

OPERATING INSTRUCTIONS

	DD51-E-RF	GN 9154
CONTROL UNIT FOR	DD52R-E-RF	GN 9153
	MPI-R10-RF	GN 7110

UC-RF

*(GN 9150)**

*(Produktcode gültig für Deutschland - Product series valid only for Germany)

elesa®

These operating instructions are valid for the following products:

CE.99225-W2	UC-RF-W2 ETHERNET/IP
CE.99226-W2	UC-RF-W2 ETHERCAT IO
CE.99231-W2	UC-RF-W2 PROFINET IO
CE.99229-W2	UC-RF-W2 MODBUS TCP

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1. Safety Instructions

1.1 FW release information

1.2 Safety Instructions

This device has been designed and manufactured in accordance with current legislation. To keep the product in this state, it must be assembled and used correctly, in strict compliance with the instructions contained in this instruction manual and with the following specific safety precautions. This manual is intended as an indispensable supplement to the existing documentation (catalogues, data sheets and assembly instructions). Make sure that the user has read and understood the instruction manual and in particular this chapter “Safety instructions”. In addition to the instruction manual, all legal regulations regarding accident prevention and environmental protection must be observed. 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.’ This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates,uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter not be co-located or operating in conjunction with any other antenna or transmitter.



Use without respecting the specific descriptions/parameters, in combination with systems/ machines/processes to be controlled, can lead to product malfunction, which causes:

- health hazards,
- environmental hazards,
- damage to the product and to its proper functionality.

The device must not be used:
- in explosion hazard areas;
- in medical/life support areas and equipment.

Do not open the equipment and do not apply any modifications!
Modification of the equipment could adversely affect the reliability of the device and could lead to hazards! Do not attempt any repairs. Always return any defective equipment to the manufacturer! Any breach of the integrity of the device as delivered will invalidate the warranty. Changes or modifications not expressly

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approved by the manufacturer could void the user's authority to operate the equipment.

1.2.1 Configuration / Commissioning

In the event of abnormal behaviour (including change of operating conditions), the device must be shut down immediately. Installation and commissioning must only be carried out by adequately trained and authorised personnel. After correct assembly and commissioning, the device is ready for operation.

1.2.2 Maintenance/repair

Switch off the power supply to the equipment before carrying out any operation. Maintenance must be performed only by trained and authorised persons.
Do not open or modify the indicator case. Tampering with this product can compromise the correctness and accuracy of its function. In the event of a malfunction, do not attempt to repair the unit.
In case of malfunction, do not attempt any repair to the units and contact Elesa sales office.

2. Description

The control unit allows communication between the RF electronic position indicators and the Magnetic measurement to a PLC.
Connected to a UC-RF, the PLC can read the current position of each indicator and transmit remote devices a target position. This allows the PLC and consequently the operator to know the exact situation and position of the control shafts and/or components of the machine.
In addition, you can read and set the configuration of remote devices, as well as check the status and the goodness of the connection.
The control unit (UC-RF) is a standard DIN rail module. The unit is equipped with a socket for connection to a power source, an industrial standard bus interface connector for communication with the PLC and an antenna output for RF communication with the position indicator electronic RF and Elesa meters (to be ordered separately).

2.1. Compatible devices

UC-RF communicates with the following device families (hereinafter referred to as REMOTE DEVICES):

- DD51-E-RF
- DD52R-E-RF
- MPI-R10-RF

2.2 Available interfaces

UC-RF is available for the following buses:

- Ethernet/IP
- Profinet
- Modbus/TCP
- EtherCAT

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2.3 RF communication

RF transmission uses the ISM SRD band in the range of 2400-2416 MHz. Communication between the remote device and UC-RF follows a proprietary protocol from Elesa.

3. Connections and mounting

The UC-RF can be installed on a common DIN rail thanks to the special hook on the back..

3.1 Power supply

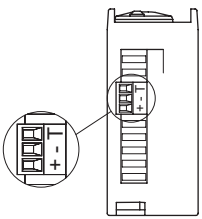


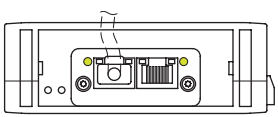
Fig. 3 1 – UC-RF power suplly connector

The plug for the power connector is provided in the kit.
WARNING: The power input must be protected with a 100ma T fuse.

3.2 Connection to the PLC

The UC-RF must be connected to the PLC via an Ethernet RJ45 cable by using one of the two ports on the front of it (see drawing below). Both ports are equivalent. In case two PLCs (or PLC+PC) are connected, make sure that conflicts are avoided. For further specifications, refer to the specific communication bus requirements.

Fig. 3 2 – UC-RF Bus interface ports



3.3 Antenna

The antenna is supplied with the control unit. The antenna is suitable for mounting in applications where the counterpoise will not be shielded from the antenna. The antenna must not be mounted inside a metal

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cabinet; non-conductive or open metal enclosures or fixings must be used.
If the counterpoise is within a shielded enclosure it will affect the antenna performance.
The antenna must be placed in the middle of the area where the remote devices are mounted. Ideally where it is possible to avoid any metallic shielding in between. If necessary, extension cables can be used. RG 174/U coaxial cable (fitted with SMA male/female connectors) must be used, see on the Elesa catalogue the available connection cables.
However, the best solution is to keep the antenna directly connected to the UC-RF and install it where it's more convenient, following the hints above.

WARNING:

The range of the radio link is up to 30m in line of sight. However, in industrial environments the real range depends on many factors - presence of walls, machine parts, metal obstacles, etc.
An accurate choice of antenna position avoids communication issues.

4. Description of the New Elesa Network

On the Elesa wireless network, each device is identified by a unique identifier defined in the factory by Elesa. The network can be divided into subnetworks; a subnetwork is made up of a UC-RF which includes a maximum of 36 remote devices.
Once released from the factory, each remote device is in a NON-ASSOCIATED state and is therefore available to be associated with the first UC-RF that requests it. Once the ASSOCIATION (bind) request has been received from a UC-RF, the remote device stores the ID of the UC-RF as its only interlocutor on the network. The remote device can be returned to the NON-ASSOCIATED condition (unbinded) via the appropriate menu item present on each device.
Once associated with a UC-RF, the remote device will transmit its data to the connected UC-RF with a certain frequency. During this communication UC-RF may possibly send target or configuration data to the remote device. The frequency and transmission mode can be set on the remote device using the appropriate function in the programming menu.

5. Ethernet interface

The MODBUS/TCP, Profinet, Ethernet/IP and EtherCat protocols identify interfaces with an IP address.
The UC-RFs are factory set with the following parameters:
IP: 192-168.1.10 static
SN Mask: 255.255.255.0
Gateway: 198.168.1.1
You can change the network parameters using the IPConfig utility downloadable from:
https://www.elesa.com/en/elesab2bstoreuk/control-unit-for-rf-indicators-uc-rf#listtype=search&term=uc-rf
If enabled, the devices also support DHCP.

