

# $\mu$ CU-IQ MANUAL

## 1. DESCRIPTION

The small control panel  $\mu$ CU-IQ is one component of the new ICAS IQ *wireless* system. IQ System is an intelligent radio system, which works at 868 MHz frequency band. The IQ System is created by various kind of IQ components, which provides to the customer complete and very flexible RF fire alarm system. All components of the IQ system use a special RF communication protocol. This protocol handles building small or large size, smart installations, depending directly on the user requirements. The smart installation consist of systems, which control their local loops of IQ components (nodes). The systems are connected to the RF (radio frequency) loop, which is identified by the individual Loop ID number. Each installation depending on complexity can contain from 1 to 8 systems, where systems are also described with individual System ID. RF communication principle in systems is based on "STAR" topology and RF communication principle among systems (all systems in installation has information about other systems) is based on "P2P" topology. This kind of configuration and system description allows making very flexible small or large installations according to customer demands. Big advantage of the system is that most of IQ components are battery operated with 10 years lifetime. This allows the customer to install all components without special power supply wiring projection.



Control panel  $\mu$ CU-IQ serves as controller of the system. It is equipped with indication of the local loop events and also with the remote events which could occur in other systems local loop.  $\mu$ CU-IQ tests also communication in the system, also tests communication between other systems in installation and communication with other system part at RS485 line. The control panel includes power line and external power supply indication and is equipped with two relay outputs and siren. The panel functions could be controlled by three push buttons.

The typical application is  $\mu$ CU-IQ wireless connection with up to 32 optical detectors CHOR-IQ (one system with one Loop ID and System ID). The larger application is the configuration from 2 to 8  $\mu$ CU-IQ in installation (up to 8 systems with one Loop ID and different System ID). All  $\mu$ CU-IQ are connected together into loop with identical Loop ID and each  $\mu$ CU-IQ has specified its own System ID. Each system can handle up to 32 assigned CHOR-IQ detectors.

$\mu$ CU-IQ is also equipped with RS485 transceiver, which is used for connection up to 14 RS485 communication modules  $\mu$ CU-M.485 or for connection up to 13  $\mu$ CU-IQ. It could be useful for installations, where could be problem with radio frequency loss.

## 2. FUNCTION

After power supply is on, the control panel starts with reset indication, where initialization of the indication and also of the RF module is done. When reset is finished, the panel checks and indicates actual power state. If everything is normal the green POWER LED is lightning. The blinking indication on positions FAULT, COMM. LOSS LOOP and SYSTEM is used for detection, that the panel has not been connected to the RF loop and has not its own unique Loop ID and System ID yet. If there is the blinking indication that the  $\mu$ CU-IQ is not connected into a loop, the system has to be configured according to ICAS IQ Wireless System Configuration manual first. After the RF loop configuration, the control panel disabling/enabling and reset is recommended. The blinking indication FAULT, COMM. LOSS LOOP and SYSTEM disappears, the POWER LED is lightning only and the  $\mu$ CU-IQ starts to monitor the RF loop.

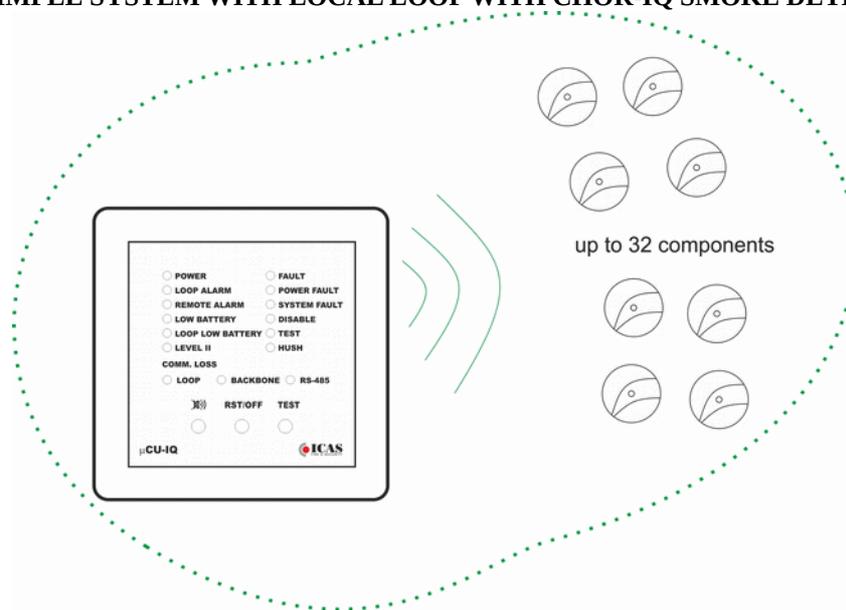
$\mu$ CU-IQ works as a kind of "message repeater" in the IQ system. In case of some event, an IQ component transmits a message to the  $\mu$ CU-IQ, it is translated and transmitted to other systems in the RF loop (if there are more) and to IQ components of the own local loop. For example, if there is fire alarm detected by a CHOR-IQ detector, the fire alarm message is transmitted to the  $\mu$ CU-IQ panel and the panel transmits the fire alarm message to other systems first and then to own local loop - typically to other local loop detectors in order to start their remote alarm indication. It is very important to install all assigned IQ components in the  $\mu$ CU-IQ radio-range.

