

**Alarm Control Panels**

**INTEGRA**

Firmware Version 1.04

# **INSTALLER MANUAL**

**Satel**   
GDAŃSK





## WARNINGS

For safety reasons, the alarm system should only be installed by qualified personnel.

In order to avoid the risk of electric shock, read carefully this manual before proceeding to installation. Any connections should only be made in deenergized state, i.e. with power supply disconnected.

The control panel should be connected to **PSTN (analog) lines only**. Connecting the telephone circuit directly to digital network (e.g. ISDN) will cause damage to the equipment.

The alarm system may comprise dangerous devices, therefore it is necessary that its components be kept so as to prevent unauthorized access to the equipment.

If the service operations consist in fuse replacement, they must only be carried out with supply voltage disconnected. Only fuses having identical parameters with the original ones can be used for the replacement.

It is recommended that the manufacturer's prescribed housings and power supply units be used.

Making any construction changes or unauthorized repairs is prohibited. This applies, in particular, to modification of assemblies and components.

### CAUTION!

It is impermissible to connect a fully discharged battery (with voltage on unloaded terminals less than 11V) to the alarm panel. In order to avoid equipment damage, the fully discharged / never used battery should be precharged by means of a suitable charger.

The batteries used in the alarm systems contain lead. When used-up, the batteries must not be thrown away, but disposed of as required by the existing regulations (European Directives 91/157/EEC and 83/86/EEC).

<b>DECLARATION OF CONFORMITY</b>		
<b>Products:</b> CA424P, CA832, CA16128P - mainboards of INTEGRA control panels. - INTEGRA 24 - INTEGRA 32 - INTEGRA 64 - INTEGRA 128	<b>Manufacturer:</b> SATEL spółka z o.o. ul. Schuberta 79 80-172 Gdańsk, POLAND tel. (+48 58) 320-94-00 fax. (+48 58) 320-94-01	
<b>Product description:</b> Mainboards for alarm control panels intended for use in intruder alarm systems.		
<b>These products are in conformity with the following EU Directives:</b> LVD 73/23/EEC+93/68/EEC EMC 89/336/EEG + 91/263/EEC, 92/31EEC, 93/68/EEC R&TTE 1999/5/EC (network connection, TBR21)		
<b>The product meets the requirements of harmonized standards:</b> LVD: EN 50131-1:1997; EN 50131-6:1997; EN60950:2000, EN60335-1:1994/A1:1996 Annex B EMC: EN 55022:1998; EN 61000-3-2/-3; EN 50130-4:1995, EN 61000-4-2/-3/-4/-5/-6/-11 R&TTE: TBR 21(1998)		
Gdańsk, Poland	07.03.2005	Head of Test Laboratory: Michał Konarski 
Latest EC declaration of conformity and product approval certificates are available for downloading on website <a href="http://www.satel.pl">www.satel.pl</a>		

The INTEGRA alarm control panels meet requirements as per CLC/TS 50131-3, Grade 3, and have been certified by Det Norske Veritas Certification AS, Norway.

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## 1. Introduction

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This manual has been prepared for the whole family of INTEGRA alarm control panels. Information contained herein refers mainly to the INTEGRA 128 control panel, which is the biggest of them. During installation of the smaller control panels, it is necessary to make allowance for differences in technical parameters which are characteristic of the particular mainboards (see Table, page 3).

Devices incorporated in the INTEGRA alarm system meet requirements of the following standards: 50131-3, 50130-4, 50130-5 and 50131-6.

## 2. General Features of Control Panels

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The INTEGRA series alarm control panels are designed for small, medium-size and large facilities. Irrespective of its dimensions, each of the control panels has identical, advanced functional capabilities. The alarm systems which are based on them can be without difficulty extended by using the same expansion modules for all these control panels. It also makes possible to easily replace the control panel with a bigger one, if it is required by development of the system. Owing to such a solution, the optimal control panel can be selected for the particular site. The INTEGRA alarm control panels not only guarantee a perfect protection of the facility against burglary; they also offer advanced functions of access control and automatic operation of a number of devices. At the same time, they are easy to operate and user-friendly.

The control panels are characterized by the following features:

- Processor system with software stored in the FLASH memory, which allows panel firmware updating and adding new functions. New software versions can be loaded via the control panel RS-232 port without removal of the panel from the site.
- Possibility to keep the parameters programmed by service personnel in the FLASH memory. Thus, even on disconnecting the memory back-up battery, the control panel can restore the previous settings.
- Possibility to divide the system into objects and 32 partitions (partition = group of zones). The partitions may be controlled by the user, timers, control zones, or their status may be dependent on the status of other partitions. It is possible to temporarily restrict the access to partitions.
- Possibility of system development by adding the expansion modules (the development extent depending on the control panel size). Creation of a system based on modules (including the wireless system controller of SATEL manufacture) installed at various places throughout the facility can considerably reduce the amount of cabling used.
- Possibility to store in the system from 16 to 240 passwords (codes), which may be either assigned to users or to control functions.
- Advanced functions of simultaneous system control by means of LCD keypads and user computers connected to them. Additionally, the service personnel have an option to control the panel either via the RS-232 port or through a telephone link. Individual partitions can also be controlled through partition keypads assigned to them.
- Possibility to control the access to selected partitions of the facility by means of partition keypads, code locks, proximity card readers and DALLAS chips, which enable monitoring the access doors as well as controlling the locks (electric latches). The monitoring of door status does not reduce the number of zones controlled by the panel.
- Possibility to define the names of users and of majority of system components (partitions, zones, outputs, modules) which facilitates the control and monitoring of system as well as viewing of events log.

- Monitoring effected by means of built-in telephone communicator to two monitoring stations (four telephone numbers).
- Optional connection of additional communication modules, enabling monitoring with the use of Ethernet (TCP/IP), GSM (GPRS technology) or ISDN networks.
- The control panel allows for monitoring in Contact ID format, as well as in several other formats.
- Alarm messaging to telephones by means of voice messages or to a pager with text messages. Reception of a message can be acknowledged with a code entered from the telephone set keyboard (DTMF).
- Function of phone call answering, which enables checking the status of all control panel partitions and controlling the status of outputs. It is performed after user identification (each user may be assigned a special "telephone" password/code).
- Extended function of events printing, which enables the events to be sorted. Event descriptions are in accordance with the Contact ID standard, hence the printouts from the control panel correspond to those from the monitoring station. Besides, the names of zones, modules and users are printed as they are defined in the system.
- Additional function of the control panel RS-232 port, i.e. controlling the external analog modem, ISDN modem, GSM module, ISDN module and ETHM-1 module of SATEL manufacture, enables communication to be established with the service computer. In this case, the remote programming via telephone network or Ethernet as well as the service are as quick as direct programming from the computer via RS-232 port.
- Possibility of time-based control owing to timers that operate on week work cycle, with an option to define exception periods. Additionally, each partition is provided with its own timer (based on week or day cycle), programmed by the suitably authorized user, to secure automatic arming and disarming.
- Facilitated performance of non-standard functions due to a possibility to make complex logic operations at outputs.
- High-capacity event log where, in addition to the monitored events, also other events (like user access, functions used, etc.) are stored.
- Internal program structure allows to process all the incoming events. Because of the processing power, there's no need to individually prioritize particular signals.
- Shared indicators (like the LCD display) use the following display priority for the zone state (listed from highest to lowest priority): Bypass, Fault, Tamper Alarm, Intruder Alarm, Tamper violation, Intruder violation, Tamper memory, Intruder memory, Zone OK.

### 3. System Components

#### 3.1 Mainboards

Show in the table below are technical parameters of the alarm systems based on particular control panels of the INTEGRA family.

Technical parameter (quantity)	INTEGRA 24	INTEGRA 32	INTEGRA 64	INTEGRA 128
Security Grade	3			
Available messaging options	A, B, C			
Zones, mainboard	4	8	16	16
Zones, system	24	32	64	128
High-current outputs, programmable, mainboard	2	2	4	4

Dedicated power outputs for keypads, expanders and detectors	3	3	2	2
Outputs, OC type, mainboard	2	6	12	12
Outputs, system	20+4*	32	64	128
Connectors for voice synthesizers	1	1	2	2
Keypads, system	4	4	8	8
Expander buses	1	1	2	2
Expanders, system	32	32	64	64
Zone expanders	2	3	6	14
Output expanders	2	3	6	14
Objects	1	4	8	8
Partitions	4	16	32	32
Timers	16	32	64	64
Telephone numbers for messaging	4	8	16	16
Pager messages	16	32	64	64
Voice messages	16	16	16	32
Remote switches	16	16	16	32
Users (w/o master user and service)	16	64	192	240
Event log	899	899	6143	22527
Power supply capacity [A]	1.2	1.2	3	3
Battery charging current [mA]	350	400/800	500/1000	500/1000
Current capacity, programmable outputs: high-current / OC [A]	2 / 0.05	2 / 0.05	3 / 0.05	3 / 0.05
Current capacity, power-supply outputs: +KPD / +EX1 with +EX2 [A]	-	-	2.5 / 2.5	2.5 / 2.5
+KPD / +EX / AUX [A]	0.5/0.5/0.5	0.5/0.5/0.5	-	-

\* 20 physically available outputs (mainboard + expanders) + 4 virtual outputs (to perform logical functions – see description of output types 46 and 47).

