DT44 UHF RFID Desktop USB Tag Reader and Programmer Instruction Manual

Installation & Operations Manual
Model DT44
UHF RFID Desktop USB
Tag Reader & Programmer

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Product Part Numbers & Accessories

Part Number	Description
808-0044-00	Model DT44 Desktop Reader/Programmer, 4 inches square, USB
730-0052-10FT	USB Cable, 10′, 2.0 S Male to B Male
	Note: 5' USB cable in included with Reader

Specifications

Mechanical: Certifications:	Measurements:	107x107x22.5mm	4.2″x4.2″x.87″
	Material:	ABS Housing	
	Weight:	4 Ounces	114 grams
	RoHS III	REACH	CE
	FCC Part 15 & ETSI	SIL2	Free of BBP, DEHP, DBP, DIBP

RF:	Standard:	ISO 18000-6c	EPC Gen2
	Frequency:	902-928 MHz (US)	865.6-867.6 MHz (EU)
	Power:	USB	
	Security:	Password Protected	Kill Tag Option

Environmental:	Storage Temp:	-77°F to +185°F	-25°C to +85°C
	Temp, Operating:	-77°F to +185°F	-25°C to +85°C
	Life:	40 Year Shelf Life	
	Ingress Protection:	IP65	

Section 1 – General Information

This manual provides information pertaining to the installation and operation of the Model DT44 UHF 902-928 MHz Reader & Programmer. This Reader contains an internal Antenna and is powered via its USB connection.

This Reader is capable of operating with any ISO standard 18000-6C EPC Gen2 RFID Tag. Tag memories vary by chip. Please reference page 7 for a full list of Tag memory chips.

This Reader is simple to use, plug & play. The Reader operates as both a transmitter and receiver, providing an ultra-high frequency electromagnetic field at 902-928 MHz (North America) or other depending upon the geographical location of use, to energize and activate an electronic transponder (RFID Tag). Once the Tag is energized it modulates its data back to the Reader which in turn detects and demodulates this data for delivery to the USB port.

Section 2 – Quick Start Installation Guide
Software

Go to **https://www.rfidinc.com/resource-center/** and choose the DT44 option. Download the DT44 zip file. Once downloaded, extract the entire zip folder as the program (app file named DT44Control) will not work without the two dll files. Save those three files to a folder on your PC and create a shortcut to the DT44Control software program on your desktop. Open the DT44Control file. You may have to temporarily turn off your firewall especially if you have Norton. The file is safe, do not worry. Once opened you should see this screen:

DT44

Serial Connect

port:

buad: 115200

OPEN(O)   CLOSE(C)

USB Connect

USB

ScanUSB

OPEN(O)   CLOSE(C)

RfPower(dbm):   Get   Set
WorkMode: Get   Set
OutInterface: Get   Set

Freq Band: Get   Set

Freq Start: End:

Inquiry Area   Data
EPC Set Get   Read   Start
Filter Time   Bank   Word Start   Word Count
0   Set Get   01   02   06   Write   Stop

No.	Data	Len	Cnt(Ant1/2/...	RSSI(d...	Channel

Connect the Reader to a Windows based PC or laptop via the USB cable. You should hear a beep and see multi-colored lighting on the Reader face, and after some time the multi-colored lighting should stop flashing but remain illuminated.

In the program, do not use the Serial Connect area. This is a function for other Readers. Under the USB Connect section, select "ScanUSB." Use the pulldown box and select \USB-Open, then select "OPEN(O)." The rest of the program screen should then go from greyed out to normal print.

Section 3 – Operating the Reader

The program should be defaulted to EPC in the Inquiry Area, Bank of 01, Word Start of 02 and Word Count of 06. If not, please set as such for tutorial uses of this product manual.

Work Mode

From the Work Mode pulldown you can select one or the other and then select Set, Start, Stop.

AnswerMode – Tags will not read or report until Start is selected. Tags will continue to read and report continuously. Select Stop to discontinue reading Tags or remove the Tags from the Reader.

There is no Filter Time option in this mode. Filter Time is an option to choose at what intervals in time of seconds to read a Tag.

ActiveMode – Tags will read without needing to select Start but will not report to the display area until Start is selected. A Tag will read continuously until Filter Time is set. The Filter Time option allows for a Tag to be read and reported only once per the amount of Filter Time set. Filter Time only works if one Tag is present. Again, if you select Stop in this mode, a Tag will continue to be read (beeping) but not show in the display area, assuming no Filter Time is set. In the ActiveMode, think of Start and Stop as starting and stopping Tag data to the display area.