$\mu$ CU-IQ tests the wireless system integrity periodically and if there is communication loss of some IQ component discovered the comm. loss fault is indicated.

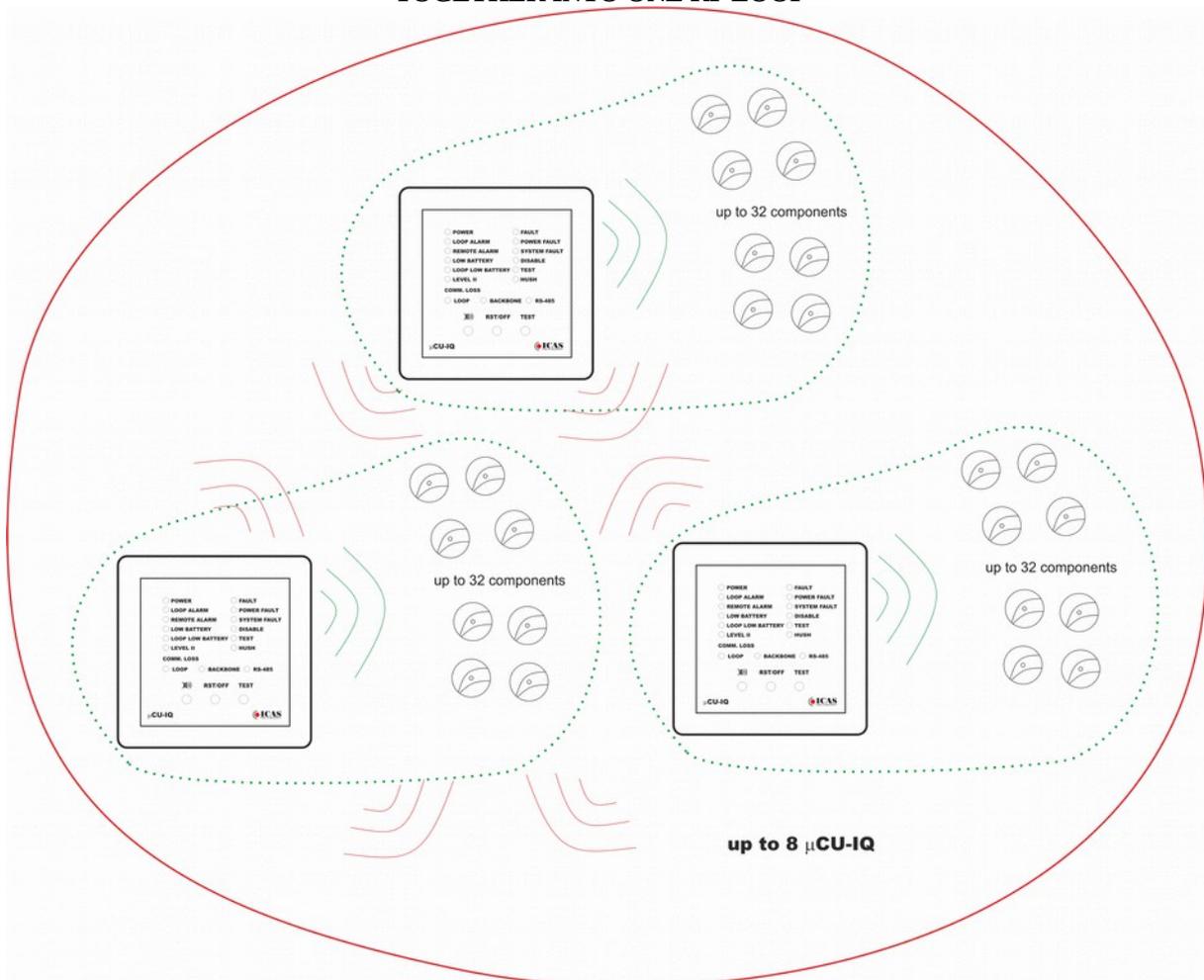
The  $\mu$ CU-IQ panel can be connected into RS485 network. To create RS485 network use please CONFIGURATION OF RS485 NETWORK on the page 7. Alarm messages from RF loop are transmitted into RS485 network and contrariwise alarm message from RS485 is transmitted into RF loop. The  $\mu$ CU-IQ panel periodically tests also RS485 network integrity to detect and indicate eventual communication loss of connected RS485 modules.

