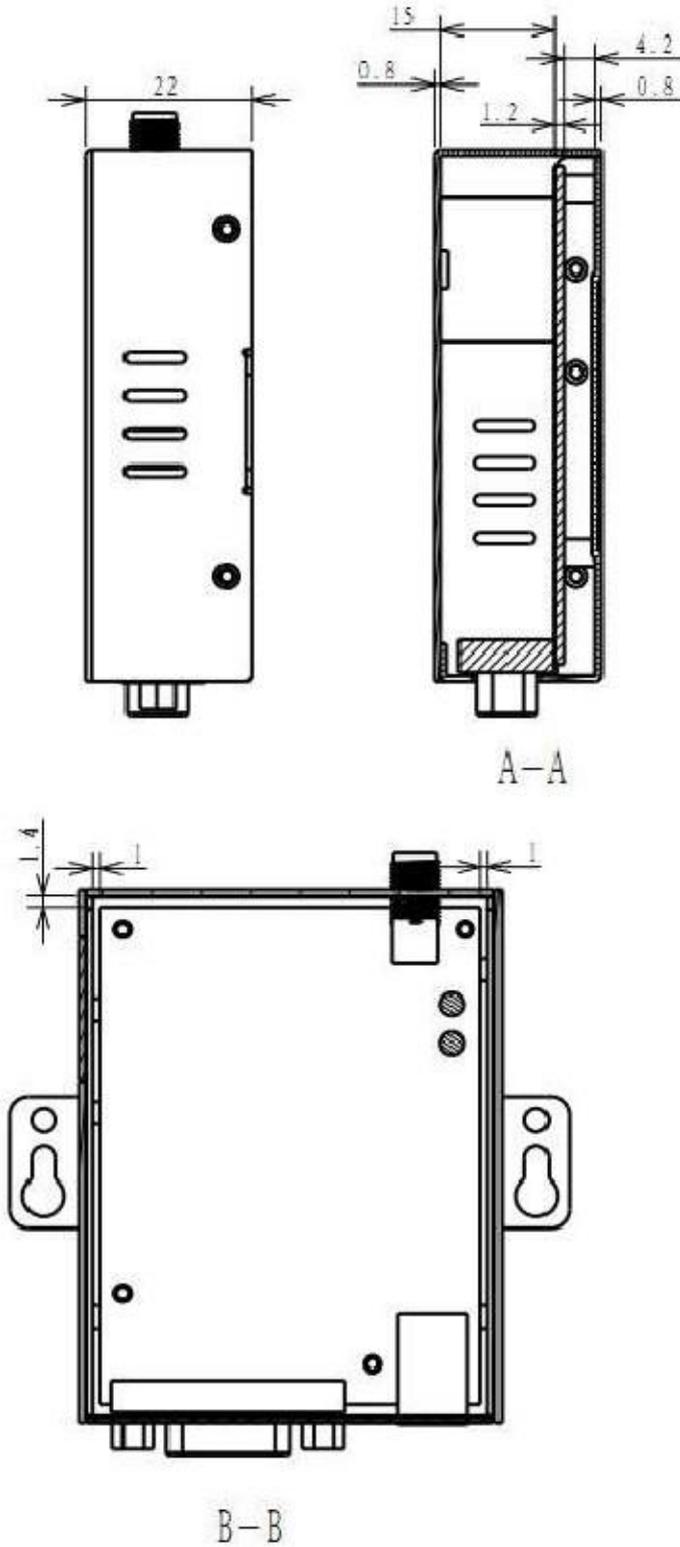
P/N	Network	Interface	Voltage
D10-FA2T	LTE	RS232	12V
D10-FA4T	LTE	RS485	12V
D10-FATT	LTE	TTL	12V

Technical parameters

Item	Specification
LTE	FDD: B1/3/7 TDD: B38/39/40/41
Antenna	50ΩSMA (Female)
SIM card	1.8V/3V SIM
Serial Data interface	RS232/RS485/TTL
Rate	300~115200bps
Power	5~26V DC
Function	12V DC Sleeping mode: 5ma (Data service wake up) Standby mode: 35ma (SMS wake up) Communication: 120ma -30~75°C
Working temperature	
Storage temperature	-40~85°C
Related humidity	95% (non-condensing)
Dimension	70.5x55.6x22mm
Weight	150g (without antenna)