Filter Time – Single Report Mode is the operation of reading a Tag only once. Go to the Filter Time field and enter an amount of time in seconds, say 5, then select Set. Remember, you must be in the ActiveMode. If you present a single Tag to the Reader it will now read only once. Whether the Tag is present to the Reader or not, it will be read only every 5 seconds. Increase the time if you'd like a longer interval of the Single Read Mode.

Notes:

Maximum time setting is 255 seconds (4 minutes, 15 seconds).

If a second Tag is introduced to the Reader the time filter clock will begin anew cancelling the time filter for the initial Tag read. If more than one Tag is present to the Reader, they will all read continuously. The Time Filter only applies to a single Tag.

Operation Modes

There are two types of operation to read Tags, Inventory and Single Tag.

Inventory Operation – Multiple Tag readings using the "Start" and "Stop" buttons, the Reader will read a Tag or Tags repeatedly and display their data in the lower data display area once Start is selected. Both AnswerMode and ActiveMode can perform in Inventory Mode. The Inventory mode ignores any defined Bank, Word Start and Word Count settings and reads the area of memory as defined in the Inquiry Area when you select "Start."

At any point in time, if you wish to select and focus on one Tag only, clicking that data in the lower data display area will copy the data to the upper data display field. In the Inventory Operation, the number of times a Tag was read can be viewed under "Cnt." Note, once you select Start again all previous Tag data will disappear from the lower data display area although any data in upper data display area from a previous operation will remain. You can delete it or ignore it.

Single Tag Operation – Aka single Tag reading/writing via use of the "Read" and "Write" button. This gives you the ability to command the Reader to read and display a Tag in the upper data display area, the smaller rectangular data field above Bank. It is best to be in the AnswerMode else the Reader will continually beep when a Tag is present and you must have both the Inquiry Area as well as the Bank, Word Start and Word Count defined correctly. Place a Tag on the Reader and simply select "Read." If you have two Tags on the Reader, one or the other will display, but not both.

Inquiry Area – When using the Single Tag Operation (Read and Write buttons), regardless of what is shown in the Inquiry Area, you can read different banks of memory by defining the Bank, Word Start and Word Count, and then selecting Read.

In the Inventory operation where Tags are read continually, the number of times a Tag was read can be viewed under "Cnt." Note, once you select Start again all previous Tag data will disappear from the viewing screen. In this example we read a single Tag with the data of 3008 33B2 DD09 0140 5C00 5242 36 times. Notice that by default the area of memory to be read is set to Bank to 01, the Word Start to 02, and the Word Count (or length of memory) to 06. This is the Tag's basic most used memory known as EPC and is all explained in the next section.

Writing (Programming) Tags (part 1)
If you intend to Write (program) a Tag, it's important to understand the structure of a UHF RFID Tag's memory.

Understanding Tag Memory

Tag data is represented in Hexadecimal format, meaning characters of 0 to 9 and A to F. Each UHF RFID memory chip consists of 3 sections:

TID – 24 characters of unique ROM data. This data cannot be changed and is guaranteed unique.
EPC – 24-40 characters of writable data.
User Memory – Varying amounts of additional writeable data variable by chip model.
Memory mapping is organized by Blocks and Word Addresses. A Word is 16 bits, also known as 2 bytes and appears as 4 hex characters. The last 4 characters in the example Tag read above of 5242 is 16 bits, aka 2 bytes

or 1 Word.

Viewing the table below, think of the mapping as streets and house addresses. In this small town, we've only got 4 streets, Block 00, 01, 02, and 03. Each house (address) has a function or contains Tag data.

Block 00 allows the functions of killing a Tag such that it is rendered inoperable, or setting a password so that a Tag can only be re-programmed if that password is known. As of this writing, we have not included the Kill Tag option, only the password option exists. Default password is set to 00000000. Setting a password only limits the reprogramming of Tag data. Tag data can always be read regardless of whether a password is set or not. If you wish to set a password, it is critical that each password is documented. If forgotten, there is no way to recover that password.