- Zones programmed individually to handle configurations with or without end-of-line resistor (NO, NC, EOL, 2EOL/NO and 2EOL/NC) with functional test of the detector. One of a few dozens of response types can be chosen for each zone.
- High-current outputs with electronic fuses and low-current outputs designed to control relays, with a programmable operating mode and a possibility to select one of a few dozens functions.
- High-current outputs with electronic fuses for "power supply output" function.
- 1 or 2 connectors for voice synthesizers (SM-2 or CA-64 SM).
- Communication bus (keypad bus) for connection of LCD keypads and some of the additional modules.
- 1 or 2 communication buses (expander buses) for connection of additional modules to expand the mainboard functional capabilities. 32 or 64 such modules can be connected to the control panel.
- Telephone communicator, provided with a DTMF detection system for reception of commands via the telephone, as well as for monitoring, messaging, answering calls and remote programming.
- RS-232 port enabling the alarm system operation by means of a computer (DLOADX installer program), interfacing with a printer and the use of an external modem.
- Switching-mode power supply with short-circuit protection, provided with battery monitoring and discharged battery disconnection circuit.
- Independent real time clock with calendar, provided with its own back-up battery.
- Visual signaling of operation of all outputs, battery charging circuit and telephone communication unit.

- Protection of all zones, outputs and communication buses.

## 3.2 LCD keypads

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The keypads interacting with INTEGRA control panels are made with or without a built-in proximity card reader. They have the following features:

- Large, easy to read 2x16 characters display with permanent or temporary backlighting activated on pressing a key or by any control panel zone.
- Keyboard with backlighting controlled in the same way as the display backlighting.
- 2 zones with properties identical to main panel zones.
- Microswitch for keypad tamper detection.
- RS-232 port enabling the alarm system to be operated by means of computer (GUARDX supervisory and user program).

## 3.3 Optional modules

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The control panels are equipped with communication buses to allow for addition of expansion modules, which, along with the firmware updating feature to enhance their functionality, provides means for an easy upgrading of the system. It enables the system to be expanded by adding new components in order to better meet individual needs of the customer. The INTEGRA control panels interact with the CA-64 control panel dedicated modules, though some of them require a new program version.

### 3.3.1 Modules to be connected to keypad bus

**CA-64 PTSA. Mimic Board.** Enables visualization of the state of partitions / zones in the security system. The INTEGRA control panels support the mimic boards made in version CA64T v 1.4 and having firmware in version v4.0 or later.

**ETHM-1. Ethernet Module.** Makes it possible to operate the control panel through the Ethernet. INTEGRA control panels with firmware version 1.04 support ETHM-1 modules version 1.02 or later.

### 3.3.2 Modules to be connected to expander bus

**INT-S-GR / INT-S-BL / INT-SK-GR. Partition Keypad.** Controls the armed mode in one partition; can perform the access control functions and operate the electromagnetic door lock.

**INT-SZ-GR / INT-SZ-BL / INT-SZK-GR. Code Lock.** Enables performance of the access control functions and operation of the electromagnetic door lock.

**CA-64 SR. Expander of Proximity Card Reader.** Supports the SATEL made proximity card readers to enable performance of the access control functions and operation of the electromagnetic door lock.

**CA-64 DR. Expander of "DALLAS" Chip Readers.** Supports the DALLAS chip readers to enable performance of the access control functions and operation of the electromagnetic door lock.

**CA-64 E Zone Expander.** Enables the system expansion by 8 zones.

**CA-64 EPS Zone Expander with Power Supply.** Enables the system expansion by 8 zones. Equipped with a 2.2A built-in switching mode power supply.

**CA-64 ADR Addressable Zone Expander.** Enables the system expansion by 48 zones. Equipped with a 2.2A built-in switching mode power supply. The INTEGRA control panels support the addressable zone expanders having firmware in version v1.5 or later.

**CA-64 O-OC / CA-64 O-R / CA-64 O-ROC. Output Expander.** Enables expansion of the system by 8 outputs. Made in three versions: 8 OC type outputs, 8 relay outputs and 4 relay outputs / 4 OC outputs.

**CA-64 OPS-OC / CA-64 OPS-R / CA-64 OPS-ROC. Output Expander with Power Supply.** Enables expansion of the system by 8 outputs. Made in three versions: 8 OC type outputs, 8 relay outputs and 4 relay outputs / 4 OC outputs. Equipped with a 2.2A built-in switching mode power supply.

**CA-64 PP Zone / Output Expander with Power Supply.** Enables expansion of the system by 8 zones and 8 outputs (4 relay and 4 OC type). Equipped with a 2.2A built-in switching mode power supply.

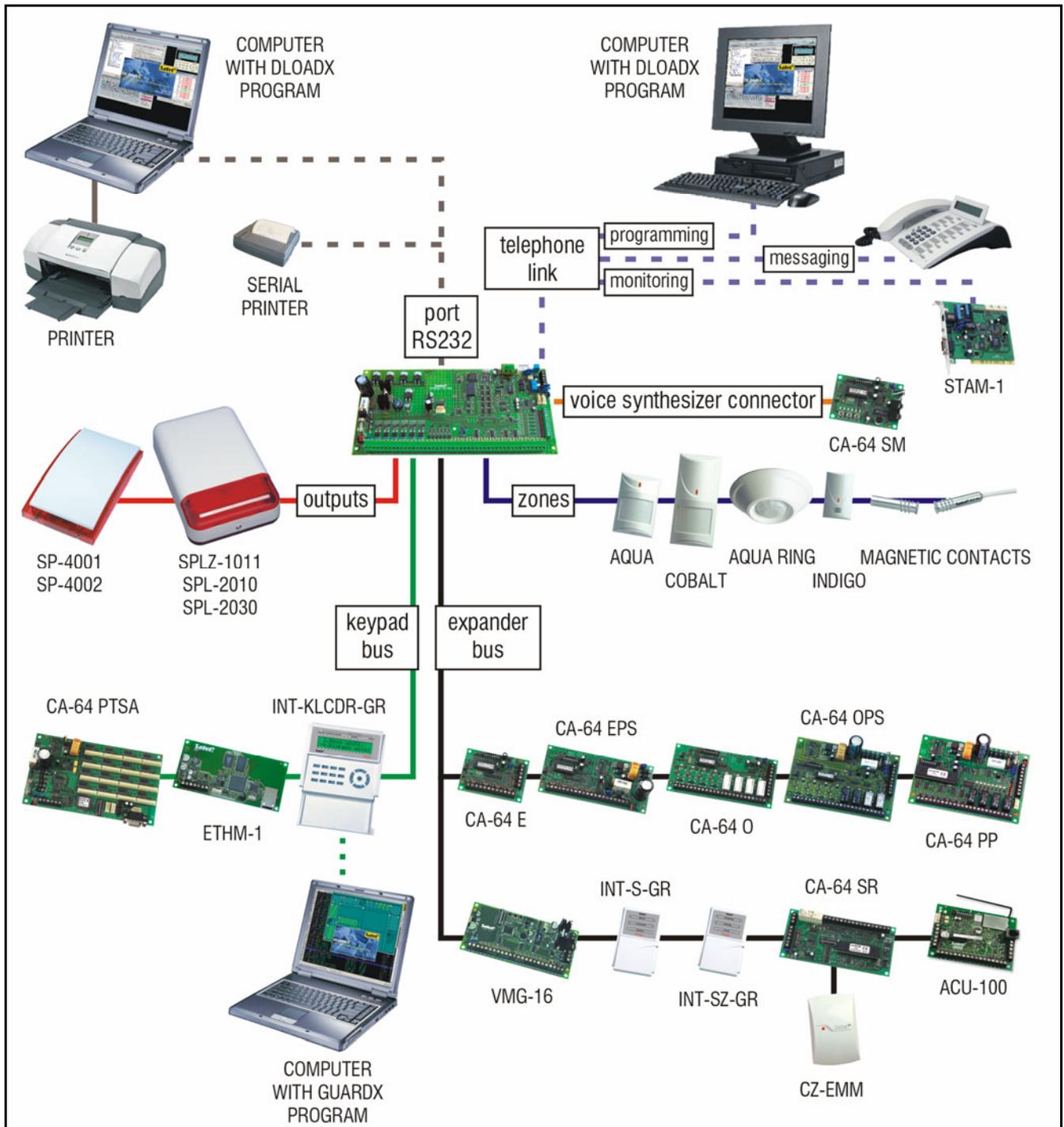


Fig. 1. Example of devices interfacing with the INTEGRA alarm control panel.