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6. UC-RF status LEDs

When turned on, the red LED lights up. Shortly afterwards it will turn off and the green one will begin to flash until the start-up phase is completed.
If the red LED and the green LED continue to flash alternately, check the connection to the PLC and/or the IP address configuration.
If the red LED and the green LED remain lit, the UC-RF is active and waiting for the operating MODE to be set (see Chap. 0).
During operation, the GREEN LED flashes when successful communication with a remote device occurs. The RED LED, however, flashes if the communication has suffered a failure.
Sometimes the RED LED may flash for reasons other than a failed communication.

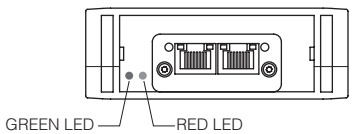


Fig. 6 1 – UC-RF status LEDs

7. BUS available

7.1. ETHERNET/IP (CE.99225-W2)

The module uses Class 1 (explicit) messaging.
For configuration, the EDS file is available at the following link:
https://www.elesa.com/en/elesab2bstoreuk/control-unit-for-rf-indicators-uc-rf#listtype=search&term=uc-rf
se il collegamento non è raggiungibile, contattare l'assistenza clienti Elesa.
EDS allows the PLC to recognize the UC-RF on the Ethernet/IP bus. Then, you need to configure all I/O instances as described below
Input assembly UC-RF →PLC
Instance 0x64h (100 DEC), 224 bytes organized as described in chapter 0:

Output assembly PLC →UC-RF
Instance 0x96 (150 DEC), 224 bytes organized as described in chapte.0:

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7.1.1 Status LEDs

Network Status LED	
LED State	***Description***
Off	No power or no IP address
Green	Online, one or more connections established (CIP Class 1 or 3)
Green, flashing	Online, no connections established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)

Module Status LED	
LED State	***Description***
Off	No power
Green	Controlled by a Scanner in Run state
Green, flashing	Not configured, or Scanner Idle state
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Red, flashing	Recoverable fault(s)

LINK/Activity LED 3/4	
LED State	***Description***
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

7.2 ProfiNET (CE.99231-W2)

The GSD file is available at the following link:
https://www.anybus.com/support/file-doc-downloads/compactcom-30-series-specific/?ordercode=AB6221
If the link is not reachable, please contact the Elesa customer service.
The GSD file allow the PLC to recognize the UC-RF on the Profinet bus. Then it is needed to configure 56 8bits long slots as follows:
- Slot 0 a Slot 27 - uscita (PLC a UC)
- Slot 28 a Slot 55 - ingresso (UC a PLC)

Each data block length is 224 bytes.
The organization and value of single bytes is explained in chapter 0.

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7.2.1 Status LEDs

Network Status LED		
LED State	***Description***	***Comments***
Off	Offline	- No power - No connectionnwith IO Controller
Green	Online (RUN)	- Connection with IO Controller established - IO Controller in RUN state
Green, 1 flash	Online (STOP)	- Connection with IO Controller established - IO Controller in STOP state or IO data bad - IRT synchronization not finished
Green, blinking	Blink	Used by engineering tools to identify the node on the network
Red	Fatal event	Major internal error (this indication is combined with a red module status LED)
Red, 1 flash	Station Name error	Station Name not set
Red, 2 flashes	IP address error	IP address not set
Red, 3 flashes	Configuration error	Expected identification differs from Real Identification

Module Status LED		
LED State	***Description***	***Comments***
Off	Not Inizialized	No power OR Module in SETUP or NW_INIT state.
Green	Normal Operation	Module has shifted from the NW_INIT state.
Green, 1 flash	Diagnostic Event(s)	Diagnostic event(s) present
Red	Exception error	Device in state EXCEPTION
	Fatal event	Major internal error (this indication is combined with a red network status LED)
Alternating Red/ Green	Firmware update	Do NOT power off the module. Turning the module off during this phase could cause permanent damage.

LINK/Activity LED		
LED State	***Description***	***Comments***
Off	No Link	No link, no comunication present
Green	Link	Ethernet link established, no comunication present
Green, flickering	Activity	Ethernet link established, comunication present

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7.3 MODBUS/TCP (CE.99229-W2)

The UC-RF memory is organized as two arrays of 112 words (2 bytes) each.
The first R/W, with address 0x00h, contains the data that the PLC sends to the remote devices (input data) and the commands that are given to UC-RF
The second R only, with address 0x100h, contains the data that UC-RF reads from remote devices (output data) and the status of UC-RF.
READ/WRITE - updated by the PLC

- 0x00 – 0x6B input data
- 0x6C – 0x6F UC-RF commands

READ only - updated by the UC-RF

- 0x100 - 0x16B output data
- 0x16C – 0x16F UC-RF status

7.3.1 Status LEDs

Network Status LED	
LED State	***Description***
Off	No power or no IP address
Green	Online, one or more connections established (CIP Class 1 or 3)
Green, flashing	Online, no connection established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)

Module Status LED	
LED State	***Description***
Off	No power
Green	Controlled by Scanner in Run state
Green, flashing	Not configured, or Scanner in Idle state
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Red, flashing	Recoverable fault(s)

Ambient conditions	
LED State	***Description***
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

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7.4 ETHERCAT (CE.99226-W2)

The ESI file is available for configuration and can be requested from Elesa customer support.
The ESI file allows the PLC to recognize the UC-RF on the EtherCAT bus.
Two 224byte arrays are defined:

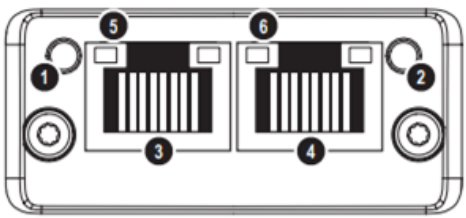
UC-RF →PLC 224 read-only bytes (TX PDO) organized as described in ch.8:

PLC →UC-RF 224 ead-only bytes (RX PDO) organized as described in ch.8:

7.4.1 Status LEDs and connectors

Front View (RJ45 Connectors)

#	Item
1	RUN LED
2	ERROR LED
3	EtherCAT (IN port)
4	EtherCAT (OUT port)
5	Link/Activity (IN port)
6	Link/Activity (OUT port)



The flashing sequences of the RUN LED and ERROR LED are defined in ETG1300_S_R_V1i1i0_IndicatorLabelingSpecification.pdf (ETG).
CAUTION
The module connectors are not equivalent but the connection must respect the direction of the EtherCAT bus IN-OUT connection.

RUN LED
This LED indicates EtherCAT communication errors etc.

LED State	Indication	Description
Off	INIT	EtherCAT device in 'INIT'-state (or no power)
Green	OPERATIONAL	EtherCAT device in 'OPERATIONAL'-state
Green, blinking	PRE-OPERATIONAL	EtherCAT device in 'PRE-OPERATIONAL'-state
Green, single flash	SAFE-OPERATIONAL	EtherCAT device in 'SAFE-OPERATIONAL'-state
Flickering	BOOT	The EtherCAT device is in 'BOOT' state
Red	(Fatal Event)	If RUN and ERR turn red, this indicates a fatal event, forcing the bus interface to a physically passive state. Contact HMS technical support.

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ERR LED

This LED indicates EtherCAT communication errors, etc.