Block 01 has 8 addresses, of which 00 and 01 are functions, not accessible by the user. CRC in address 00 is a check sum to ensure data is not corrupt. Protocol Control tells us if User Memory contains data. A Tag reporting 3000 tells us the user memory has not been programmed, while 3400 alerts us that there is more data present in User Memory. Note that sometimes these are represented as 5000 and 5400 when EPC length is increased to 40 characters. Notice addresses 02 to 07, EPC data. This range encompasses 6 addresses, each being 4 characters, and 4 x 6 = 24, which is the length of our EPC data in the example above. If we were to look into address 07 only, we'd see the last 4 characters of 5242, also known as the last Word.

Block 02 is the TID data, ROM, always unique, cannot be altered. If you'd like to operate with TID data, use the pulldown menu in the Inquiry Area section, choose TID and Set.

Block 03 begins User Data, which is basically extra data beyond the 24 characters of EPC. If you'd like to read or write User Data, set the Inquiry Area to User Data first, and Set. Some memory chips have zero User Data, another may have 512 bits, and divided by 4 would equal 128 characters of data divided into 32 Words (4 data characters). See the section Tag Memory Chip Options on page 10.

Block or Ba nk	Word Addr ess	Description	Memory Siz e
0	0	Ki Password	32 bits
	1	CRC-16	32 bits 16 bit s
1	0		
	1	Protocol Control (this is the first appearance of Tag data) 3000 = n o data in user memory 3400 = data present in user memory	16 bits
	2	EPC Data (total EPC data in sub-addresses 02-07 = 96 bits	16 bits
	3	EPC Data	16 bits
	4	EPC Data	16 bits
	5	EPC Data	16 bits
	6	EPC Data	16 bits
	7	EPC Data	16 bits
2		TID (tag rd=r2icTrS1 R M, cannot be changed	96 bits
3	Varies 00-?	User Memory up to 61,400 bits 1	Varies

Let's take a look at the following EPC Tag data:432D 3332 3035 372D 3354 5753

Now let's use the same table above and fill in this Tag data broken into 16 bits (1 word, 4 characters) increments.

Block or Bank	Word Address	Data	Description	Memory Size
00	00		Kill Password	32 bits
	01		Access Password	32 bits
01	00		CRC-16	16 bits
	01	**3000**	Protocol Control (this is the first 4 Tag data bytes) 3000 = no data in user memory, EPC Length 6 words (factory default) 3400 = data present in user memory, EPC Length 6 words (factory default) 5000 = no data in user memory, EPC Length 10 words 5400 = data present in user memory, EPC Length 10 words	16 bits

	02	**432D**	EPC Data (total EPC data in sub-addresses 02-07 = 96 bits	16 bits
	03	**3332**	EPC Data	16 bits
	04	**3035**	EPC Data	16 bits
	05	**372D**	EPC Data	16 bits
	06	**3354**	EPC Data	16 bits
	07	**5753**	EPC Data	16 bits
02			TID (tag identification) ROM, cannot be changed	96 bits
03	Varies 00 -?		User Memory up to 61,400 bits	Varies

Writing (Programming) EPC Data (part 2)

Let's write a Tag's EPC data from 432D 3332 3035 372D 3354 5753 to 1234 5678 90AB CDEF 1234 5678. Remember to set Inquiry Area to EPC and memory mapping to Bank 01, Word Start 02, and Word Count (word length) to 06. Enter the new data of 1234567890ABCDEF12345678 into the upper white rectangular Data field.

Data
1234567890ABCDEF12345678

Read   Start

Bank   Word Start   Word Count
01   02   06

Write   Stop

No.	Data	Len	Cnt(Ant1/2/...	RSSI(d...	Channel
1	43 2D 33 32 30 35 37 2D 33 54 57 53	12	7/0/0/0	24	0

In the AnswerMode, select Stop, place a Tag on the Reader, select Write, then Start and Stop to read and confirm the Write was successful by viewing lower data display area which should now match that in the upper data display area. Replace with a new Tag, enter new Tag data and repeat to continue. You do not have to select Start, you can also select Read to read the Tag only once and output to the upper data display area.

Let's write 12 characters into the first area of User Memory using 1111222233334444. In the AnswerMode, choose Stop, set Bank to 03, Word Start to 00 and Word Count to 04, which means we are going to program addresses 00, 01, 02 and 03. Type 111222233334444 into the upper data display field and select Write. You do not have to change the Inquiry Area to User Data in order toWrite. You do need to choose the Inquiry Area if you intend to read and confirm the ser Data was programmed successfully. Change the Inquiry Area to User Data, Set, Start and Stop to confirm. For a more advanced and detailed explanation, please download and view video available under DT44 link here **https://www.rfidinc.com/resource-center/**.