**CA-64 SM Speech Synthesizer Expander.** Capable of storing 16 voice messages, each with 15 second duration. The messages are used for alarm notification via telephone.

**VMG-16 Voice Message Generator.** Plays back prerecorded messages when specified events occur in the system.

**ACU-100 Controller of ABAX Wireless System.** Enables expansion of the system by adding wireless devices.

## 4. Control panel installation

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**The control panel mainboard contains electronic components sensitive to electric charges. Prior to installation, these charges must be removed. During installation, avoid touching any elements on the control panel board.**

The control panel and other intruder system components should be installed within the protected premises. Permanent (not disconnectable) 230 VAC power supply with protective ground should be available on site. The telephone line must be made with the use of four-wire cable to enable the control panel to be connected before other equipment (telephone, fax, etc).

The control panels of INTEGRA series can be installed in the following housings:

- CA-64 OBU N (all panels),
- CA-10 OBU N (INTEGRA 24 and INTEGRA 32),
- CA-6 OBU N (INTEGRA 24 and INTEGRA 32).
- OMI-3 (INTEGRA 64, INTEGRA 128) – required for conformance to Standard 50131-3,
- OMI-2 (INTEGRA 24, INTEGRA 32) – required for conformance to Standard 50131-3,
- OMI-1 (INTEGRA 24) – required for conformance to Standard 50131-3.

### **Notes:**

- *Prior to mounting the control panel housing, install mainboard fixing pins.*
- *When installing the housing, be careful not to damage cables which will pass through openings in the rear wall of the control panel housing.*
- *Switch off the mains / battery power supply when connecting LCD keypads and other components powered from control panel outputs.*

### **CAUTION !**

The control panel is power supplied from 230VAC mains - any negligence or mistake in making wire connections may lead to electric shock and pose danger to life!

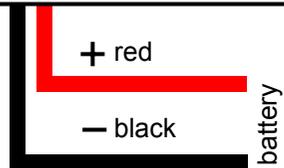
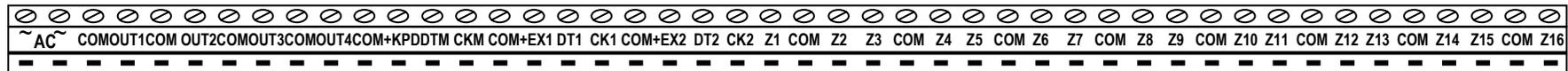
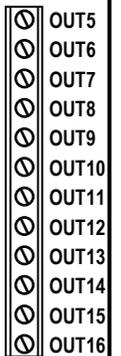
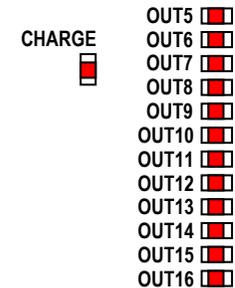
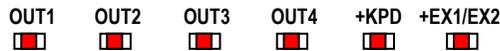
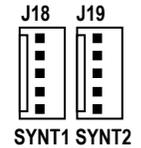
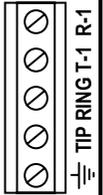
Be particularly careful when connecting the control panel. During installation and hook-up of the control panel the power supply cable must never be live!

The following tools will be useful during installation:

- screwdriver, flat 2.5mm,
- screwdriver, phillips,
- pliers, precision,
- pliers, flat nose,
- driller c/w a set of drill bits.

# INTEGRA 64 / INTEGRA 128 control panel mainboard

MEMORY



Board terminals:

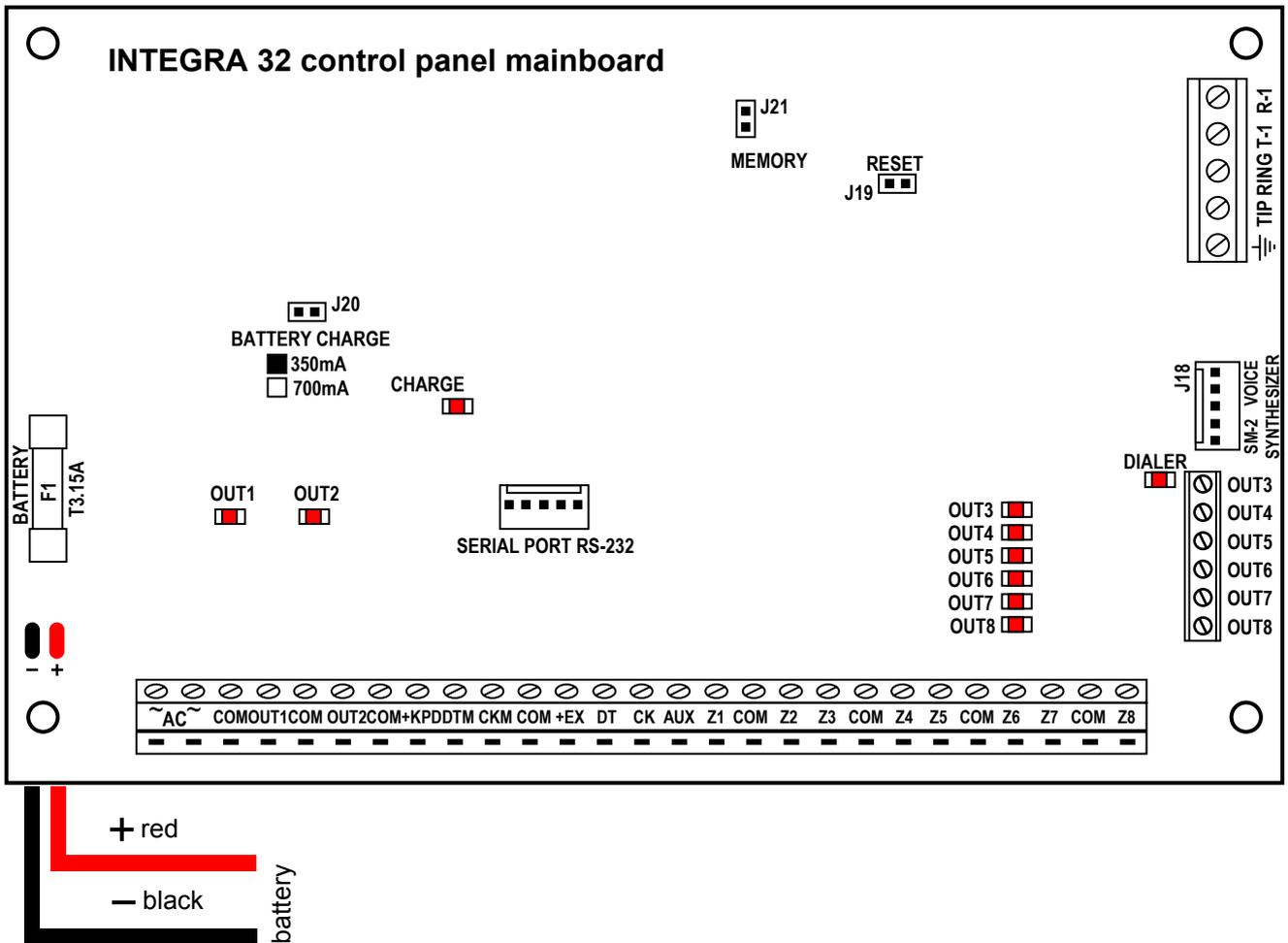
- AC** - power supply inputs (20V AC)
- Z1 to Z16** - zones
- OUT1 to OUT4** - high-current outputs
- OUT5 to OUT16** - low-current outputs
- DTM, CKM** - keypad bus
- DT1, CK1** - expander bus 1
- DT2, CK2** - expander bus 2
- COM** - common ground