LED State	Indication	Description
Off	No error	No error (or no power)
Red, blinking	Invalid configuration	State change received from master is not possible due to invalid register or object settings.
Red, single flash	Unsolicited state change	Slave device application has changed the EtherCAT state autonomously.
Red, double flash	Sync Manager watchdog timeout	See *Watchdog Functionality, p. 15* for more information.
Red	Application controller failure	Anybus module in EXCEPTION. If RUN and ERR turn red, this indicates a fatal event, forcing the bus interface to a physically passive state. Contact HMS technical support.
Flickering	Booting error detected	E.g. due to firmware download failure.

Link/Activity

These LEDs indicate the status and activity of the EtherCA link.

LED State	Indication	Description
Off	No link	Link not sensed (or no power)
Green	Link sensed, no activity	Link sensed, no traffic detected
Green, flickering	Link sensed, activity	Link sensed, traffic detected

Ethernet Connector (RJ45)

Pin	Signal	Notes	
1	Tx+	-	
2	Tx-	-	
3	Rx+	-	
4	-	Normally left unused; to ensure signal integrity, these pins are tied together and terminated to PE via a filter circuit in the module.	
5	-		
6	Rx-	-	
7	-	Normally left unused; to ensure signal integrity, these pins are tied together and terminated to PE via a filter circuit in the module.	
8	-		

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8. Modes

Bus interface modules expose two data arrays of 224 bytes each.
One read-only array (UC-RF => PLC) exposes, in the first 216 bytes, data read by UC-RF from individual remote devices.
The other array, read-write (PLC => UC-RF), in the first 216 bytes, allows UC-RF to set the data to be transmitted to the remote devices.
The last 8 bytes of each array are used for status and/or command communication to the UC-RF.
The configuration of the data contained in the above arrays, the meaning of the individual bytes, is defined and dependent on the, hereinafter referred to as, UC-RF communication MODE.
You can configure the communication mode by setting byte 217 (config byte) of the PLC => UC-RF array as shown in Tab. 1

Tab. 1- Communicarion modes

MODE	Meaning
0x01	For backward compatibility
0x20	UC Configuartion
0x22	Target and position
0x24	Basic onfiguration
0x25	Offset configuration
0x26	Target configuration 1
0x27	Target configuration 2
0x28	Binding mode
0x29	Unknown bound devices
0x2A	Transmission quality
0x2C	Direct memory access

ATTENTION:

- UC-RF uses values in formsto little endian format. The position and target are 4-byte signed numbers that always represent the measurement in hundredths of a millimeter, in the case of linear measurements, or hundredths of a degree in the case of angular measurements.

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Ex. 64 00 00 00 == 1.00 mm
1.00 mm = 100 · 0.01 mm
100 → 00 00 00 64 → 64
Hex little 00
Endian 00
00

8.1 MODE 20 – UC Configuration

MODE 20 is dedicated to the exchange of configurations and commands between the PLC and the UC-RF. Since this is a communication that does not involve remote devices, just as with modes 0x28, 0x29, 0x2A, 0x2C, the data sent will be processed once only the Data Valid flag is sent (10.2 - UC-RF command). Within mode 0x20 several commands are encoded, which are identified by a unique ID. Added to this is a control code that prevents inadvertent sending of the command. Some commands require data and parameters to be sent as specified below for each command. There is no significant data that needs to be read back from the UC-RF, except the status of the UC-RF to identify that the data sent has been processed via the Data Valid Ok flag (10.1 - UC-RF status).

8.1.1 Command ID 0x01 – Reset Command

This command requires a simple restart of the UC-RF
Command ID: 0x01
Control Word: 0xA55A

		0x01 – Reset Command		
Word	**Byte N**	**PLC => UC-RF**		**UC-RF => PLC**
0x000	0	Command ID 0x01		
	1			
0x001	2	Control Word	0x5A	
	3		0xA5	
	...	...		...
0x06C	216			Present CH
	217	Mode: 0x20		Present Mode
0x06D	218	UC Command		UC Status
	219			
0x06E	220			UC-RF ID
	221			
0x06F	222			
	223			

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8.1.2 Command ID 0x02 – Reset Config Default

This command resets the configurations saved in nonvolatile memory (e.g., the table of associated remote devices) to factory values, except for the UC-RF ID, which is constant.
At the end of the reset procedure, the device is rebooted to perform a new initialization.
Command ID: 0x02
Control Word: 0xA55A

		0x01 – Reset Command		
Word	**Byte N**	**PLC => UC-RF**		**UC-RF => PLC**
0x000	0	Command ID 0x02		
	1			
0x001	2	Control Word	0x5A	
	3		0xA5	
	...	...		...
0x06C	216			Present CH
	217	Mode: 0x20		Present Mode
0x06D	218	UC Command		UC Status
	219			
0x06E	220			UC-RF ID
	221			

8.1.3 Command ID 0x03 – Reset Message Cnt

This command resets the message counters received from associated devices (see 8.9).
After the procedure is completed, the UC-RF is not restarted and its operation is not interrupted.
Command ID: 0x03
Control Word: 0xA55A

		0x03 – Reset Message Cnt		
Word	**Byte N**	**PLC => UC-RF**		**UC-RF => PLC**
0x000	0	Command ID 0x03		
	1			
0x001	2	Control Word	0x5A	
	3		0xA5	
	...	...		...
0x06C	216			Present CH
	217	Mode: 0x20		Present Mode

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		0x03 – Reset Message Cnt	
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x06D	218	UC Command	UC Status
	219		
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

8.1.4 Command ID 0x0A – Load Binding Table

This command reloads the table of associated devices from the non-volatile memory of the UC-RF. This table is saved automatically after each configuration send in mode 0x28. In this way, it is not necessary to repeat the remote device association procedure when the UC-RF is rebooted.
After the procedure is completed, the UC-RF is not restarted and its operation is not interrupted.
Command ID: 0x0A
Control Word: 0xA55A

		0x0A – Reset Message Cnt		
Word	**Byte N**	**PLC => UC-RF**		**UC-RF => PLC**
0x000	0	Command ID 0x10		
	1			
0x001	2	Control Word	0x5A	
	3		0xA5	
...		...		...
0x06C	216			Present CH
	217	Mode: 0x20		Present Mode
0x06D	218	UC Command		UC Status
	219			
0x06E	220			UC-RF ID
	221			
0x06F	222			
	223			

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8.1.5 Command ID 0x15 – Set RF Channel

This command sets a new radio channel for communication with remote devices.
For future implementations there is a 'CH Mode' field, which should be left at the default value (0x01).
Note that currently changing the RF channel via this command, does not automatically update the same setting on the remote devices as well, which will have to be manually aligned
At the end of the procedure, the UC-RF is not restarted and its operation is not interrupted.
Command ID: 0x15
Control Word: 0xA55A
CH Mode: 0x01
RF Channel: 0x01 – 0x24 (Default: 0x13)

		0x15 – RF Channel	
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0	Command ID 0x21	
	1		
0x001	2	Control Word 0x5A	
	3	Control Word 0xA5	
0x003	4	RF CH Mode 0x01	
	5		
0x004	6	RF Channel 0x13	
	7		
...	...	...	...
0x06C	216		Present CH
	217	Mode: 0x20	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

8.1.6 Command ID 0x1F – Set disconnected unit time out

This command sets for each remote device the time out before it is reported as disconnected.
The command is followed by a table of 16bit integers indicating the time in seconds. The first value is