Tag Memory Chip Options

UHF RFID Tags contain a EEPROM with encoded data in the TID and EPC memory sections. Tags have no finite life for read only operations and a finite life of 100k writes. There exists a plethora of UHF Tag memory chips available shown in the table below that RFID, Inc. can supply in a finished RFID Tag. Table lists chip manufacturer, model, and amounts of TID, EPC, and User memory.

RFID, Inc. can supply a data sheet on each chip option. If you'd like assistance choosing a particular chip fitting your needs, please consult with us.

	TID (ROM)	UID (EPC)	User Memory
Alien Higgs3 Higgs4 Higgs EC **Higgs9**	64 bits	96 to 480 bits	512 bits
	64 bits	128 bits	128 bits
	48 bits	96-128 bits	128 bits
	48 bits	496 bits	688 bits
EM EM4123 EM4124 EM4126 EM4324 EM4325 **EM4423 dual HF NFC/UHF EM4425 dual HF NFC/UHF**	TID (ROM)	UID (EPC)	User Memory
	64 bits	0 bits	0 bits
	64 bits	96 bits	0 bits
	32 bits	208 bits	0 bits
	64 bits	96 bits	720 bits
	48 bits	352 bits	3072 bits
	96 bits	64-160 bits	0 bits
	96 bits	Up to 480 bits	Up to 2048 bits less EPC
Fujitsu (FRAM) MB97R88110 MB97R88120/8130	TID (ROM)	UID (EPC)	User Memory
	208 bits	480 bits	61,400 bits

MB97R8050	208 bits	480 bits	61,400 bits
	176 bits	160 bits	0 bits
	TID (ROM)	UID (EPC)	User Memory
	96 bits	Up to 128 bits	32 bits
	96 bits	Up to 496 bits	128 bits
	96 bits	Up to 128 bits	512 bits
Impinj M4D M4E M4QT	96 bits	Up to 256 bits	480 bits
M4i MX-8k	96 bits	Up to 128 bits	8,192 bits
Monza R6P Monza R6 Monza R6A Monza R6B Monza 5 M730	96 bits	Up to 128 bits	Up to 64 bits
	96 bits	96 bits	0 bits
M750	96 bits	96 bits	0 bits
	96 bits	Up to 128 bits	32 bits
	96 bits	128 bits	32 bits
	96 bits	128 bits	0 bits
	96 bits	96 bits	32 bits
	TID (ROM)	UID (EPC)	User Memory
	48 bits	128 bits	0 bits
	48 bits	128 bits	32 bits
NXP UCODE 7 UCODE 7m	48 bits	448 bits	1024 bits
UCODE 7xm UCODE 7 xm+ UCODE 8 UCODE 8m UCODE 9	48 bits	448 bits	2048 bits
	96 bits	128 bits	0 bits
UCODE G2iL & G2iL+	96 bits	96 bits	32 bits
UCODE G2iM	96 bits	96 bits	0 bits
	64 bits	128 bits	0 bits
	96 bits	256 bits	512 bits

UCODE G2iM+ UCODE G2XM UCODE G2XL **UCODE HSL**	96 bits	Up to 448 bits	Up to 640 bits
	64 bits	240 bits	512 bits
	64 bits	240 bits	0 bits
	64 bits	0 bits	1680 bits

More about the DT44 Control Program

RfPower(dbm)
The DT44 RFID Reader is capable of being tuned up or down in power which results in increased or decreased read range. Default setting is 17dBm. If you experience reading Tags sitting nearby inadvertently, you may wish to consider selecting a lower power setting by using the pulldown menu, choosing your preference and then selecting Set. The setting is held in non-volatile memory.

OutInterface
Only USB should be used with the DT44 Reader as this is the only port available.

Freq Band
Depending upon the country of use, local authorities set bandwidth mandates. The USA's FCC mandates use only between 902-928 MHz, while most of Europe (ETSI) mandates 865.6-867.6 MHz.
A complete list by country can be found here
https://www.gs1.org/sites/default/files/docs/epc/uhf_regulations.pdf.
Freq Start and End
These fields simply display the user the frequency setting.