**T-1, R-1**

**TIP, RING**

**+KPD, +EX1, +EX2**  
**SYNT1, SYNT2**  
**RS-232**

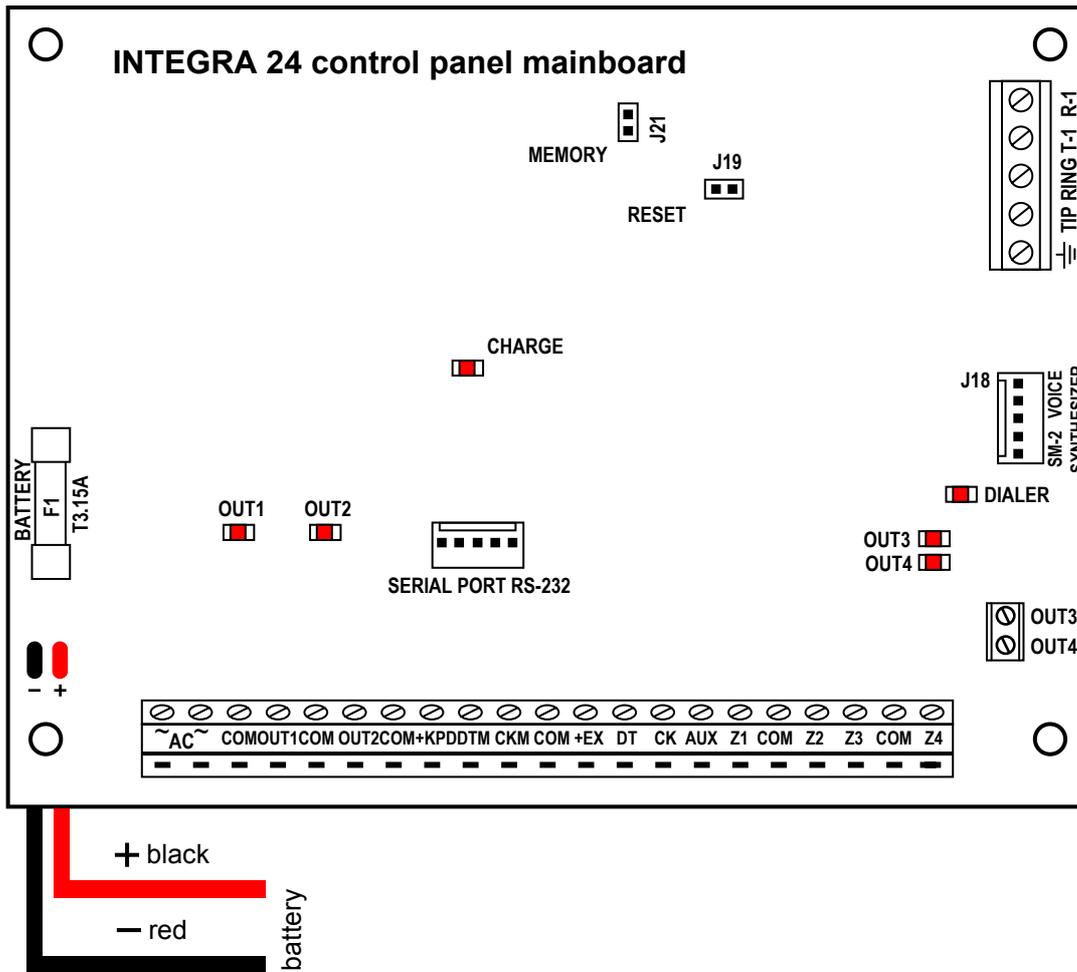
- extension telephone line (telephone set connection)
- public telephone line (analog)
- protective terminal - ground (connect to protective circuit only)
- supply outputs (+12V)
- connectors for voice synthesizers
- connector for service computer



Board terminals :

- ~ AC** - supply inputs (18V AC)
- Z1 do Z8** - zones
- OUT1, OUT2** - high-current outputs
- OUT3 do OUT8** - low-current outputs OC
- DTM, CKM** - keypad bus
- DT, CK** - expander bus
- COM** - common

- T-1, R-1** - extension telephone line (telephone set connection)
- TIP, RING** - public telephone line (analog)
- ⏏** - protective terminal - ground (connect to protective circuit only )
- +KPD, +EX, AUX** - supply outputs (+12V)
- SM-2 VOICE SYNTHESIZER** - connector for voice synthesizer
- RS-232** - connector for service computer



Board terminals :

- ~ AC** - supply inputs (18V AC)
- Z1 do Z4** - zones
- OUT1, OUT2** - high-current outputs
- OUT3, OUT4** - low-current outputs OC
- DTM, CKM** - keypad bus
- DT, CK** - expander bus
- COM** - common

- T-1, R-1** - extension telephone line (telephone set connection)
- TIP, RING** - public telephone line (analog )
- ⏏** - protective terminal - ground (connect to protective circuit only)
- +KPD, +EX, AUX** - supply outputs (+12V)
- SM-2 VOICE** - connector for voice synthesizer
- SYNTHESIZER** - synthesizer
- RS-232** - connector for service computer

### 4.1 Connecting LCD keypads

Up to eight independent LCD keypads, intended for control and programming of the alarm system, may be connected to the INTEGRA control panel. All the LCD keypads dedicated to the INTEGRA control panel ensure full control of the panel and can be installed in one alarm system. Where several keypads are connected to the control panel, they should be connected in parallel. Since keypad bus data are addressed, all keypads operate independently.

The keypads are to be connected to COM, +KPD, DTM and CKM terminals. The +KPD output makes it possible to supply all keypads (this output is provided with electronic circuit breaker). Each keypad must be connected with a separate cable (a typical unscreened cable is recommended). Maximum distance between keypad and control panel can be up to **300m**.

To ensure correct operation of the keypads it is important that the cable resistance be kept as low as possible. For example: depending on the distance between the keypad and the control panel, the number of parallel-connected wires for particular signals (with the DY8x0,5 cable), must be as indicated in the table below.

DISTANCE \ SIGNAL	NUMBER OF WIRES FOR DY8x0,5 CABLE			
	+KPD	COM	CKM	DTM
up to 100m	1	1	1	1
up to 200m	2	2	1	1
up to 300m (DY12x0.5)	4	4	2	2

**Notes:**

- CKM, DTM and COM leads must be in the same cable!
- Supply voltage measured at the LCD keypad terminal block, with the backlighting on, must not be lower than 11V.
- Keypads installed far from the control panel may be supplied locally from an independent power source. They are connected to the system by means of CKM, DTM and COM signals.

TERMINALS DESCRIPTION						
<b>KEYPAD</b>	KPD	DTM	CKM	COM	Z1 – to detector	Z2 – to detector
<b>PANEL</b>	+KPD	DTM	CKM	COM	ADDITIONAL SYSTEM ZONES	

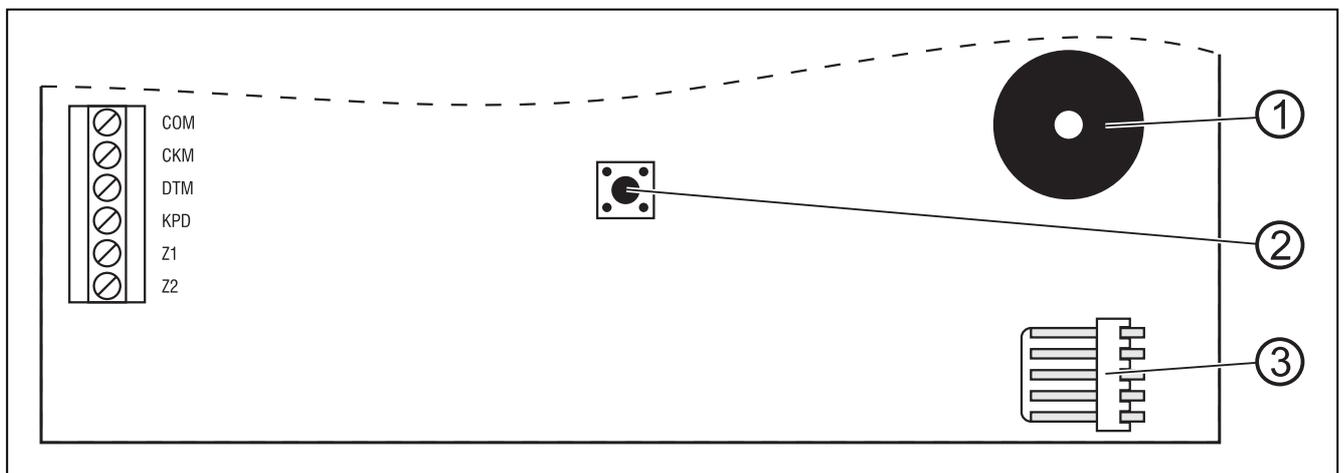


Fig. 2. Partial view of keypad board: INT-KLCD-GR / INT-KLCD-BL / INT-KLCDR-GR / INT-KLCDR-BL.