Dimension





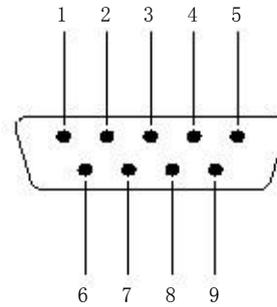
Interface

Interface diagram



Serial port

D10 DTU DB9 female connector,
The way, as right picture



Port definition

Pin definition	1	2	3	4	5	6	7	8	9
RS232 (DTE)	NC	TXD	RXD	NC	GND	NC	NC	NC	NC
RS485	NC	B	A	NC	NC	NC	NC	NC	NC
TTL (DTE)	NC	TXD	RXD	NC	GND	NC	NC	NC	NC

Indicator lights

State	Description	NET	PWR
Module self-test	Test SIM card、LTE	Flashes every 100ms	Always lighting
Standby	Waiting for wake-up or re-connection	Flashes every 2second	
connect	connecting to the main station Connect the main station	Flashed every 100ms	
online	Signal strength over 21	Always lighting	
Good signal	Signal strength below 21	green	
Bad signal		red	

SIM card

Open the SIM card cover by screwdriver to install the card, reattach the cover by screwdriver to effectively prevent the cover off.

Switch for program upgrade

Select the switch to upgrade the local program

Item	Switch direction	Instruction
Program upgrade	Dial to the outside	Re-power, upgrade H10 program through serial port by ISP upgrading software
Run program	Dial to the inside	Re-power, running the H10 program

Function

Serial port data packet identification

D10 communicates with user equipment by serial port, D10 will handle it in packet processing for data received from serial port. Below is the process:

First is maximum packet length, if a data reach maximum packet length, D10 handle it with one packet, if not reach maximum packet length, then, depend on interval, if no another data is sent or received in a interval, the previous data is seen as one packet.

maximum packet length	D10 can handle data packet of 1~1024 bytes. Consider the character of mobile net, if the length is within 300,the transmission is optimum.
Data packet interval	D10 can handle data interval of 50~65535 Ms
data-caching mechanism	In maximum, D10 can provide 4K byte cache to memory user's data,
Switch to configuration mode	D10 can send special order by serial port, to make D10 into configuration mode, it's mainly for configuring parameter, pls refer to serial port configuration.

Auto PPP dialing

D10 use auto PPP dialing mode to link to GPRS mobile net, and maintain the validity of link automatically, when link is unusually off, it will automatically dial for connection.

two trigger circumstance

1. Under online mode, D10 execute this function once starting up, automatically dial when it's off line.
2. Under wake-up mode, D10 don't dial when starting up, it's standby mode, once wake up by SMS or data. it execute this function. After communication, it's automatically off-line and back to standby mode.

PPP number of channels	Support one PPP channel, all IP link will use this channel.
authentication method	Support PAP and CHAP, automatically choose as needs.
APN	support mobile VLAN, can configure APN access point, user name, secret
link detecting	D10 use PING function to detect if dialing link is valid, when it's off line, it will automatically re-dial for connection.

UDP connection

D10 support UDP link, no need to handshake with master station and no response mechanism, it's suitable for a user equipment with complete agreement, and user equipment and master station judge if data or order is answered by each other.

The disadvantage of UDP link mode is not response mechanism, not sure if data is received by each other, and advantage is that without maintaining the link ,it can send or receive data anytime. For dynamic allocation port because of high latency of mobile communication net and insufficient resource, it's flexible and can save lots of flow.