### 3. APPLICATION DIAGRAM

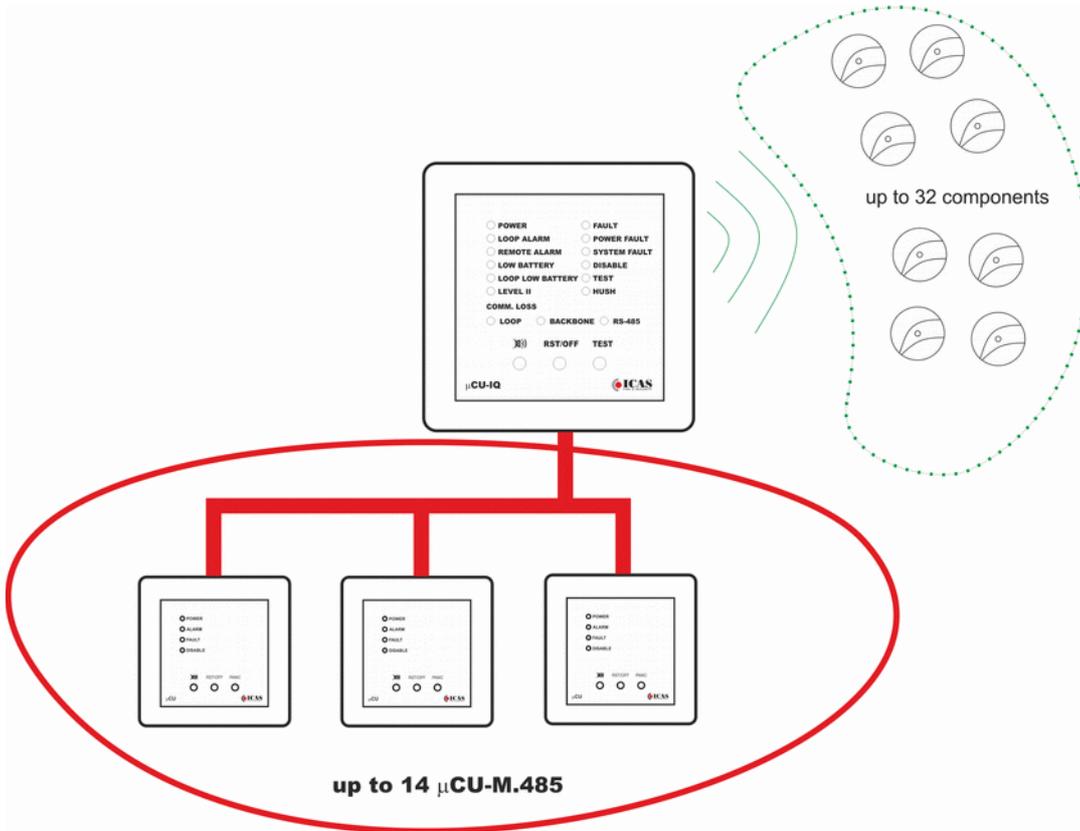
“ONE SIMPLE SYSTEM WITH LOCAL LOOP WITH CHOR-IQ SMOKE DETECTORS”



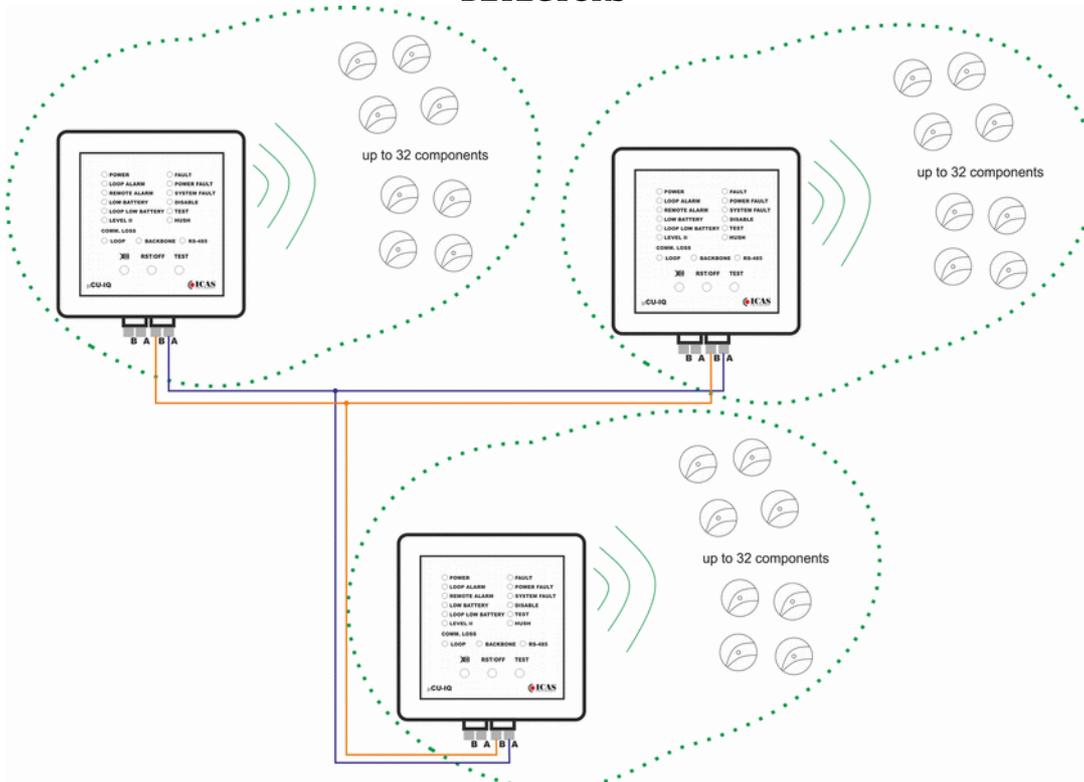
“MORE LOCAL LOOPS (SYSTEMS) WITH CHOR-IQ SMOKE DETECTORS CONNECTED TOGETHER INTO ONE RF LOOP”



**“RS485 LOOP WITH  $\mu$ CU-M.485 MODULE AND SIMPLE SYSTEM WITH LOCAL LOOP CHOR-IQ SMOKE DETECTORS”**



**“RS485 LOOP WITH  $\mu$ CU-IQ AND SIMPLE SYSTEM WITH LOCAL LOOP CHOR-IQ SMOKE DETECTORS”**



## 4. INSTALATION

Install the external power source Power Unit  $\mu$ PU first (Follow  $\mu$ PU manual). Make sure that mains of the Power Unit  $\mu$ PU as well as  $\mu$ PU low voltage output are switched off before  $\mu$ CU-IQ installation.  $\mu$ CU-IQ is intended to be installed into an instrument distribution box. Install the  $\mu$ CU-IQ unit at least 0.5m from fuse box or other electrical appliances. Be aware that EMC can harm the Control Panel.