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relative to the device whose ID is in the rhyme position in the table of connected IDs, the second is relative to the second, and so on (Tab. 2- MODE 28 - memory organization).
At the end of the procedure, the UC-RF is not restarted and its operation is not interrupted.
Command ID: 0x1F
Control Word: 0xA55A
Time out dispositivo [36]: Default: 10

		0x15 – RF Channel	
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0	Command ID 0x21	
	1		
0x001	2	Control Word 0x5A	
	3	Control Word 0xA5	
0x002	4	RF CH Mode 0x01	
	5		
0x003	6	RF Channel 0x13	
	7		
...	...	...	...
0x023	70	Timeout dispositivo	
	71		
...	...	...	...
0x06C	216		Present CH
	217	Mode: 0x20	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

8.2 MODE 28 – Binding

In MODE 28, it is possible to tell UC-RF the ID of devices that are part of its subnetwork.
To associate a remote device with UC-RF, it is sufficient to write into PLC=>UC-RF memory, in the position shown in Tab. 2, the ID of the device to be associated (ID1, ID2, ...). The position in the ID table will determine the position of the related data in the other modes.

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If the device is not already associated with another central unit, it will be automatically associated with it during the first useful comuincation that will take place with UC-RF.
The ID of the device to be associated can be read on the device via the appropriate menu item.
In the UC-RF=>PLC memory is the list of IDs not associated with any UC-RF that are transmitting in the covered area.

Tab. 2- MODE 28 – memory organization

		Active devices	**Free devices**
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0	ID1	ID1 free
	1		
0x001	2		
	3		
0x002	4	ID1 Command	ID1 free status
	5		
0x003	6	ID2	ID2 free
	7		
0x004	8		
	9		
0x005	10	ID2 Command	ID2 free status
	11		
	...	...	...
0x069	210	ID36	ID36 free
	211		
0x06A	212		
	213		
0x06B	214	ID36 Command	ID36 free status
	215		
0x06C	216		Present CH
	217	Mode: 0x28	Present Mode
0x06D	218	UC Command	UC Status
	219		

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		Active devices	Free devices
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

In the UC-RF=>PLC memory, UC-RF lists the IDs of those online, non-associated devices that it can contact within its range.

8.3 MODE 29 – Already connected devices

MODE 29 is similar to MODE 28 but in the UC-RF=>PLC memory it will show the IDs of devices already associated with the UC-RF that are transmitting in the covered area but not registered in the binded table.

Tab. 3- MODE 29 – memory organization

		Active devices	Binded devices
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0	ID1	ID1 free
	1		
0x001	2		
	3		
0x002	4	ID1 Command	ID1 free status
	5		
0x003	6	ID2	ID2 free
	7		
0x004	8		
	9		
0x005	10	ID2 Command	ID2 free status
	11		
	...	...	...
0x069	210	ID36	ID36 free
	211		
0x06A	212		
	213		

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		Active devices	Binded devices
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x06B	214	ID36 Command	ID36 free status
	215		
0x06C	216		Present CH
	217	Mode: 0x29	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

MODE 29 is useful for retrieving the configuration of a machine at power-up. In this case you will have the remote devices that are battery powered have retained their configuration while UC-RF, having been switched off has lost its table of associated devices. Obviously, the list of associated devices could be stored in the PLC but should you wish to retrieve a configuration from scratch MODE 29 can be useful.

8.4 MODE 22 – target and position

In MODE 22 UC-RF presents in memory the position and status communicated by the associated remote devices and allows a target position to be set for each. To activate mode 22 simply write 0x22 into byte 217 in the PLC => UC-RF output buffer.
See Chapter 9 for the meaning and use of the words CH Status and CH Command

Tab. 4- MODE 22 – memory organization

Word	Byte N	PLC => UC-RF	UC-RF => PLC
0x000	0	ID1 Target quote	ID1 Position
	1		
0x001	2		
	3		
0x002	4	ID1 Command	ID1 Status
	5		

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Word	Byte N	PLC => UC-RF	UC-RF => PLC
0x003	6	ID2 Target quote	ID2 Position
	7		
0x004	8		
	9		
0x005	10	ID2 Command	ID2 Status
	11		
	...	...	...
0x069	210	ID36 Target quote	ID36 Position
	211		
0x06A	212		
	213		
0x06B	214	ID36 Command	ID36 Status
	215		
0x06C	216		Present CH
	217	Mode: 0x22	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

The current position and target values are always expressed, regardless of how the resolution is set on the remote device in the following way:

Measuring unit on the remote device	Value transmitted
Mm	Cents of mm
Inch	Cents of mm
Degrees	Cents of degrees

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8.5 MODE 24 – Base configuration

In MODE 24 it is possible to read or set the configuration of a remote device whose ID is set in the last 4 bytes (CH ID) .
Having set mode 24, writing 0x24 in byte 217 in the PLC => UC-RF output buffer, when UC-RF is contacted by the remote device, its basic configuration consisting of the parameters in Tab. 5 is read or written.
For details, see Chapter 10 where the meaning and use of the command (UC Command) and status (UC Status) words present at bits 218-219 are explained.

Tab. 5 - MODE 24 – memory organization

		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0		
	1		
0x001	2		
	3		
0x002	4	password	password
	5		
0x003	6		
	7		
0x004	8	mm_origin	mm_origin
	9		
0x005	10		
	11		
0x006	12	deg_origin	deg_origin
	13		
0x007	14		
	15		
0x008	16	mm_step	mm_step
	17		
0x009	18		
	19		
0x00A	20	deg_step	deg_step
	21		
0x00B	22		
	23		

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		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x00C	24	mm_toll	mm_toll
	25		
0x00D	26		
	27		
0x00E	28	deg_toll	deg_toll
	29		
0x00F	30		
	31		
0x010	32	Lincorr	Lincorr
	33		
0x011	34		
	35		
0x012	36	Degcorr	Degcorr
	37		
0x013	38		
	39		
0x014	40	radius	radius
	41		
0x015	42		
	43		
0x016	44	radius	radius
	45		
0x017	46		
	47		
0x018	48	count_direction	count_direction
	49	display	display
0x019	50	mm_res	mm_res
	51	inch_res	inch_res
0x01A	52	deg_res	deg_res
	53	cycle	cycle

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		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x01B	54	speed	speed
	55	pswenable	pswenable
0x01C	56	arkey_reg	arkey_reg
	57	arkey_shift_reg	arkey_shift_reg
0x01D	58	ukey_reg	ukey_reg
	59	ukey_shift_reg	ukey_shift_reg
0x01E	60	orgkey_reg	orgkey_reg
	61	orgkey_shift_reg	orgkey_shift_reg
0x01F	62	flip	flip
	63	HBrate	HBrate
0x020	64	units	units
	65	measmode	measmode
0x021	66	Eco mode time	Eco mode time
	67	Dyn. RSSI TG	Dyn. RSSI TG
0x022	68	Offset mm	Offset mm
	69	Offset deg	Offset deg

0x06A	212		FW Release
	213		
0x06B	214		
	215		
0x06C	216		Present CH
	217	Mode: 0x24	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	220	Device ID	UC-RF ID
	221		
0x06F	222		
	223		

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8.5.1 Default Values and Meaning of Parameters

The default parameter values of the devices connected to the network are shown in the table below. The Memory column contains the numerical value contained in the device's memory. This is then explained in its actual meaning for each device family in the following columns.