UDP and TCP is alternative.

transparent transmission	After received data from user equipment, D10 pack it to be UDP packet and send to master station. After received data from master station, D10 unpack UDP packet and send to user equipment, these two procedures is transparent transmission.D10 won't modify any data.
Master station address	Master station address can configure IP , realm name or port. For both circumstances of fixed IP and non-fixed IP. It's alternative.
non-master Station data filtering	Because UDP link don't need handshake, in theory, it can receive data from any UDP link, D10 will filter according to master station address, D10 won't send data of non-master station to user equipment.
heartbeat function	Under UDP link, it can start heartbeat function, pls refer to heartbeat function description. Heartbeat function can maintain the vitality of link, make data sent or received anytime between D10 and master station, but its data is visible for master station, so need to modify heartbeat packet content as needs.
Set PING function	If don't use heartbeat function .with no data communication for long time, perhaps it can't detect if PPP dialing net send "off-link", now by setting up PING function and timed PING detecting, it can find PPP is off link and re-dial for recovery.

TCP link

D10 support TCP link mode, which need handshake with TCP SERVER of master station, reply after each data packet is sent, it guarantee data sending and receiving and suitable for most of circumstances, especially the circumstance that user equipment don't have agreement. The advantage of TCP link mode is response mechanism, guarantee the success of data sending and receiving ,also find if link is off or not on time. The disadvantage is it take extra flow for response packet, meanwhile, because of the high latency character of mobile communication net, it make TCP protocol stack re-transmission repeatedly, it waste flow.

UDP and TCP is alternative

Transparent transmission	After received data from user equipment, D10 pack it to be TCP packet and send to master station. After received data from master station, D10 unpack TCP packet and send to user equipment, these two procedures is transparent Transmission. D10 won't modify any data. Pls notice, TCP is different with UDP, in the procedure of transmission, TCP data packet is probably combined or unpacked by router, to make it more fit the data transmission character in this piece of network.
Master station address	Master station address can configure IP , realm name or port. For both circumstances of fixed IP and non-fixed IP. It's alternative.
random local port	GPRS network's local port is meaningless, but after configure APN VLAN, data is send and received only in VLAN, local port is useful.
TCP keep-alive mechanism	TCP link of D10 support TCP keep-alive function, when TCP link don't send or receive data, it will send a keep-alive detecting packet every minute. To detect TCP link is valid, if invalid, D10 will rebuild TCP link.
heartbeat function	Under TCP link, heartbeat function can be start using, pls refer to heartbeat function description. Because TCP have keep-alive function which mainly for identifying equipment connected by TCP.
Setting function PING	Because TCP have keep-alive function, it's not need to use PING function.

PING function

D10 support PING function, it can send ICMP packet to target address and detect its reply, this function can use to detect if PPP dialing link offline .

Usually, it's for UDP communication without heartbeat configuration.

Master address	Master station address can configure IP , realm name or port. For both circumstances of fixed IP and non-fixed IP. It's alternative.
Timed detecting off/on	0~255 seconds Set up timed detecting interval to be 0 minute, it shut off PING function, other number will open PING function.

DNS function

DNS function is for circumstance that master station don't have fixed IP, every time after master station change IP, it sends new IP to DNS server. Each time when H10 is online, it analysis realm name corresponding IP in DNS server, then, use this IP address to link master station.

realm name setup	Master station address can configure IP or realm name, it's alternative If use realm name, IP need to configure to be 0.0.0.0,
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Heartbeat function

two functions of D10 heartbeat function

1. Maintain link, sending heartbeat packet can postpone the time that mobile net take back resource, make UDP or TCP link effective
2. Identifying terminal equipment, heartbeat packet can attach ID into end of packet, master station can identify each terminal equipment matched with each link by this ID.

heartbeat function can be with TCP keep-alive and PING for different objective.

1. Heartbeat function maintain link, identify terminal
2. TCP keep-alive → TCP maintain link, only for TCP
3. PING function detecting PPP dialing net

user-defined heartbeat packet	D10's heartbeat packet need configured by user, make it identified by master station, don't interfered normal data communication.
	Heartbeat packet can configure 1~63 byte, the betty range can be 0x00~0xff.
	Master station don't need to response to D10' heartbeat packet.
Sending time	D10 have two sending time: 1. the connection is just done, D10 will send heartbeat packet immediately to make master station to identify this terminal. 2. If no data sent or received, D10 will send heartbeat packet every fixed time, to maintain the link, by another hand, to save flow.
Heartbeat interval	It can be 0~65535 seconds,0 means that don't start using heartbeat function, others means start using.
Attached ID	D10's heartbeat packet can attach ID to end of packet, the maximum length of heartbeat packet can be 67 byte. This function can be forbid.