***Before you start instalation of the IQ system, make sure that it is already configured. For the configuration follow the instructions in IQ Wireless System Configuration manual.***

Connect  $\mu$ CU-IQ to the Power Unit  $\mu$ PU. The recommended cable type is AF CEI 20-22 IEC 332 or VD-04 shielded cable, or equivalent type. Shield of the cable has to be terminated on 0V. Follow the picture 4.1 on the page 5. In case the  $\mu$ CU-IQ is installed into RS485 network, follow the pictures 4.2 or 4.3 on the page 6 according to the panel is connected with  $\mu$ CU-M.485 or other  $\mu$ CU-IQ.

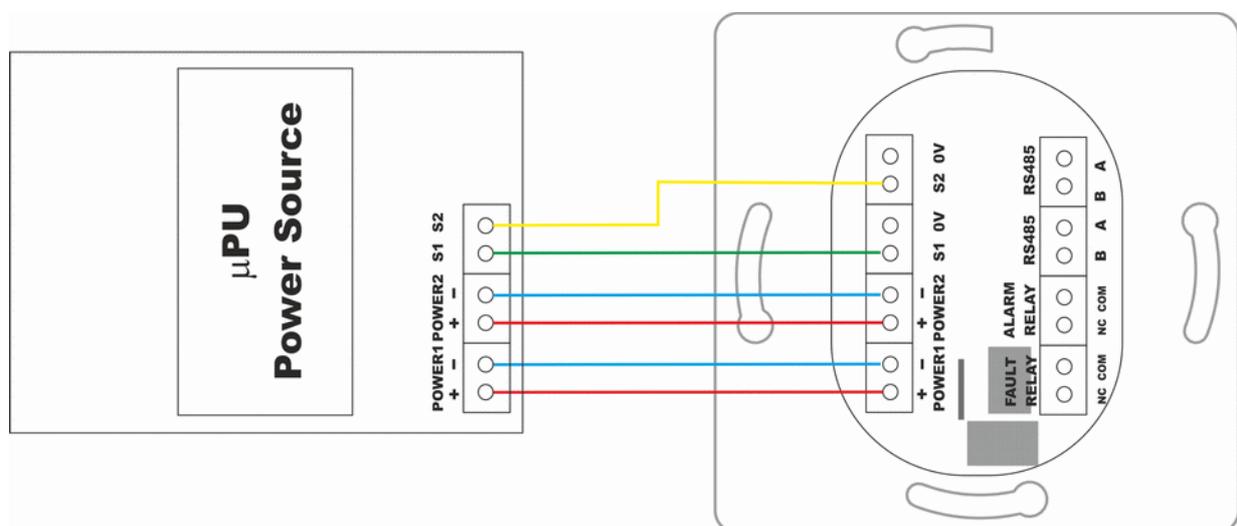
$\mu$ CU-IQ unit has two relay outputs. Terminals for alarm relay are marked ALARM\_RELE and NC, COM. Terminals for fault relay are marked as FAULT\_RELE and NC,COM.

Remove the top cover of the  $\mu$ CU-IQ carefully. Put screwdriver to the left side of cover groove and slightly lever to left side and remove the top cover. Place the  $\mu$ CU-IQ control panel in vertical position into instrument distribution box. Use 2 screws to connect both sides of the  $\mu$ CU-IQ to the box. Put the top cover of  $\mu$ CU-IQ back.