Tab. 6 – Default values for MODE 24 parameters

		Parameter	Default values			
Word	**Byte N**		**Memory (hex)**	**DD51**	**DD52R**	**MPI**
0x000	0					
	1					
0x001	2					
	3					
0x002	4	password	0x0000 0000	22011	22011	22011
	5					
0x003	6					
	7					
0x004	8	mm_origin	0x0000 0000	0 mm	0 mm	0 mm
	9					
0x005	10					
	11					
0x006	12	deg_origin	0x0000 0000	0 deg	0 deg	
	13					
0x007	14					
	15					
0x008	16	mm_step	0x0000 0064	1 mm/r	1 mm/r	
	17					
0x009	18					
	19					
0x00A	20	deg_step	0x0000 0001	1 deg/r	1 deg/r	
	21					
0x00B	22					
	23					

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Word	Byte N	Parameter	Default values			
			Memory (hex)	DD51	DD52R	MPI
0x00C	24	mm_toll	0x0000 000A	0.1 mm	0.1 mm	0.1 mm
	25					
0x00D	26					
	27					
0x00E	28	deg_toll	0x0000 0005	0.1 deg	0.1 deg	0.1 deg
	29					
0x00F	30					
	31					
0x010	32	Lincorr	0x000F 4240			1
	33					
0x011	34					
	35					
0x012	36	degcorr	0x000F 4240			1
	37					
0x013	38					
	39					
0x014	40	radius	0x0000 2710			100 mm
	41					
0x015	42					
	43					
0x016	44	ang_coeff	0x0000 1662			3600/(2 π radius)
	45					
0x017	46					
	47					
0x018	48	count_direction	0x00	--o	--o	--o
	49	display	0x01	180°	180°	
0x019	50	mm_res	0x02	2 decimal	2 decimal	2 decimal
	51	inch_res	0x03	3 decimal	3 decimal	3 decimal

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Word	Byte N	Parameter	Default values			
			Memory (hex)	DD51	DD52R	MPI
0x01A	52	deg_res	0x02	2 decimal	2 decimal	2 decimal
	53	cycle	0x78			
0x01B	54	speed	0x01	600 RPM	600 RPM	2m/s
	55	passw	0x00	Disabled	Disabled	Disabled
0x01C	56	arkey_reg	0x00	ArClr	ArClr	ArClr
	57	arkey_shift_reg	0x00	L_OFS	L_OFFS	L_OFFS
0x01D	58	ukey_reg	0x01	ALL	ALL	ALL
	59	ukey_shift_reg	0x00	P_ORG	P_ORG	P_ORG
0x01E	60	orgkey_reg	0x01		d_togo	d_togo
	61	orgkey_shift_reg	0x00		OFF	OFF
0x01F	62	flip	0x00			▶
	63	Hbrate	0x23	Hbrate= 4062.4ms Hbfast_rate = 380.9 ms Auto update = OFF	Hbrate= 4062.4ms Hbfast_rate = 380.9 ms Auto update = OFF	Hbrate= 4062.4ms Hbfast_rate = 380.9 ms Auto update = OFF
0x020	64	units	0x00	mm	mm	mm
	65	mode	0x00	Absolute	Absolute	Absolute
0x021	66	Eco mode time	0x00	OFF	OFF	OFF
	67		0x00			
0x022	68	Offset mm	0x0A	10	10	10
	69	Offset deg	0x0A	10	10	10

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Parameter	Voice on the remote device	Description	Values (refer to the device's user manual)
Password		Numeric value used as password	
mm_origin	Origin	Value assigned to the point of origin when the select unit of measure is mm or inches	Numeric value expressed in cents of millimeter
deg_origin		Value assigned to the point of origin when the select unit of measure is degree	Numeric value expressed in cents of degree
mm_step	Step	Conversion coefficient from shaft turns and the selected unit of measurement.	Numeric value expressed in cents of millimeter
deg_step			Numeric value expressed in cents of degree
mm_toll	P_toll	Tollerance of the the target position when the selected unit of measure is mm or inches	Numeric value expressed in cents of millimeter
deg_toll		Tollerance of the the target position when the selected unit of measure is degree	Numeric value expressed in cents of degree
lincorr	Lin corr	Linear measurement correction coefficient	1 = 0.000001 9999999 = 9.999999
degcorr	Deg corr	Angular measurement correction coefficient	1 = 0.000001 9999999 = 9.999999
radius	Radius	Radius of the magnetic band guide for anguilar measurements	Numeric value expressed in cents of millimeter
ang_coeff		Angular coefficient	Automatically calculated value

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<table>
<tr><th>Parameter</th><th>Voice on the remote device</th><th>Description</th><th>Values
(refer to the device's user manual)</th></tr>
<tr><td>count_direction</td><td>Dir</td><td>Direction of the positive values.. Set the positive values rotation direction of the shaft.</td><td></td></tr>
<tr><td>display</td><td>Displ</td><td>Display orientation</td><td></td></tr>
<tr><td>mm_res</td><td rowspan="3">Res</td><td>Measure resolution when the selected unit of measure is mm</td><td rowspan="3">Number of decimal position to show.
0 ÷ 2 forr mm and deg
0 ÷ 3 for inch</td></tr>
<tr><td>inch_res</td><td>Measure resolution when the selected unit of measure is inches</td></tr>
<tr><td>deg_res</td><td>Measure resolution when the selected unit of measure is 7degree</td></tr>
<tr><td>speed</td><td>Speed</td><td>Maximum allowed shaft rotoation</td><td>Per DD:<table><tr><th>speed</th><th>RPM</th></tr><tr><td>0</td><td>300</td></tr><tr><td>1</td><td>600</td></tr><tr><td>2</td><td>1000</td></tr></table>Per MPI:1÷5m/s</td></tr>
<tr><td>passw</td><td></td><td>Enabling password for access to programming menuEnabling password for access to programming menu</td><td>0 OFF
1 ON</td></tr>
<tr><td>arkey_reg</td><td></td><td>ABS/REL key functions</td><td>0 ABS– REL+CLR
1 ABS – REL
2 OFF</td></tr>
</table>

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Parameter	Voice on the remote device	Description	Values (refer to the device's user manual)
arkey_shift_reg		ABS/REL + SHIFT key functions 	0 Load offset 1 Reset origine 2 OFF
ukey_reg		UNIT key functions 	0 mm-inch-deg 1 mm-inch 2 OFF
ukey_shift_reg		UNIT + SHIFT key functions 	0 set origin 1 set step 2 set offsets 3 OFF
orgkey_reg	t_Sho	ORG key functions  Display mode when the target is active. See related menu item in the remote device manual	0 display target 1 display to go 2 OFF
orgkey_shi-ft_reg		ORG + SHIFT key functions 	0 Menu target 1 OFF
flip		Target direction	0 ▶ 1 ◀

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Parameter	Voice on the remote device	Description	Values (refer to the device's user manual)
Hbrate	Hb rt Hbfrt HBAUp	7 6 5 4 3 2 1 0 HBAUp Hbfrt Hb rt	Refer to the remote device user manula
units		Unit of measure in use	0 millimiters 1 inches 2 degrees
measmode		ABS/REL mode	0 ABS 1 REL
Eco mode time	d tout	Idle time before the screen turns off	0 OFF 1 1 s 2 2 s .. 255 255 s
Offset mm		Used offset index when the unit of measure is mm	0 ÷ 9 offset 0 ÷ 9 On 10 offset OFF
Offset deg		Used offset index when the unit of measure is degree	0 ÷ 9 offset 0 ÷ 9 On 10 offset OFF

8.6 MODE 25 – Offset configuration

In MODE 25 it is possible to read or set the value of the offsets stored on the remote device whose ID is set in the last 4 bytes (CH ID) .
Having set mode 25, writing 0x25 in byte 217, when UC-RF is contacted by the remote device, the 10 offsets stored on the device are read or written as shown in Tab. 7.
For details, see Chap.10 where the meaning and use of the command (UC Command) and status (UC Status) words present at bits 218-219 memory organisation is explained.