Status prompt

To help user equipment to know the operation status of D10, D10 will send some information to user equipment in regular format by serial port.
D10's status prompt information have 3 grades.
Only allow to choose one of them.

No status information	In this case, D10 won't send any status and debugging information.
Open status information	In this case, D10 will send some important status information to user equipment. Data format: pls refer to status information of serial port order

Open debugging information	<p>status information</p> <ul style="list-style-type: none"> ● module detecting failure ● SIM card detection failure ● strength of signal ● online ● off-line ● restarting <p>Details, pls refer to status information of serial port order</p>
	<p>In this case, D10 will output all debugging information, but status information won't send out, this is for debugging equipment before formal use, to know the operation status of D10 by debugging information.</p> <p>after debugging, it need to set status prompt to be "none" or "status information"</p>

Online mode

D10 have two operation mode: online mode and wake-up mode

Under online mode, D10 start PPP dialing, then, connect to master station, it won't log off, if link is off, it will reconnect master station after a while.

The advantage of online is always online, can send or receive data anytime, the disadvantage is needing more flow and a mass of heartbeat packet to maintain link.

Online mode is suitable for the circumstance that data is sent or received frequently

Re-connection interval	Can be 0, 5~65535seconds,if 0, reconnect at once.
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Wake-up mode

D10 have two operation mode: online mode and wake-up mode

Under wake-up mode, D10 is in standby mode after enablement. When receiving a data or wake-up SMS from user equipment, it start PPP dialing, connecting to master station,. after that, it break off UDP or TCP link and PPP dialing after a fixed time, return to standby mode.

The advantage of wake-up mode is online according to needs, user equipment or SMS can wake up for online, it can save lots of flow. The disadvantage is equipment will in standby mode for long time, master station can not use the way of active polling, if use SMS to wake up, it need some cost.

Wake-up mode is suitable for the circumstance that data isn't sent or received frequently.

Data wake-up	<p>Once D10 receive data packet from user equipment, it start online ,and begin the sending and receiving of data.</p> <p>For the first data packet which wake up D10,it can be called wake-up packet, it's not format demand. If set wake-up packet, this packet is only for wake up D10 online, then, abandoned. If no set wake-up packet, this packet can wake up D10,but also send to master station.</p>
SMS wake-up	D10 can receive a appointed format SMS for wake-up online
Idle off- line	<p>After wake-up, D10 will send or receive data, if not data, it will disconnect to be standby mode.</p> <p>Idle interval can be 5~65535 seconds</p>
Auto delete data	If D10 can't connect master station after wake-up, D10 will delete data received this time, won't leave expire data to next connection.

Serial port configuration

D10 can configure local parameter by serial port, D10's serial port communication can send special order under transparent mode to switch to configuration mode to finish parameter configuration function.

The order of configuration mode refer to serial port configuration order.

D10 have software to configure parameter. Pls refer to DTU parameter configuration software V1.0

Below is relevant content of serial port configuration order

switch configuration mode order	<p>User can configure a 6 byte order, D10 will switch to configuration mode after receive this order.</p> <p>Under configuration mode, D10 install serial port configuration order format to identify data packet, it's not same as under transparent mode.</p>
Query parameter	Query parameter will collect all parameter of D10 with one data packet.
Set parameter	Set-up parameter order need all parameters are set up into D10 in one time, most of parameters are still useful in next use, some of it need restart, pls refer parameter manual.
restart	When receive this order, D10 will close all connection, PPP dial net one by one, then, restart equipment.
Return transparent mode	<p>User equipment can use this order to return from configuration mode to transparent mode</p> <p>Under configuration mode, if connected link receive data from master station, it will keep it, and send to user equipment when return to transparent mode, meanwhile, under configuration mode, it's not allowed to</p>

Initialization parameter	send user data, only can configure.
	If forgetting the configuration of serial port, it can use the erasure function of local upgrade software to erase the parameter of D10, after restarting, D10 will initial all parameters.
	Serial port initialization is 115200、8N1

Local upgrade

D10 use special ISP upgrade software to update application program, pls refer to ISP upgrade software manual

Program upgrade	For upgrade the whole program of D10
parameter initialization	Use erasure function for D10 parameter initialization, solve problem of forgetting serial port configuration.