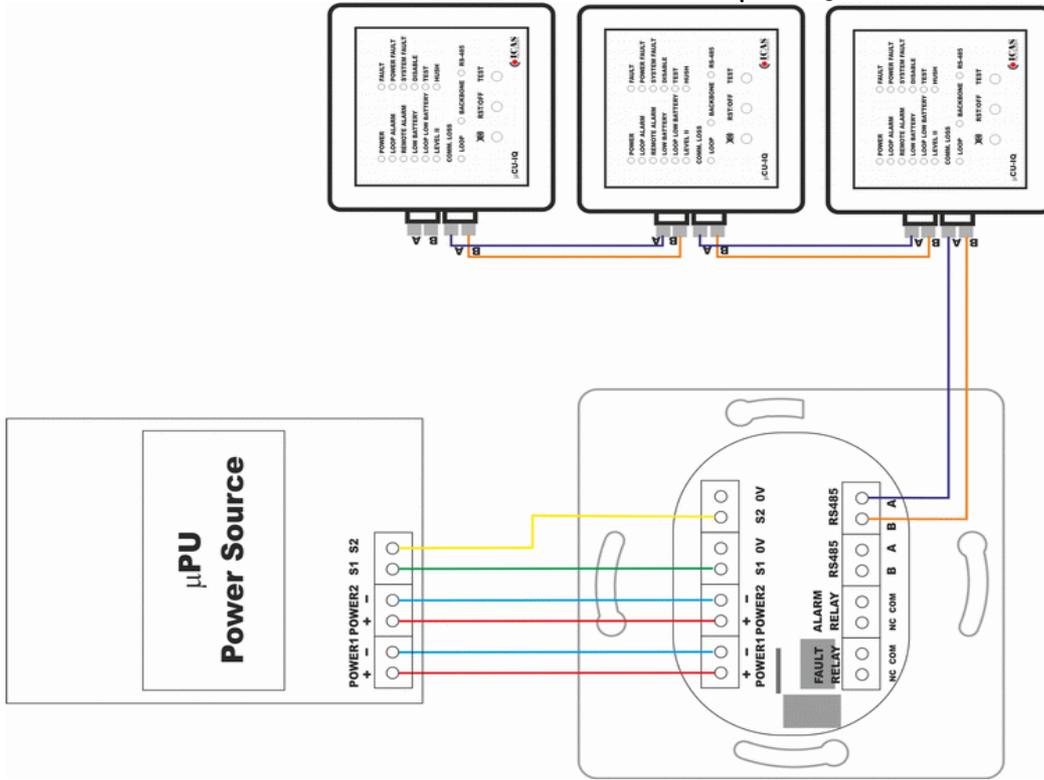
Switch on mains to start the Power Unit  $\mu$ PU.  $\mu$ CU-IQ is supplied and starts the reset indication ( indicated by all LED fast flashes ), after reset is finished the green LED is lightning and FAULT, COMM. LOSS LOOP and SYSTEM LEDs are blinking (unconnected control panel).

Now follow instructions in IQ Wireless System Configuration manual. In case of connection through RS485 please follow also CONFIGURATION OF RS485 NETWORK on the page 7.

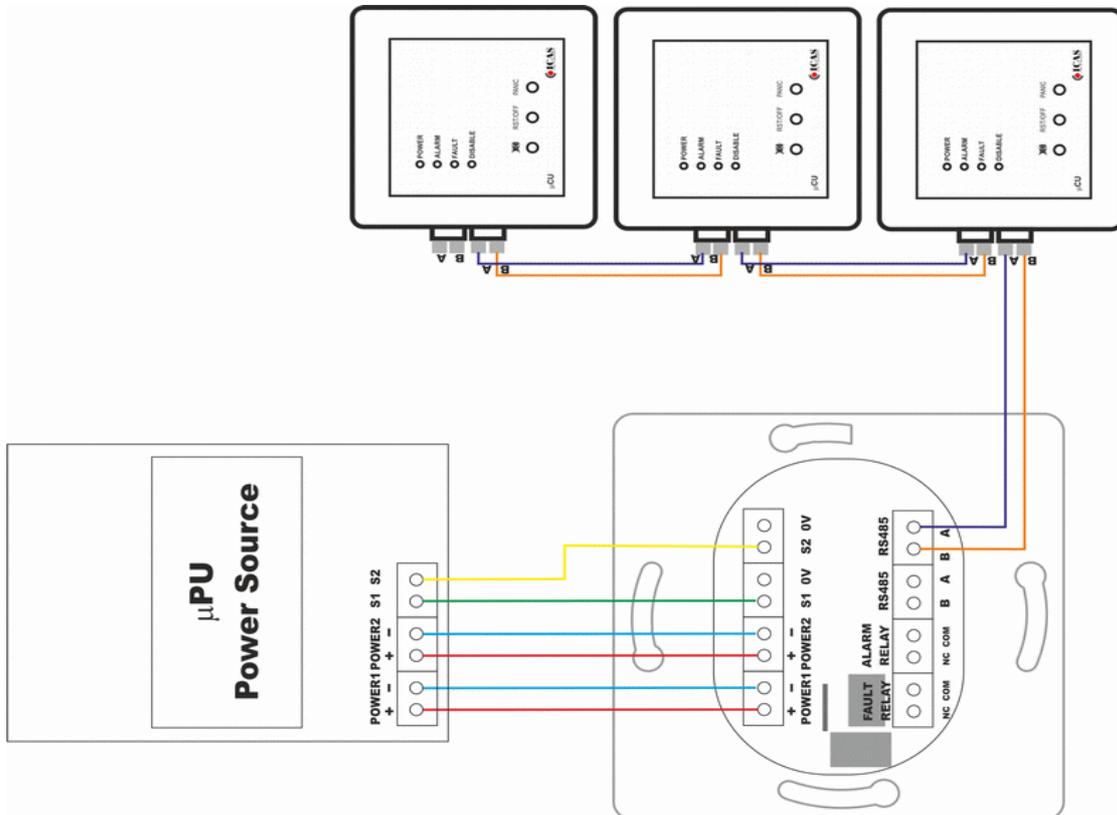
### “4.1. $\mu$ CU-IQ POWER SUPPLY”



“4.2. RS485 NETWORK CONNECTION OF  $\mu$ CU-IQ”



“4.2. RS485 NETWORK CONNECTION  $\mu$ CU-IQ WITH  $\mu$ CU-M.485”