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Tab. 7 - MODE 25 – memory organization

		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0		
	1		
0x001	2		
	3		
0x002	4	mm_offset[1]	mm_offset[1]
	5		
0x003	6		
	7		
0x014	40	mm_offset[10]	mm_offset[10]
	41		
0x015	42		
	43		
0x016	44	deg_offset[1]	deg_offset[1]
	45		
0x017	46		
	47		
0x028	80	deg_offset[10]	deg_offset[10]
	81		
0x029	82		
	83		
0x06C	216		Present CH
	217	Mode: 0x25	Present Mode
0x06D	218	UC Command	UC Status
	219		

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		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x06E	220	Device ID	UC-RF ID
	221		
0x06F	222		
	223		

8.6.1 Default Values and Meaning of Parameters

The deafault value of all offsets is 0 and therefore the value 0x0000 0000 will be found in the corresponding positions. In the case of values relating to the measurement of lengths, the value is expressed in hundredths of a millimetre. In the case of values relating to the measurement of degrees, the value is expressed in hundredths of a degree.

8.7 MODE 26 and 27 – Target configuration

In MODE 25 it is possible to read or set the value of the offsets stored on the remote device whose ID is set in the last 4 bytes (CH ID) .
Having set mode 26 or 27 in byte 217, when UC-RF is contacted by the remote device, the 10 offsets stored on the device are read or written as shown in Tab. 7.
For details, see Chap.10 where the meaning and use of the command (UC Command) and status (UC Status) words present at bits 218-219 memory organisation is explained.

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Tab. 8 - MODE 26 e 27 – memory organisation
– MODE 26: target in mm, MODE 27: target in gradi

		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0		
	1		
0x001	2		
	3		
0x002	4	target[1]	target[1]
	5		
0x003	6		
	7		
0x004	8	target[2]	target[2]
	9		
0x005	10		
	11		

0x040	128	target[32]	target[32]
	129		
0x041	130		
	131		

0x06C	216		Present CH
	217	Mode: 0x26 or 0x27	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	222	Device ID	UC-RF ID
	223		
0x06F	222		
	223		

8.7.1 Default Values and Meaning of Parameters

The deafault value of all targets is 0 and therefore the value 0x0000 0000 will be found in the corresponding positions.
In the case of values relating to the measurement of lengths, the value is expressed in hundredths of a millimetre.
In the case of values relating to the measurement of degrees, the value is expressed in hundredths of a degree.

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8.8 MODE 2C – Direct memory access

MODE 2C allows direct access to a subset of the parameters listed in modes 4, 5, 6 and 7 of the remote device whose ID is set in the last 4 bytes (CH ID) .
Once the 2C mode is set, by writing 0x2C in byte 217, when UC-RF is contacted by the remote device, a number of bytes equal to the value contained in byte 7 (lenght) are read or written starting from the byte indicated in byte 6 (Start Address) in the parameter table relative to the mode indicated in byte 4 (Mode) as shown in Tab. 9
For details, see chap. 10 where the meaning and use of the command (UC Command) and status (UC Status) words in bits 218-219 are explained.

Tab. 9 - MODE 2C – memory organisation

		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x000	0		
	1		
0x001	2		
	3		
0x002	4	Mode	Mode
	5		
0x003	6	Start Address	Start Address
	7	Lenght	Lenght
0x004	8		
	9		
0x005	10		
	11		

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		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x006	12	Data	Data
	13		
0x007	14		
	15		
0x008	16		
	17		
0x009	18		
	19		
0x00A	20		
	21		
0x00B	22		
	23		
0x00C	24		
	25		
0x00D	26	Data	Data
	27		
0x00E	28		
	29		
0x00F	30		
	31		
0x010	32		
	33		
0x011	34		
	35		
0x012	36		
	37		
0x013	38		
	39		
0x014	40		
	41		
0x015	42		
	43		
0x016	44		
	45		
0x017	46		
	47		
0x018	48		
	49		

0x06C	216		Present CH
	217	Mode: 0x2C	Present Mode

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		Values to write	Read values
Word	**Byte N**	**PLC => UC-RF**	**UC-RF => PLC**
0x06D	218	UC Command	UC Status
	219		
0x06E	220	CH ID	UC-RF ID
	221		
0x06F	222		
	223		

8.9 MODE 2A – Transmission quality

In MODE 2A, the UC-RF => PLC memory contains, instead of position and status of the remote device, the following indicators of the quality of communication between UC-RF and remote devices:
- Last Comm Counter: the counter is incremented by 1 every time UC-RF receives a correct communication from the associated remote device. The congruence between the transmission rate set on the remote device and the counter increment rate indicates the presence and goodness of the RF link.
- Quality Status: contains the estimated values of LQI and RSSI which are indicators of the quality of the RF link with the remote device see Fig. 8 1

Tab. 10- MODE 2A – memory organisation

Word	Byte N	PLC => UC-RF	UC-RF => PLC
0x000	0	ID1 Target quote	ID1 Last Comm Counter
	1		
0x001	2		
	3		
0x002	4	ID1 Command	ID1 Qual. status
	5		
0x003	6	ID2 Target quote	ID2 Last Comm Counter
	7		
0x004	8		
	9		
0x005	10	ID2 Command	ID2 Qual. status
	11		
	...	...	...

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Word	Byte N	PLC => UC-RF	UC-RF => PLC
0x069	210	ID36 Target quote	ID36 Last Comm Counter
	211		
0x06A	212		
	213		
0x06B	214	ID36 Command	ID36 Qual. status
	215		
0x06C	216		Present CH
	217	Mode: 0x2A	Present Mode
0x06D	218	UC Command	UC Status
	219		
0x06E	220		UC-RF ID
	221		
0x06F	222		
	223		

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
X	LQI							RSSI							

Fig. 8 1 – Content of the quality status register

9. Status and command for remote devices

In modes 2, 8 and A, where the states of several devices are displayed, it is possible for each one to display its status and/or send commands.