Remote control management

D10 have long-distance management function, it can send special SMS to D10 to make it online, and log in appointed server, and manage D10 by long-distance management order, in actual use. D10 will build a standalone gallery, distinguish from transparent transmission service of user data.

Long-distance management can configure D10 parameter, upgrade program, restart control. D10 have correspondent management software, which can manage directly, pls refer to software manual or develop with long-distance management agreement

SMS summon	Only if D10's SIM card can receive SMS, it can send special SMS order to D10,make it log in server appointed by SMS for long-distance management.
	SMS number will be filtered, only the beforehand set-up phone number can be received, other SMS from mobile phone number will be abandoned.
Parameter configuration	Long-distance parameter configuration can modify all application parameter of D10 one time.
	After update parameter, log off D10,then,restart to make new parameter effective.
Program upgrade	Long-distance program upgrade can upgrade application program of D10.

	<p>Support break point resume function, save flow.</p> <p>Support safe upgrade function, if power of or other condition, D10 can upgrade new program when re-power on.</p> <p>Within the process of download, security module can cancel upgrade anytime, security module can ensure the proper function of current software.</p> <p>Support program upgrade in different data type, after download, it will update needed parameter file automatically.</p>
Re-power on	Support the restart control of logging-in
log off	<p>After logging in management software, it will auto-log off without interactive order after a while</p> <p>Meanwhile, management software will send order to D10 automatically to make it log off ASAP.</p>
heartbeat function	After logging in management software, it need heartbeat function to maintain connection, this function is executive automatically

SMS configuration

D10 support SMS to configure parameter, considering the content control of SMS, SMS parameter configuration only support modify master IP address and port parameter.

If need configurate more parameter, it can be managed by remote control.

configure SMS	Support inputting visual character, detail format can refer to SMS agreement.
take effect	<p>Only configure master station IP and port parameter</p> <p>Consider the specificity of SMS configuration, once SMS configuration order received, it update parameter, then restart D10 at once.</p>

Parameter description

Parameter	Function	Data range	Default settings
Serial port parameters			
baud rate	Serial port configuration, no flow control mode, data bit fixed 8 characters	300、600、1200、2400、4800、9600、19200、38400、57600、115200	115200
data bits		8	8
check bit		0、odd(1)、even(2) when	0

stop bit max packet length time delay interval status report		programming	
		1、 2	1
	This parameter is for identifying data packet under Transparent serial port mode	1~1024 byte	256
		100~1000 millisecond	300
	This parameter is for controlling the sending out of debugging information	<ul style="list-style-type: none"> ● off : no send out any debugging information ● status report : Sending pivotal operating information according to order format, to help user equipment to know the operation status of D10 ● debugging information: Sending operation information, you can see each step of D10 while operating. For debugging, it should be set up to be “off” or “status report” after debugging. Use 0,1,2 as representative when programming. 	off
Dialing parameter			
access point	Access point of VLAN	1~63 visual characters	CMNET
	Public net and private net. In public net, it can visit any place where can connect internet, but in private net, only visit each other in private net. It need to buy relevant service from mobile operator if want to build private net.	Not allow to be empty	
User name code	user identification in VLAN For public net, no need to use these two parameter, but for private net, it must be input ,otherwise it can't get access into mobile net	1~63 visual characters	
		1~63 visual characters	
Connection parameter			
Connection mode	Communication mode of D10 for connecting master	TCP client-side、 UDP 0, 1 when programming	TCP