## 5. MANUAL CONFIGURATION OF SIMPLE LOCAL LOOP

### Small local loop with 1x $\mu$ CU-IQ (no system net)

1. Switch on  $\mu$ CU-IQ (only Green LED is on and FAULT, Comm. Fault SYSTEM and LOOP are blinking YELLOW)
2. Press RST and SILENCE at the same time
3. Comm. Fault LOOP and DISABLE starts blinking – transmitting of the configuration message
4. Wait until  $\mu$ CU-IQ Comm. Fault LOOP is ON and DISABLE is blinking.
5. Wait until all CHOR-IQ which are intended to be joined to the local loop starts blinking YELLOW (the indication should be run within max. 20s)
6. Choose one YELLOW blinking (unconfigured) CHOR-IQ detector to be connected into the local loop
7. Press and hold TL2 button on CHOR-IQ
8. Wait until YELLOW LED changes indication (Yellow blinking slowly)
9. Release the button TL2
10. CHOR-IQ transmits the confirmation message
11. Wait until chosen CHOR-IQ starts blinking RED (configured to the local loop)
12. Choose next unconfigured detector CHOR-IQ and follow instruction from the point 7)
13. In case all detectors have been configured, press RST and SILENCE on the  $\mu$ CU-IQ
14.  $\mu$ CU-IQ changes indication and transmits the message to STOP configuration process
15. RED and YELLOW LED on all detectors starts blinking – indication of STOP learning
16. Wait until  $\mu$ CU-IQ is reset, which is indicated with 3 times repetition of 4 fast flashes all LED
17. The  $\mu$ CU-IQ is restarted and the local loop is ready to use.

## 6. CONFIGURATION OF SYSTEM LOOP

### Large system with 2x or more $\mu$ CU-IQ (system net)

1. Switch on all  $\mu$ CU-IQ intended to be connected together into system loop
2. Check indication on all - only Green LED is on and Comm. Fault SYSTEM and LOOP are blinking YELLOW
3. Choose one panel and press RST and SILENCE at the same time.
4.  $\mu$ CU-IQ changes the indication – Green LED is ON and Comm. Fault LOOP and DISABLE is blinking
5. Press RST and SILENCE at the same time again.
6.  $\mu$ CU-IQ changes the indication – Green LED is ON and Comm. Fault SYSTEM and DISABLE are blinking
7. Wait until all other  $\mu$ CU-IQ changes indication on the same as the first one – Green LED is ON and Comm. Fault SYSTEM and DISABLE are blinking
8. Wait until indication is changed. The first panel indication - GREEN LED and SYSTEM on and DISABLE is blinking(configured). Remember this panel. It will be used to switching off

- of the system configuration. All other  $\mu$ CU-IQ indication - GREEN LED, DISABLE is on and Comm. Fault SYSTEM is blinking (unconfigured).
9. Choose one unconfigured  $\mu$ CU-IQ and press RST and SILENCE at the same time.
  10. Wait until panel changes the indication to configured – GREEN LED and SYSTEM is on and DISABLE is blinking.
  11. Choose next unconfigured panel  $\mu$ CU-IQ and follow instruction from the point 9)
  12. In case all panels  $\mu$ CU-IQ have been configured, press RST and SILENCE on the first  $\mu$ CU-IQ
  13.  $\mu$ CU-IQ changes indication and transmits the message to STOP configuration process
  14. Wait until all panels  $\mu$ CU-IQ are reset, which is indicated with 3 times repetition of 4 fast flashes all LED
  15. The system loop is now ready for local loops configuration. Switch off all unused  $\mu$ CU-IQ panels during every local loop configuration.

## 7. CONFIGURATION OF RS485 NETWORK ( $\mu$ CU-IQ in network)

1. Prepare all  $\mu$ CU-IQ panels, which is intended to be in the system together and switch on them the power supply
2. Choose first  $\mu$ CU-IQ panel
3. Press buttons SILENCE and TEST at the same time.
4. Panel changes indication. LEVEL II is on now
5. Press buttons SILENCE and TEST at the same time again
6. Now only GREEN LED is lightning -  $\mu$ CU-IQ is now in the mode for RS485 configuration
7. Choose count of the  $\mu$ CU-IQ panels in the RS485 loop. SILENCE button increments the count and TEST button decrements the count – actual count is indicated with LED. GREEN LED means 0 and the FAULT LED means 14
8. To confirm the count press buttons SILENCE and TEST at the same time again
9. Now only GREEN LED is lightning -  $\mu$ CU-IQ now need to have ID number for RS485 loop
10. Choose ID of the  $\mu$ CU-IQ panel in the RS485 loop. SILENCE button increments the ID and TEST button decrements the ID number – actual count is indicated with LED. GREEN LED means 0 and the FAULT LED means 14. In the same loop each ID has to be used only once, otherwise the comm Loss Fault RS485 will be indicated.
11. To confirm the count press buttons SILENCE and TEST at the same time again
12. Now the  $\mu$ CU-IQ is ready for connection
13. Choose next  $\mu$ CU-IQ panel and follow instruction from point 3, until all panels are configured.
14. Now all panels  $\mu$ CU-IQ could be connected together by wires