9.1 Device status

In each communication, the device communicates its status with a 16-bit word organised as in Fig. 9 1.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bound	Low Batt	Disconnected	Positioning	In position	Speed Err	Meas units		Resolution			No Tape Sensor Err.	NO sensor			

Fig. 9 1 – Remote device status - meaning of bits

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Below is the eleco of the bits and their meaning when they have value 1:
Bound: the device is associated with a UC-RF
Low Batt: the battery is low and must be replaced as soon as possible.
Disconnected: the device is not connected or communication is not taking place correctly (see chapter 8.1.6)
Positioning: the device is in target mode
In Position: the device is in the target position
Speed Err: the device has lost its current position due to too fast a movement of the measuring device
No tape/ MPI: the sensor does not detect the magnetic strip
Sensor Err: DD: an error is detected on the magnetic sensor
No sensor: sensor is not detected at the control port (only for MPI)
also:
Meas unit

Bit 9	Bit 8	Unit
0	0	mm
0	1	Inch
1	0	Deg
1	1	Not used

Resolution

Bit 7	Bit 6	Resolution
0	0	0
0	1	0.0
1	0	0.00
1	1	Not used

9.2 Device command

Remote devices can be activated or deactivated in pursuit of a target using the command word defined as in Fig. 9 2

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Set Target	Target active														

Fig. 9 2 – Command for remote device - meaning of bits

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To set a target:
- Set the value due at the position relative to the target device
- Write in the relevant command word 0x8000

To enable a target
- Write in the relevant command word 0xC000

10. Central unit status and control

In modes 4,5,6,and 7, the UC-RF communicates with only one device at a time whose ID is indicated in the last 4 bytes of the PLC=>UC-RF memory.
In these modes it is possible to give a command and display the status of the operation via the 16-bit words located at byte 218-219 in PLC=>UC-RF memory for the command and UC-RF=>PLC for the status, respectively.

10.1 UC-RF status

The status of the communication is reported in the 16-bit status word organised as in Fig. 10 1.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Trigger exec	Triggered	Data Valid OK	Showing Stored									Comm. failed			Waiting

Fig. 10 1 - UC Status

Below is the eleco of the bits and their meaning when they have value 1:

Trigger exec: the command issued was executed

Triggered: the command was received by the UC-RF

Data valid OK: The data in the PLC=>UC-RF buffer was copied into the memory for the selected mode

Showing stored: The data in the UC-RF=> PLC buffer is a copy of the data stored in the PLC-UC-RF memory of the selected mode.

Comm failed: Communication between UC-RF and remote device failed.

Waiting: UC-RF is waiting to be contacted by the remote device to execute the command.

10.2 UC-RF comand

UC-RF must be instructed on the operations to be performed using the command word organised as in Fig. 10-2.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Trigger	R/W													Read stored	Data valid

Fig. 10-2 - UC Comand

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10.2.1 Executing a command

In modes 4,5,6 and 7, read and write operations must be launched using the appropriate flags in the command word.

R/W

It tells UC-RF whether to read data from the remote device, which will be displayed in the UC-RF=>PLC buffer, or whether to write data from the PLC=>UC-RF buffer to the remote device. In particular:

0 - read

1 - write Indica a UC-RF se leggere i dati del dispositivo remoto, che verranno visualizzati nel buffer UC-RF=>PLC, opure se scrivere, sul dispositivo remoto, i dati presenti nel buffer PLC=>UC-RF. In particolare:

0 – lettura

1 – scrittura

Trigger

To instruct UC-RF to execute the read or write command, the trigger flag must be set to 1.

To avoid unintentional repetition of a command, the trigger flag takes effect only once. After that, it must be reset to zero and then reset to one to execute a new command.

When the command is accepted by UC-RF, the Triggered flag of the status word is set to one (see Fig. 10 1) . The execution of a command is not immediate but requires communication to be established between UC-RF and remote device. This is initiated by the remote device with a timing that depends on: frequency of HB, activation or not of the indicator (in Auto mode), amount of devices present in the same area,etc.etc. UC-RF, will signal this waiting situation with a one in the falg Waiting.

WARNING: a change of mode or of the values in the write buffer during the Waiting phase will result in the command being cancelled.

When the command is executed, the Trigger Exec status word flag is set to one (see Fig. 10 1) .

At this point, it will be possible to set the Trigger command flag to zero, and possibly set it back to one for the execution of a new command.

10.3 Mode change

The user has access to two memory buffers, one write PLC=UC-RF and one read UC-RF=>PLC. Depending on the selected mode, UC-RF mirrors its internal memory on these buffers.

This means that in some cases, when switching from one mode to another, the values written by the PLC in the write buffer (PLC=>>UC-RF), relative to the current mode, can be overwritten on the relative memory areas of the newly selected mode.

To avoid this, UC-RF has two mechanisms.

Data valid

The write buffer is not stored in the internal memory of UC-RF and therefore not read if this flag is zero.

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Read stored
. By setting this bit to one, it is possible to read the data actually written in the current mode into UC-RF. In practice, on the read buffer (UC-RF=>PLC), instead of the input data, the data contained in the write buffer stored for the selected mode within UC-RF is reported.
When switching from one mode to another, it is suggested to do the following:
- Reset Data Valid to zero
- Select new mode
- Set to one Read Stored
- Read data from the read buffer (UC-RF=> PLC)
- Copy the data read in the previous step to the write buffer (PLC=>UC-RF)
- Set Data Valid to one

At this point, the communication buffers between PLC and UC-RF and the internal memory of UC-RF are synchronised and you can continue with the desired operations in the new mode.
NOTE: It is possible to skip the read part of the stored data and set the desired write data. Just remember that these will overwrite the stored data without any check when Data Valid is one.