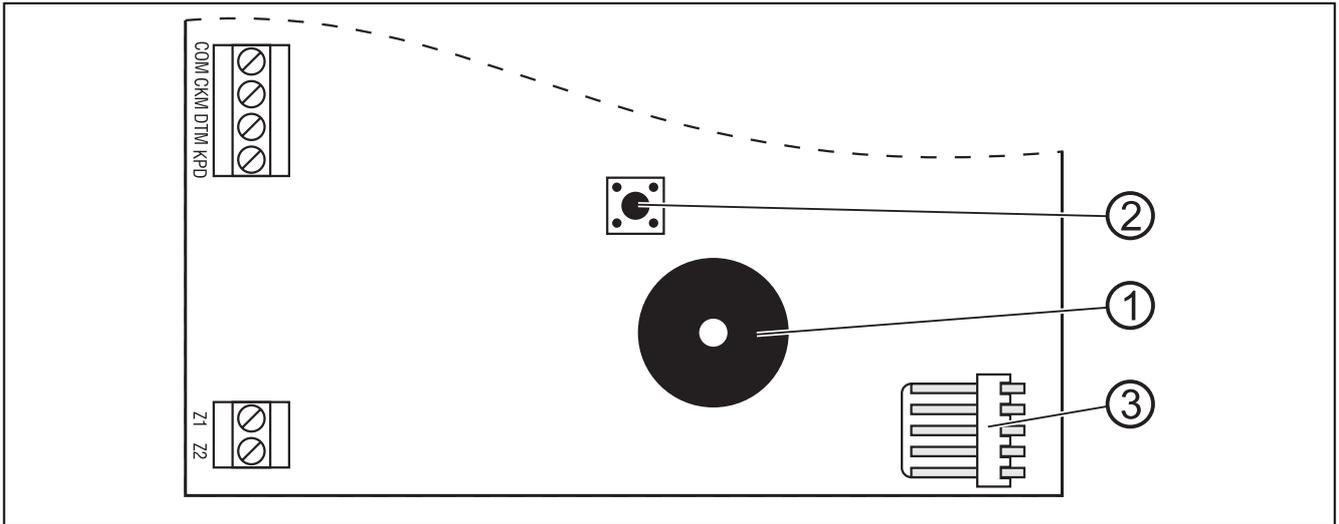


Fig. 3. Partial view of INT-KLCDS-GR / INT-KLCDS-BL keypad board.

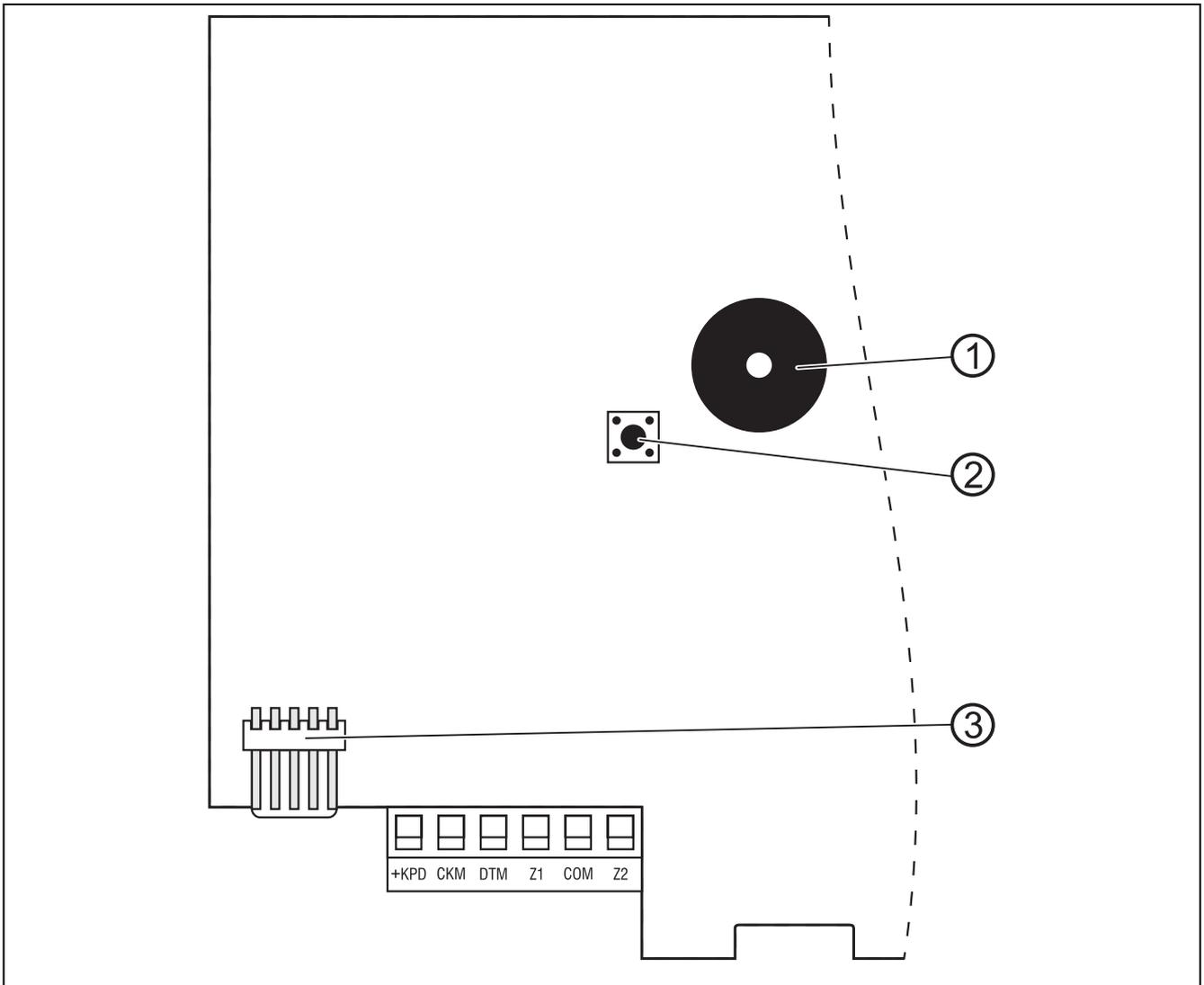


Fig. 4. Partial view of INT-KLCDK-GR keypad board.

Explanations to Figures 2, 3 and 4:

- 1 – buzzer
- 2 – tamper contact
- 3 – RS-232 port

The control panel identifies the keypads by their addresses, set by software tools and saved in EEPROM system (non-volatile memory).

The addresses cannot repeat themselves ! The keypad addresses also indicate the numbers assigned by the system to the keypad zones Z1 and Z2. They are served by the control panel in the same way as the mainboard zones.

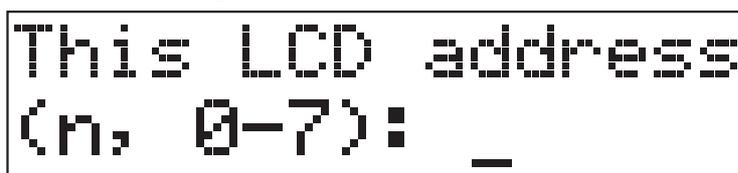
Keypad address	Numbers of Z1, Z2 zones in security system							
	INTEGRA 24		INTEGRA 32		INTEGRA 64		INTEGRA 128	
	Z1	Z2	Z1	Z2	Z1	Z2	Z1	Z2
0	5	6	25	26	49	50	113	114
1	7	8	27	28	51	52	115	116
2	21	22	29	30	53	54	117	118
3	23	24	31	32	55	56	119	120
4					57	58	121	122
5					59	60	123	124
6					61	62	125	126
7					63	64	127	128

**Note:** If expanders are connected, a situation may occur that the zone numbers of the keypad and the expander coincide. If this is the case, select the option in the keypad settings to define whether the detector is to be connected to keypad zone or expander zone (→Structure; →Hardware; →Keypads; →Settings; →Keypad name (from list) →Z1 / Z2 (selection of options and settings)).

The keypad address can be programmed in two ways:

1. Directly (skipping the control panel service code), to do so:

- Turn off the keypad power supply +KPD and the data bus wires (CKM, DTM).
- Short the keypad terminals CKM and DTM.
- Turn on keypad power supply.
- The following text will be displayed:



n=0...7, current address of the keypad

Fig. 5. Programming the keypad address

- Enter a new address from the 0-7 range. The keypad will acknowledge performance of the function with four short and one long beeps. To change the address again, press the [\*] key.
  - Connect the keypad to the control panel as required (CKM, DTM).
2. By using the control panel service function; to do so:
- Activate the panel service mode (from any supported keypad): [SERVICE CODE][\*], →Service mode.
  - Select in turn the items from the menu of displayed functions: →Structure; →Hardware; →Identification; →Keypad addr.
  - A message will appear on the displays of all keypads as shown in Figure 5.
  - Enter the appropriate address from the 0-7 range; the keypad will acknowledge performance of the function with four short and one long beeps; then, press the [\*] key - the keypad will quit the address change function, and the control panel will end the service mode.

**Notes:**

- For the LCD keypads to be properly supported by the INTEGRA control panel, the keypad identification function must be performed after setting the keypad addresses.
- Setting the same address in several keypads will trigger the tamper alarm, and also will display the "This keypad is changed" message and disable operation of such keypads. To restore the operation of keypads, change their repeating addresses into unique ones. The changes can be made as described herein (point 1).