## **8. CONFIGURATION OF RS485 NETWORK ( $\mu$ CU-M.485 in network)**

1. First of all switch off all  $\mu$ CU-M.485 modules, which needs to be in the system
2. Set the binary address of all  $\mu$ CU-M.485 modules upwardly from 0 – 14
3. Switch on all  $\mu$ CU-M.485 modules
4. Press (SILENCE + TEST) on  $\mu$ CU-IQ
5. There is LEVEL II indication ON
6. Press (SILENCE + TEST) on  $\mu$ CU-IQ
7. The LEVEL II indication gets OFF, 3 beeps sounds and only POWER is ON
8. Now increment count of  $\mu$ CU-M.485 in network by pressing SILENCE (to decrement TEST could be used )
9. Count of  $\mu$ CU-M.485 is indicated by LED – POWER ON (0) to FAULT ON(14)
10. To confirm count of  $\mu$ CU-M.485 in RS485 network press (SILENCE + TEST)
11. Press again (SILENCE + TEST) to finish RS485 configuration
12. Sounds 3 beeps, the network creation is finished and  $\mu$ CU-IQ set its own address as number of  $\mu$ CU-M.485 in network + 1
13. System is ready to use

## 9. TEST OF INSTALATION

**!!!To ensure, that each component has enough transmitting power to reach control panel, it is recommended to complete following tests!!!**

*Test will decrease the RF transmitting power in all components about 10 dBm.  $\mu$ CU-IQ processes the communication tests from all IQ components which takes approximately 4 min. After this test  $\mu$ CU-IQ transmits the message RF Test to all IQ components, which should indicate it. After test is successfully done, the user has to press RST to reset the system.*

1. Press (SILENCE + TEST) on  $\mu$ CU-IQ
2. There is LEVEL II indication ON
3. Press (SILENCE + TEST) on  $\mu$ CU-IQ
4. The LEVEL II indication gets OFF, 3 beeps sounds, only POWER is ON accompanied with periodical beeping
5. Press and hold SIREN then push TEST on  $\mu$ CU-IQ
6. The LEVEL III.A is OFF, the RF Test is blinking
7. Wait approx. 3 min until the RF test is completed
8. Check all IQ components indication – Test should be indicated on all of them
9. In case there is COMM LOSS LOOP LOCAL indicated on  $\mu$ CU-IQ, or there is some IQ component in the loop without Test indication. This IQ component is probably very far from the  $\mu$ CU-IQ.
10. Press RST on  $\mu$ CU-IQ
11. Find another place for too far IQ component and repeat the test again until the test is without fault
12. To finish the testing press RST on  $\mu$ CU-IQ

## 10. INDICATION

LED INDICATION	TYPE	SIREN	EVENT
Power (Green LED)	ON		230V is connected
	Blinking	One beep within 16s	230V is disconnected System is powered from backup battery
Power Fault (Yellow LED)	ON	One beep within 16s	Power Fault (Low battery, charger problem, power line open/shorted)
Loop Alarm (Red LED)	ON	Constant beeping	Local loop alarm (detector in the local loop gets into alarm condition)
Remote Alarm (Red LED)	ON	Constant beeping	Remote loop or RS485 alarm (Local loop alarm in different system is detected, Local loop alarm in other system in RS485 net is detected)
Test Mode	ON		Test Mode is ON
Loop Low Battery	ON	One beep within 8s	Low battery of the IQ component has been detected
Level II	ON		$\mu$ CU-IQ is switched into LEVEL II – button functions of LEVEL II are available
	OFF		$\mu$ CU-IQ is in LEVEL I – button function of LEVEL I only
Fault	ON	One beep within 1s	Local Fault alarm (detector in the local loop detected fault conditions)
System Fault	ON	One beep within 8s	Watchdog reset, RF module does not work or other internal faults
Disable	ON		RF module and RS485 Loop is disabled – do not receive RF and RS485 Loop messages
RF Test	ON	One beep within 8s	Local loop is in RF TEST mode - after test message
	Blinking	One beep within 8s	TX power is reduced for instalation test
Hush	ON	One beep within 30s	The Local loop is in Hush mode - after hush message
Comm. Loss LOOP	ON	One beep within 30s	Local Comm. Loss is detected – No response from at least one IQ components in the local loop within 300s
Comm. Loss SYSTEM	ON	One beep within 30s	System Comm. Loss is detected – No response from at least one $\mu$ CU-IQ within 300s
Comm. Loss RS-485	ON	One beep within 30s	RS-485 comm. Loss detected – No response from at least one $\mu$ CU-M.485 to the RS485 comm. test message
All LED	ON		RF module and $\mu$ CU-IQ CPU process the command
	Blinking	Short beep at the beginning	RF module and $\mu$ CU-IQ CPU RESET is running
FAULT + Comm. Loss ( LOOP + SYSTEM )	Blinking	One beep within 4s	RF module is not connected into any RF loop
Comm. Loss LOOP + Disable	Blinking		Local RF local loop configuration procedure is going to be chosen
Comm. Loss System + Disable	Blinking		System (Backbone) loop configuration procedure is going to be chosen
Comm. Loss LOOP ON + Disable blinking			The $\mu$ CU- IQ has been already connected into local loop
Comm. Loss LOOP blinking + Disable ON			The $\mu$ CU- IQ is not connected into local loop
Comm. Loss System blinking + Disable ON			The $\mu$ CU- IQ is not connected into system loop
Comm. Loss System ON + Disable blinking			The $\mu$ CU- IQ has been already connected into system loop