10.4 Timing of Status and Command Flags

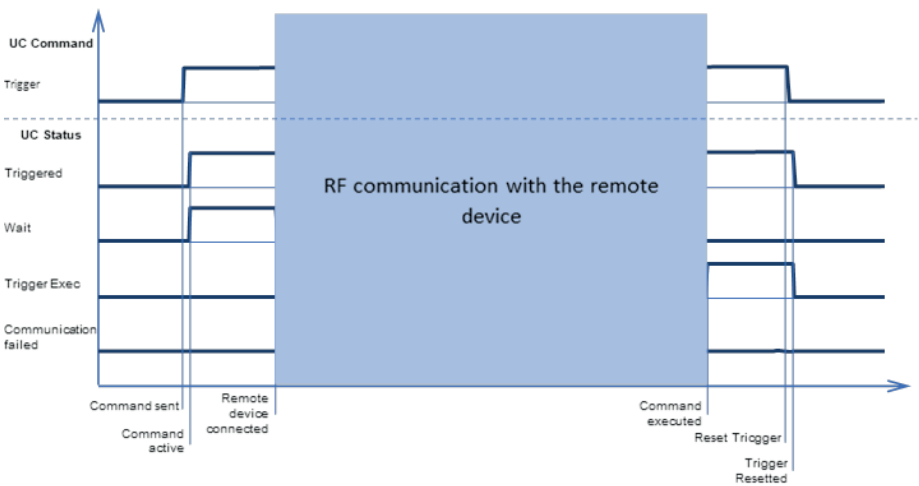


Fig. 10 3 – Timing flags in case of successful communication

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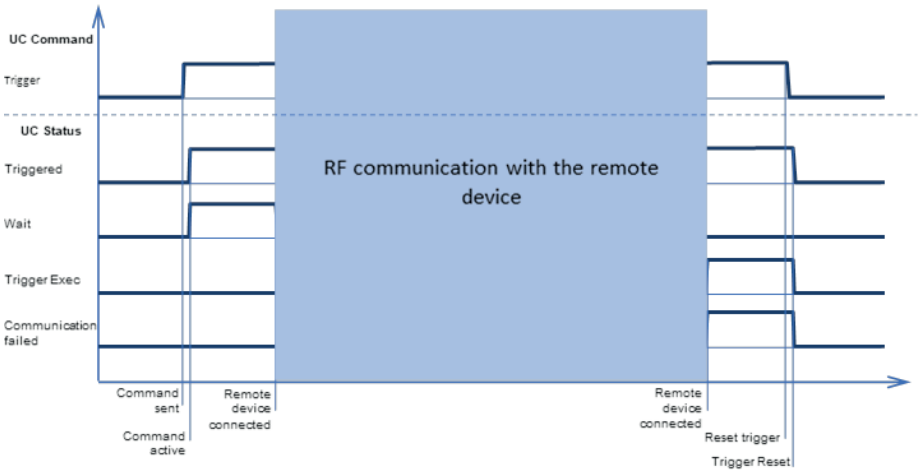


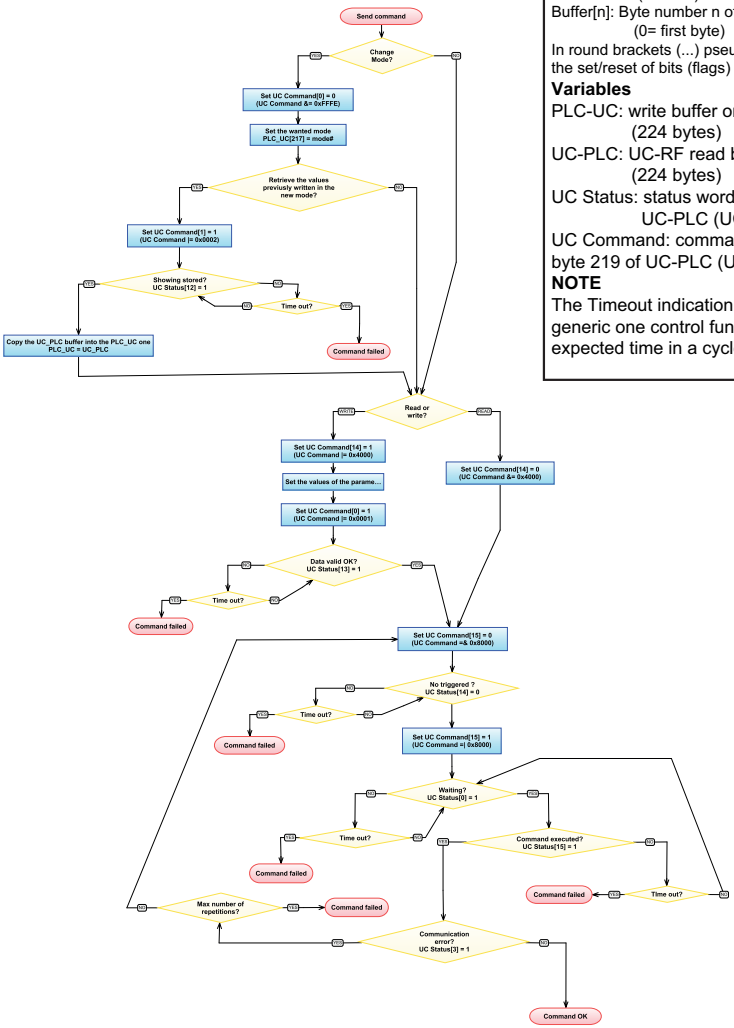
Fig. 10 4 – Timing flag in case of communication failure



Fig. 10 5 – Timing flag in case of unreachable device

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10.5 Procedure for sending commands



Notations
Variable [n]: bit number n of the variable (0= LSB)
Buffer[n]: Byte number n of the buffer (0= first byte)
In round brackets (...) pseudo code for the set/reset of bits (flags)

Variables
PLC-UC: write buffer on UC-RF (224 bytes)
UC-PLC: UC-RF read buffer (224 bytes)
UC Status: status word at byte 219 of UC-PLC (UC-PLC [219])
UC Command: command word at byte 219 of UC-PLC (UC-PLC [219])

NOTE
The Timeout indication indicates a generic one control function of the expected time in a cycle

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Appendix A – Bus interface connector

The ethrnet interface supports 10/100Mbit, full or half duplex operation

#	ITEM
1	Network Status LED
2	Module Status LED
3	Link/Activity LED (port 1)
4	Link/Activity LED (port 2)

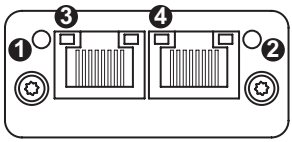


Fig. 10-6 – Front panel connectors and LEDs

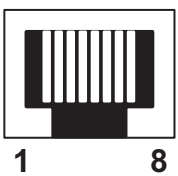
Pin no	Description	
1, 2, 4, 5	Connected to chassei ground over serial RC circuit	
3	RD -	
6	RD +	
7	TD -	
8	TD +	
Housing	Cable Shield	

Fig. 10-7 – Connector pins signals

Appendix B – Technical data

Electrical data	
Supply voltage	24 VDC ±5 %
Power consumption	50 mA
Reverse polarity	Protected
Voltage transitions	Protected

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Electrical data	
Short circuit	Not protected. A 100mA fuse has to be placed on the supply line
Frequency range	2400-2.416 MHz
Interface options	Ethernet/IP Ethercat IO Profinet IO Modbus/TCP
Antenna connector	SMA RP female
Power supply connector	3-way terminal block 3.81 mm pitch

Mechanical data	
Mounting	DIN RAIL
Weight	≈50 g
Housing material	white-gray ABS reinforced polycarbonate,
self-extinguishing	Protected
Dimensions	79x101x35 mm

Ambient conditions	
Operating temperature	0 ÷ +50 °C
Storage temperature	-20 ÷ +70 °C
Relative humidity	max. 80 %, not condensing
Environment	indoor use
Altitude	up to 2000 m

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EU DECLARATION OF CONFORMITY (DoC)

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Declare that the DoC is issued under our sole responsibility and belongs to the following product:

PRODUCT: Control Unit for DD51-E-RF DD52R-E-RF MPI-R10-RF

APPARATUS MODEL: UC-RF
TRADE MARK: Elesa

The object of the Declaration described above is in conformity with the relevant Union Harmonization Legislation:

2014/30/UE (EMC): Electromagnetic Compatibility Directive

2011/65/UE (RoHS): Restriction of the use of certain Hazardous Substances in electrical and electronic equipment

The following harmonized standards and technical specifications have been applied:

EN 61326-1:2013

Notified Body:
Not Involved (Annex II - Conformity Assessment Module A)

PLACE, DATE OF ISSUE:
Monza – Italy
24/05/2024

CARLO BERTANI
MANAGING DIRECTOR
GENERAL MANAGER

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Elesa S.p.A., Monza, May 2024

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