If properly connected, the keypad reports its restart and displays a date and clock or name, while incorrect connection is signaled by displaying the "No communication with control panel" message.

System control is only possible after the *Identification of keypads* service function is performed. This function checks the addresses to which keypads are connected and registers them in the system. Disconnection of a keypad registered in the system will trigger the tamper alarm. Any commands from a keypad not registered by the control panel are rejected (and the "Keypad is not serviced" message appears on the keypad display).

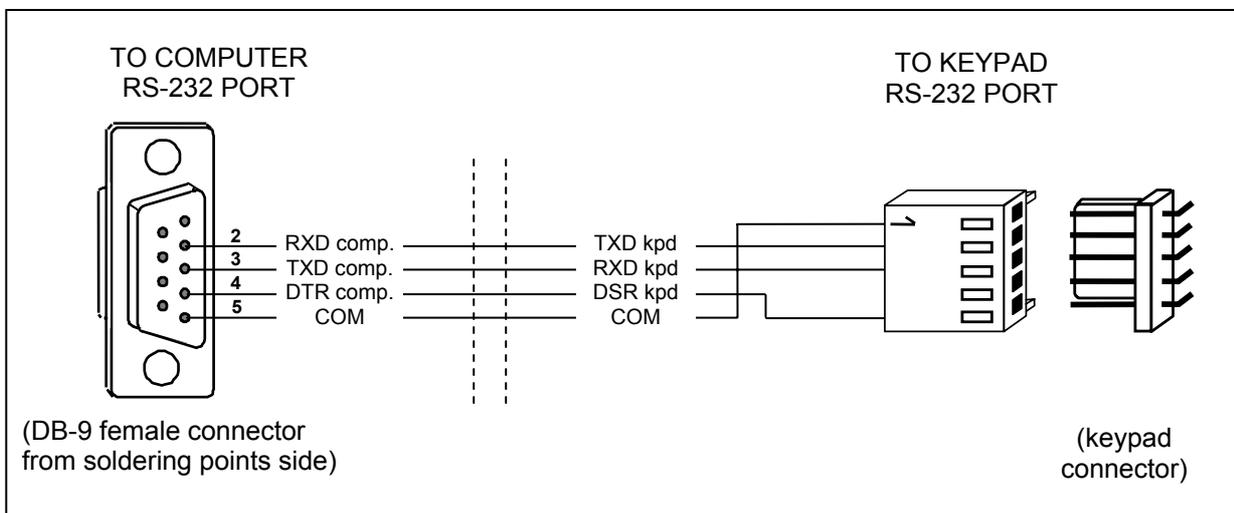


Fig. 6. Connecting computer to LCD keypad RS-232 port.

**The keypad RS-232 port** is designed for connecting the user's computer. The cable should be connected to one of the computer RS-232 ports (e.g. COM1 or COM2). Data received from the keypad are used by the GuardX program, which makes it possible to control the system by means of a computer (virtual keypad, editing users and their authority level) as well as supervise the facility (a site plan showing status of partitions and detectors, review of events log).

Connection to the computer is permanent, made with the use of an ordinary unscreened cable. For a DY8x0,5 cable, the distance between the computer and the keypad can be up to **10 meters**. Keypad connector signals are shown in Figure 6.

**Note:** Activate the "RS communication" option in parameters of keypads to which the user's computer is to be connected. Data exchange with the computer begins automatically when the GuardX program is started.

## 4.2 Connection of expansion modules

The INTEGRA control panels are provided with one or two buses designed for connecting the expansion modules (expanders). Both buses in the INTEGRA 64 and INTEGRA 128 control panels have the same priority and can be used in parallel (it is irrelevant which modules are connected to each bus). All modules are connected in parallel, and up to 32 modules may be connected to each bus.

Data exchange is carried out via DT1 (DT), CK1 (CK), and COM on the first bus, and via DT2, CK2 and COM on the second bus. Additionally, separate terminals for supplying the modules are provided in the mainboard connectors.

The modules may be connected with the use of a typical unscreened cable used in alarm systems (for example, DY8x0,5). The DT, CK and COM signals of each bus should be supplied by one cable (not by separate cables). For small distances (up to 100 meters), when modules only are connected to the power supply cable, it is permissible to connect some modules one after the other (see Fig. 7). Additional equipment connected to the power supply source must be supplied through separate cables (detectors connected to modules A and B).

**Note:** Connection of a fourth module after module C is not recommended when a DY8x0,5 cable is used. The module connected in this way may be not recognized by the control panel. Resistance of cables at DT and COM may result in the logic level "0" at the control panel input being higher than the maximum allowable level.

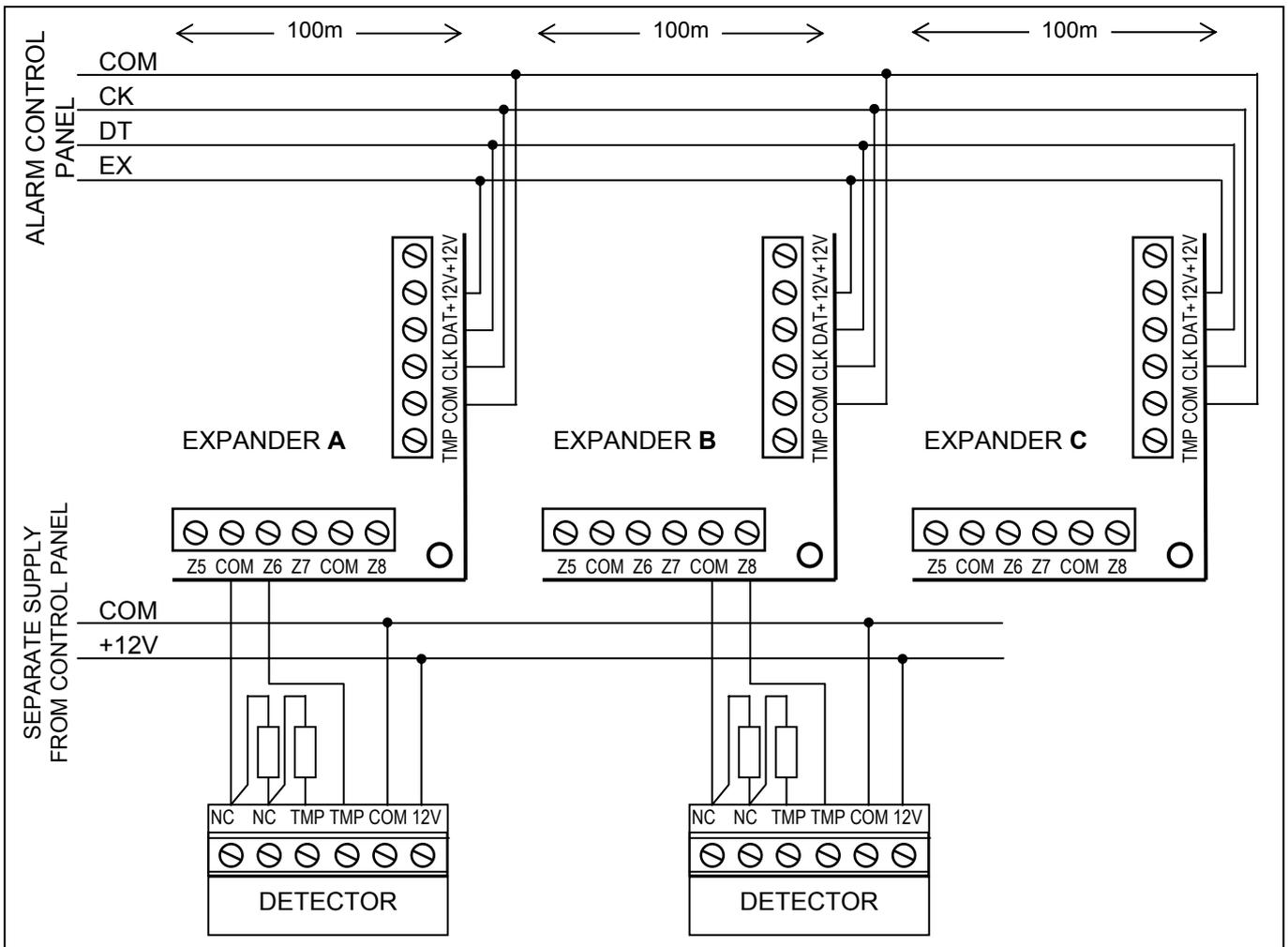


Fig. 7. Correct connection of modules at small distances between control panel and modules, and the way of connecting detectors.