Locking
To lock the tag, place it in front of the antenna and select the Area to lock followed by the Lock action. Selecting 03 Write Locked will permanently lock that area of the tag from writing when you hit the Lock button. EPC and USER memory can only be write locked, PASSWORDS can be read/write locked.

Lock Password
To use the lock command, you need to enter the password. By default, this password is 00000000 on all new tags. Although not recommended the password can be changed by writing to the access password memory area (Block 00, Word 02, 2 words). In this example we are about to change the Access Password to 12345678.

Once you have changed the Access Password all Lock commands will require the new password to work.
Inventory reads done with the Start button do not care about passwords since they are not selecting the tag.

Troubleshooting

My Reader did not beep or light up when plugged into the USB port.
Re-power the unit. Ensure the LED is on indicating power is applied? Test with a different USB cable and/or another USB port.
The Reader is beeping when I present a Tag but no data is shown/updated in display area.
Ensure you used the USB connection box, not the Serial Connect box and Open the port.
Ensure you have selected Read and Start.
When I issue new settings, they don't always take.
Ensure to select Stop before making function changes.
The Reader continues to beep and read a Tag when I don't want it to.
Use the Single Read Mode, select STOP, enter a filter time up to 255 seconds, select Set. Now the Reader should read a Tag only once per that amount of time unless a new Tag is introduced.
Be sure to keep other Tags away from the Reader so they are not accidentally read.
The following error message pops up.
Ignore this message, some PC operating systems will display this message, continue by hitting OK, nothing is wrong.
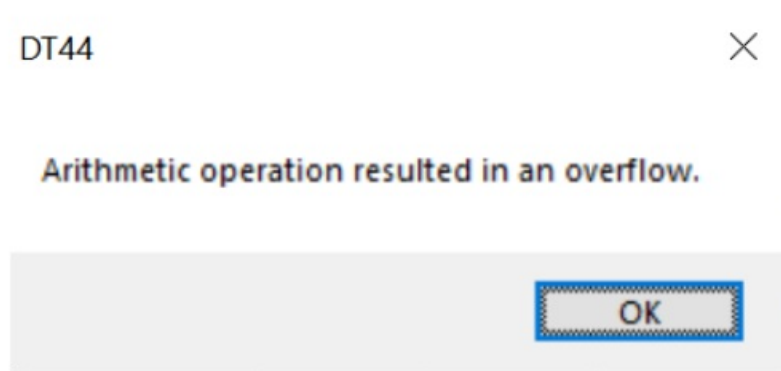
The following error message pops up.
In all likelihood you have either not Set your last change or have not correctly defined the Bank, Word Start and Word Count.
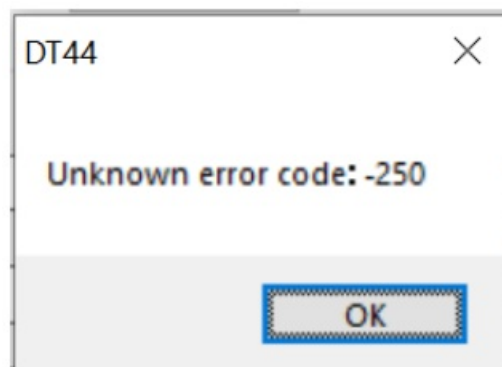
WARRANTY

RFID, Inc. products are warranted against defects in materials and workmanship for one (1) year from date of shipment. RFID, Inc. shall, at its option, either repair or replace products that prove to be defective and are

returned with freight prepaid to RFID, Inc.'s plant within the warranty period. The foregoing warranty shall not apply to defects resulting from abuse, misuse, accident, alteration, neglect or unauthorized repair or installation. RFID, Inc. shall have the right of final determination as to the existence and cause of the defect.

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Documents / Resources

Installation & Operations Manual Model DT44 UHF RFID Desktop USB Tag Reader & Programmer	**RFID DT44 UHF RFID Desktop USB Tag Reader and Programmer** [pdf] Instruction Manual DT44 UHF RFID Desktop USB Tag Reader and Programmer, DT44, UHF RFID Desktop USB Tag Reader and Programmer, Desktop USB Tag Reader and Programmer, USB Tag Reader and Programmer, Reader and Programmer

References

- **RFID Tags & Readers - UHF, Passive, HF, LF & Interfaces | RFID, Inc.**
- **Resource Center | RFID, Inc.**
- **User Manual**