IP address	station		
	Fixed IP of master station if there is a fixed IP		0.0.0.0
port	port of master station	1~65535	40009
Realm name	Realm name address of master station if there is no fixed IP It's effective only when IP address is set to be 0.0.0.0	1~63visual characters。	detran.com.cn
Heartbeat interval	The switch to maintain the link validity of heartbeat function	0~65535 seconds 0 mans no start using this function	30
user-defined heartbeat packet	Provide heartbeat packet Contentious configuration, distinguish it with user data	0~63bety , input range is 0x00~0xff	heartbeat
user-defined heartbeat packet attached ID	Can attach D10's ID after heartbeat packet, so master station can identify terminal	on, off 0,1 when programming	off
heartbeat packet length	This parameter is for user defined heartbeat packet length.(don't include attached ID) This parameter is for programming	0~63 If heartbeat length is 0,it will shut off heartbeat function	9
PING address	For PING to test target server IP address PING function is for mating UDP mode, for testing if PPP dialing link is off or not.		0.0.0.0
PING realm name	For PING to test target server realm name address Only effective when PING address is 0.0.0.0	0~63 visual characters If PING address is 0.0.0.0 or PING realm name is empty, PING function shut off.	empty
PING interval	The time interval of sending PING detection packet If a data packet received, this time will be postponed.	0~255 minute 0 means shut off PING	0
Operation mode			
Operation mode	Operating mode of D10: online mode&wake-up mode	ONLINE use 0 ,、 WAKEUP use 1 when programming	ONLINE

start using wake-up packet	<p>for data wake-up only under wake-up mode</p> <p>If start using this setup, under standby mode, D10 use the first data packet for wake up D10 to be online, then abandon it.</p> <p>If shut off this setup, this packet can wake-up D10,also send to master station</p>	on use 0, off use 1 when programming	off
Idle time	<p>Offline setup only under wake-up mode</p> <p>When no data received or sent, line is in idle time,H10 will be off line in this setup</p>	5~65535 seconds	300
Re-connection interval	<p>Re-connection setup only in online mode</p> <p>When line is interrupt usually, D10 will be in standby mode,and reconnect after the setup time</p>	5~65535seconds	300
DTU ID	For identify ID of D10, in a project, this setup is sole, only master station can identify each terminals.	4 visual bytes	0001
SMS number	<p>For filtrate mobile phone SMS number</p> <p>For SMS wake-up, SMS parameter configuration, SMS summon, if no matching, it will be abandoned.</p>	<p>0~31 visual characters</p> <p>It can be set up with complete mobile phone number, or part of it, for example 1386,then,all mobile phone number which include 1386 can be received.</p> <p>It can be set up to be empty, then all SMS will be received</p> <p>Only allow to set up one number</p>	empty
	Special order from transparent serial port mode	6 visual character	+++++

<p>enter Configuration mode order</p>	<p>to configuration mode</p> <p>User equipment send this order to set parameter of D10, under configuration mode, by returning to transparent mode, it can set parameter while running.</p> <p>Notice, if some parameter was modified, it need restart before effective. Pls check serial port parameter configuration order in details.</p> <p>D10 use "Max packet length"+data packet interval" to identify data packet, then compare with this setting-up, it will switch if matching. So if in data packet, such order won't make D10 switch to configuration mode.</p>		
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B SMS order

SMS wake-up order

direction	SMS content
Mobile phone D10	WAKEUPA0

SMS configuration order

direction	Fixed content	IP	Fixed content	port	Fixed content
Mobile phone D10	SETIP	xxx.xxx.xxx.xxx example : 12.99.22.203	PORT	yyyyy example : 4005 、 50005	A0

SMS summon order

direction	Fixed content	IP	Fixed content	port	Fixed content
Mobile phone D10	CALLIP	xxx.xxx.xxx.xxx example : 12.99.22.203	PORT	yyyyy example : 4005 、 50005	A0

Version

This manual version is suitable for D10 version

D10 software version

01.01.00

time	version	
2013-3-11	1.0	original
2013-3-25	1.1	Change products photo