For large distances between the control panel and modules (up to **1000m**), modules should not be powered from the control panel, and **DT**, **CK** and **COM** signals should use **2-wire** cable. Additionally, the DT, CK and COM signals must be in one cable. It is possible to connect several modules in parallel and connect them to a single common cable leading to the control panel (Fig. 8). For example, when the distance from the control panel to the cabling node is 800m and the distance from the cabling node to the module is less than 100m, it is possible to connect up to 16 modules.

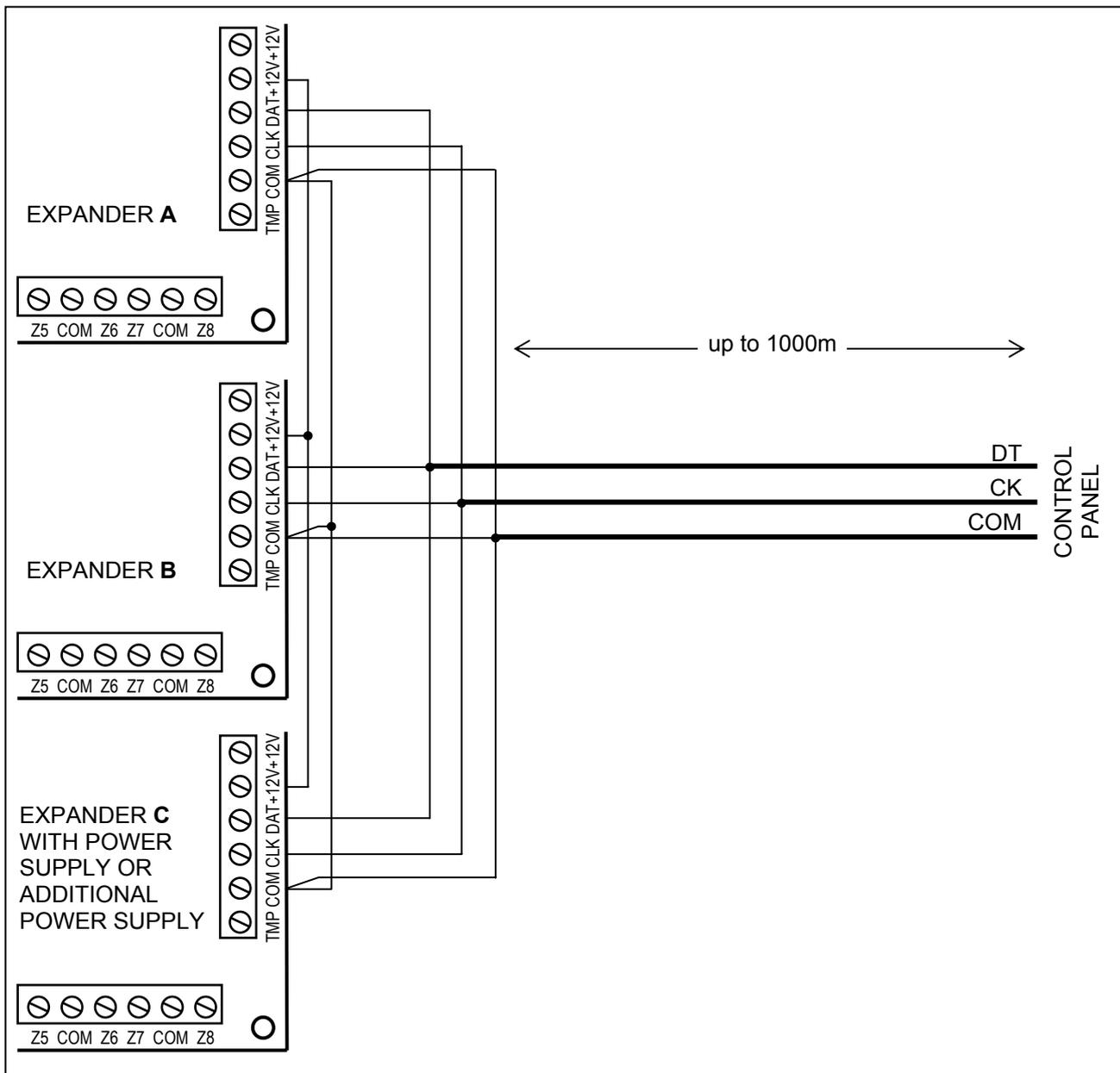


Fig. 8. Connection of module group located far from the control panel.

The expansion modules can also be mounted in metal housings, type **CA-64 OBU-EXA**, or plastic housings, type **OPU-1A**.

Each module connected to the bus should have its own, unique address from the 0 ÷ 31 range (decimal). It is irrelevant which addresses are set for individual modules (when identifying the modules, the control panel receives information on the module type and automatically sets an optimum sequence of calling the modules for data). The address is set by means of DIP-switches on keypad electronics boards. The expander addresses are displayed in the keypad in hexadecimal format. The addresses of modules connected to the first expander bus remain within the range from **00** to **1F**, and those of modules connected to the second bus - within the range from **20** to **3F**.

The control panel handles the modules registered in the system by means of the *Identification of expanders* service mode function. This function determines expander addresses and types. Additionally, it sets a special random generated marker by which the module confirms its presence in the system. This marker is stored in module non-volatile EEPROM memory, and it may be changed in a next identification process only. For this reason, each module replacement, address change and change of module type under given address require running of the identification function again.

**Notes:**

- *The control panel does not handle the module unless the identification function is completed with the "Found xx exp. (yy new)" message.*
- *A wrong module connection can make the correct identification of modules impossible, which is signaled by the message: "Error! Two expanders have the same addr. !".*
- *Too high resistance of cables connecting the module to the control panel (large distance, too small number of wires for a single signal) may result in the module being not recognized by the identification function.*
- *When modules are served by the control panel, the LEDs on modules of zones, outputs, synthesizers (etc., which are provided with operation signaling for service only) change their status.*

### 4.3 Connection of detectors

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The INTEGRA can operate with any detectors. Each control panel zone and zones of LCD keypads and zone modules may operate in the following configurations:

- NC (normally closed),
- NO (normally open),
- EOL (end of line resistor),
- 2EOL/NO (NO type detector, double end of line resistor),
- 2EOL/NC (NC type detector, double end of line resistor).

When a zone operates in the EOL configuration, use **2.2 k $\Omega$**  resistor to close the detector circuit.

For the 2EOL zones, the detector circuit is closed with two resistors **1.1k $\Omega$** . The 2EOL type zones allow the control panel to simultaneously control the detector status and its tamper contact.

Any output with electronic protection (from OUT1 to OUT4) may be used to power detectors. This output should be programmed as POWER SUPPLY OUTPUT. For larger systems with additional power supply with high capacity batteries, detectors are powered from external power sources.

Figures 9, 10, 11 and 12 show how the detectors are connected in various configurations. In the presented examples, the OUT4 output feeds the detectors (type 41 POWER SUPPLY). The detector signal is fed to the Z1 zone of the control panel. The Z2 zone, Figures 9, 10 and 11, has been programmed as type 9 (24H TAMPER). Separation of the grounds of detector power supply and signal informing of the status of detector connected to the control panel monitoring zone, eliminates the influence of the resistance of wires on the detector status detection. Assuming that only one detector is connected to the cable and the cable is not very long, the installation may be simplified by leading a common single wire for power supply ground (COM) and signal ground (COM).

The NO and NC detectors in 2EOL configuration are connected in the same way, it is only important to properly indicate to the control panel which detector is connected to the zone (2EOL/NO or 2EOL/NC).

**Note:** *The recommended power supply circuit for detectors connected to expanders is shown in section "Connection of expansion modules".*