## 11. BUTTON FUNCTION

**Right button pressing is indicated and confirmed by short beep of the siren.**

EVENT	BUTTON	EFFECT	PROCESS DESCRIPTION
FIRE ALARM (Remote or local fire alarm indication)	RST	Reset of FIRE ALARM + Siren STOP	Transmits message "R" / Reset local loop / Indication of the panel is reset
	SILENCE	Siren STOP	Stop the siren indication of the panel / transmits message "Q" / Stop all remote indication in local loop
FAULT ALARM (Fault, Comm. Loss Fault, Loop Low Battery Fault, System Fault)	RST	Reset of FAULT ALARM + Siren STOP	Transmits message "R" / Reset local loop / Indication of the panel is reset
	SILENCE	Siren STOP	Stop the siren indication of the panel / transmits message "Q" / Stop all remote indication in local loop
NO EVENT	RST	Reset of system	Transmits message "R" / Reset local loop / Indication of the panel is reset
	SILENCE	No action	No action
	Test	Test indication	Short beep and all LEDs flash / Transmits the list of last received events /
	1x (Silence + RST)	Local Loop Configuration	Transmitting "L" message - configuration local loop – do not press again 1x (Silence + RST) and wait until enabling
	2x (Silence + RST)	System configuration	Transmitting "L" message – configuration of system loop – do not press again 1x (Silence + RST) and wait until enabling
	Test + Silence	LEVEL II.B switches ON	Button operation from LEVEL II.B are enabled.
LEVEL II.B	RST	RF tranceiving and RS485 tranceiving is OFF	Switching off the RF module – RF module is sleeping and RS485 transceiver is OFF
	SILENCE&hold + push TEST	Test of all components in RF loop	Transmitting "T" message into local loop to test
	TEST&hold + push SILENCE	Switching on the Hush function in smoke detectors	transmitting "H" message into local loop to hush
	Test + Silence	LEVEL III.A is ON	Setting of the RS485 loop / actual RS485 setting is reset
	Test	Test indication + Test Mode is switched ON	Short beep and all LEDs flash / Transmits the list of last received events / + Test Mode is ON
	SILENCE	No action / if some EVENT = Siren STOP	No action / if some EVENT Stop the siren indication of the panel / transmits message "Q" / Stop all remote indication in local loop

LEVEL III.A	SILENCE	Setting of the maximal count of the RS485 components	Increment of uCU-M.485 / uCU-IQ count in the RS485 loop
	TEST	Setting of the maximal count of the RS485 components	Decrement of uCU-M.485 / uCU-IQ count in the RS485 loop
	RST	DO not USE / for development and production purpose only	RF module enables firmware programming mode
	SILENCE&hold + push TEST	LEVEL III.B is OFF + Test of the RF range is switched ON	Transmitting "1" message into local loop. All components then decreases the RF TX level about 10 dBm
	Test + Silence	LEVEL III.B is ON	Setting of the RS485 loop / Maximal RS485 components count stored in memory / When using uCU-M.485, please switch LEVEL III.B off
LEVEL III.B	Test + Silence	LEVEL III.B is OFF	Switch off the LEVEL III.B and button control is again in LEVEL I
	SILENCE	Setting of the RS485 address	Increments uCU-IQ address in the RS485 loop
	TEST	Setting of the RS485 address	Decrements uCU-IQ address in the RS485 loop
	RST	DO not USE / for development and production purpose only	RF module enables firmware programming mode

## 12. Technical specification

### POWER SUPPLY

Power supply:	9V ( + 10% / - 15% ) ~ 50Hz
Operating voltage:	3 V
Power consumption normal:	<30 mA
Power consumption backup:	<15 mA

### RF DETECTION LOOP

RF operation frequency:	868 MHz
RF modulation:	GFSK modulation
Number of nodes in local loop:	32
Number of systems in RF loop:	8
RF range in free space:	300m

### RS485 DETECTION LOOP

RS485 operation rate:	4800 Bd
Number of nodes in loop:	15
RS485 protocol:	ICAS protocol
RS485 voltage level:	0V – 3V

### RELAY OUTPUTS

Fault relay:	NC, COM
Alarm relay:	NC, COM
Relay parameters:	1x 125VAC / 0.5A, 24VDC / 1A

### S1 & S2 INPUTS

S1, S2 voltage level:	0V – 9V
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### TERMINALS

POWER Terminal:	2x
RS485 Terminal:	3x
S1 & S2 Terminal:	1x
Alarm Relay	1x
Fault Relay	1x

### MECHANICAL SPECIFICATION

Plastic box material:	ABS /UL 94 V-0
Colour:	Pour White
Size:	80mm x 80mm x 40mm
Weight:	70 g
IP-Class:	IP30 ( after installation)
Temperature:	-10 to +50 °C
Humidity:	95% RH
Cable terminals:	0.8 mm <sup>2</sup>

### SPECIFICATION

Comply with standard: EN54-2 & EN 54-4

### Appendix 1

#### ICAS IQ wireless system configuration

/ CONFIGURATION / DELETING from the LOCAL LOOP or SYSTEM LOOP/ Creating the wireless STAR loop configuration / Zone configuration/