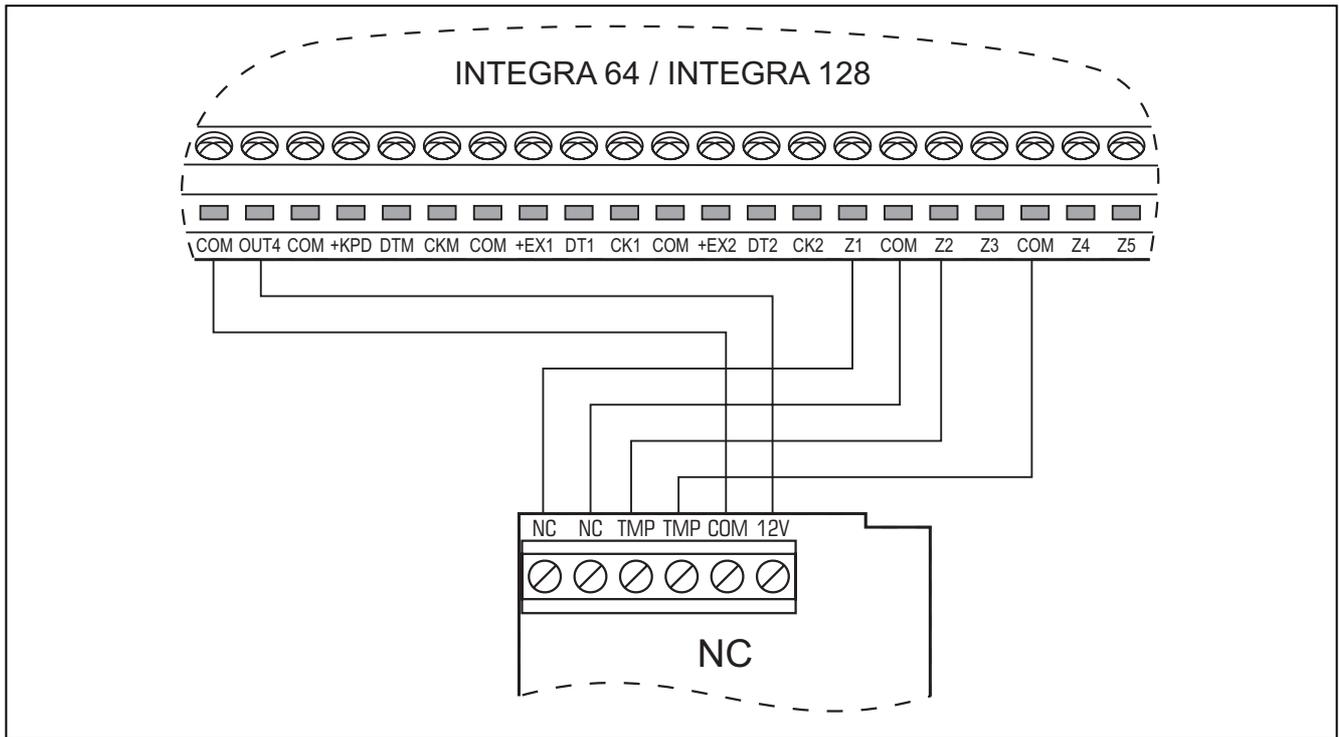


Fig. 9. Example of connecting NC type detector to control panel (NO type detector is to be connected in the same way).

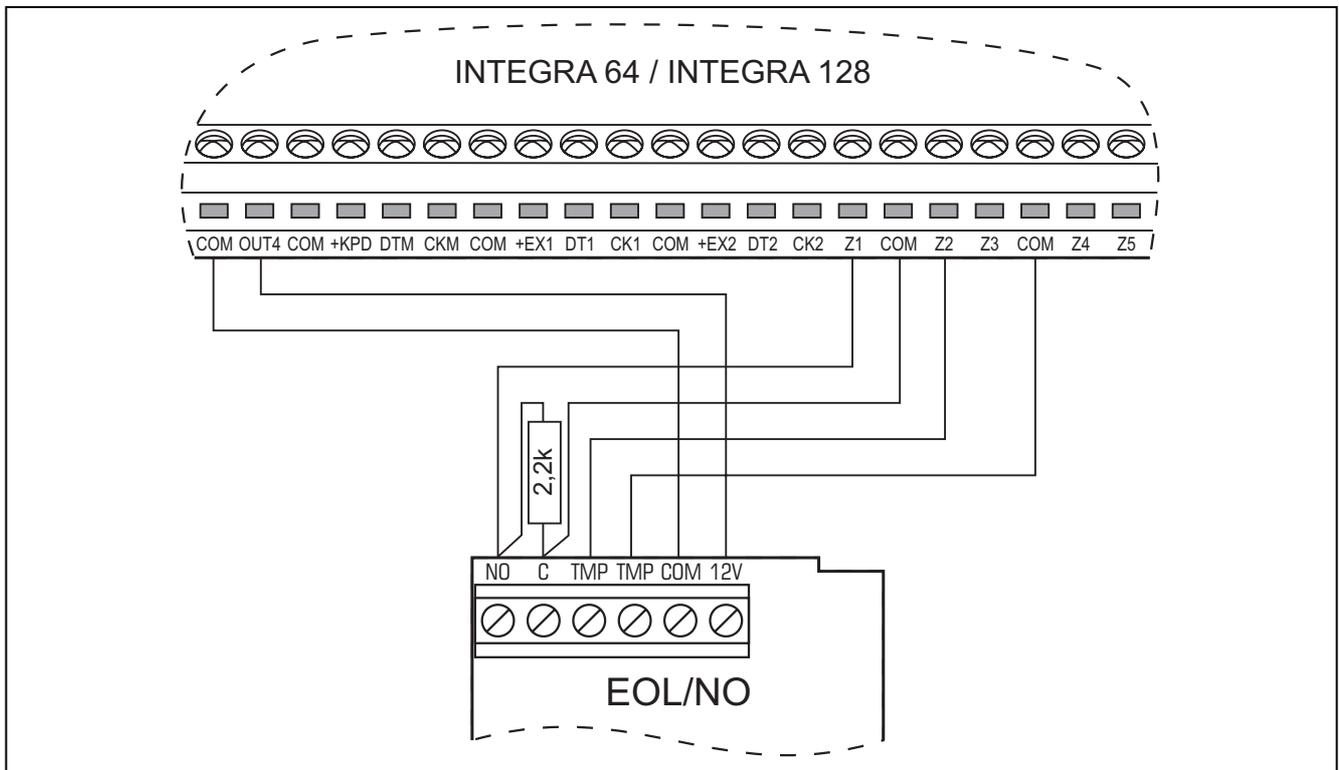


Fig. 10. Example of connecting NO type detector in EOL configuration to control panel.

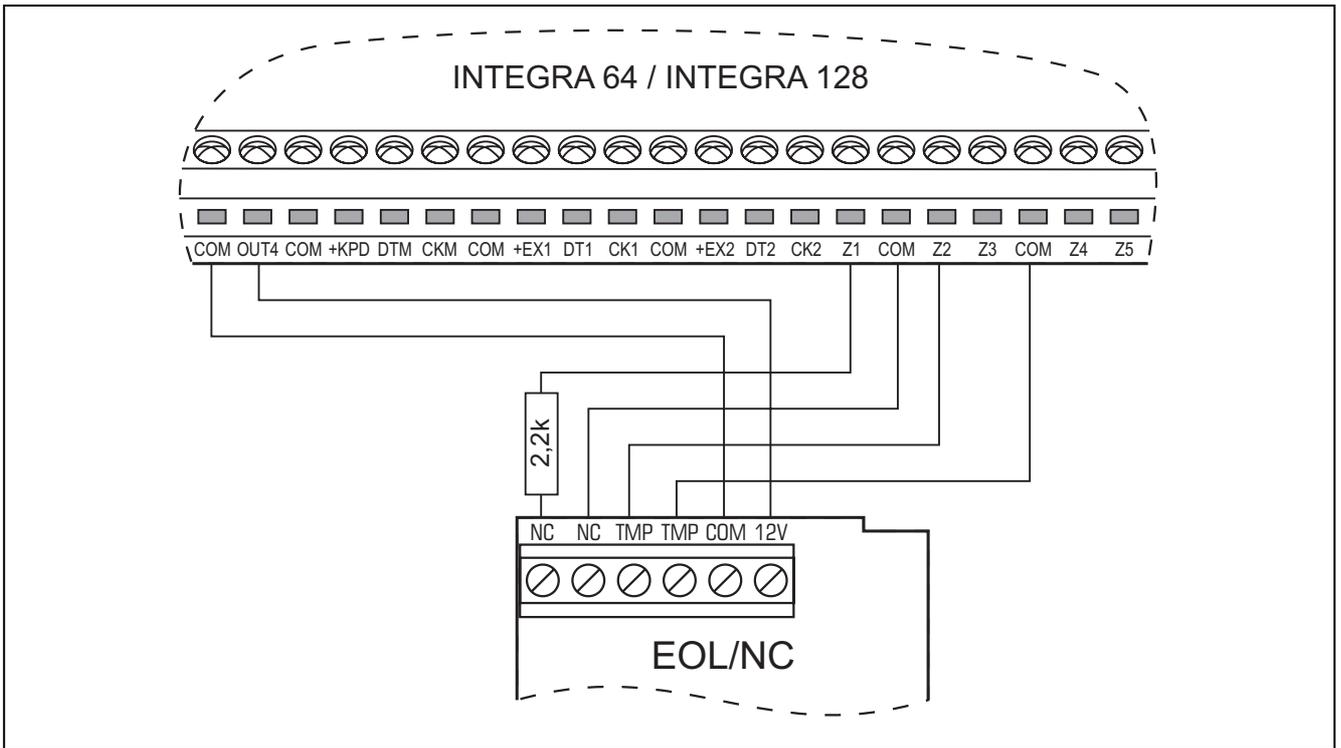


Fig. 11. Example of connecting NC type detector in EOL configuration to control panel.

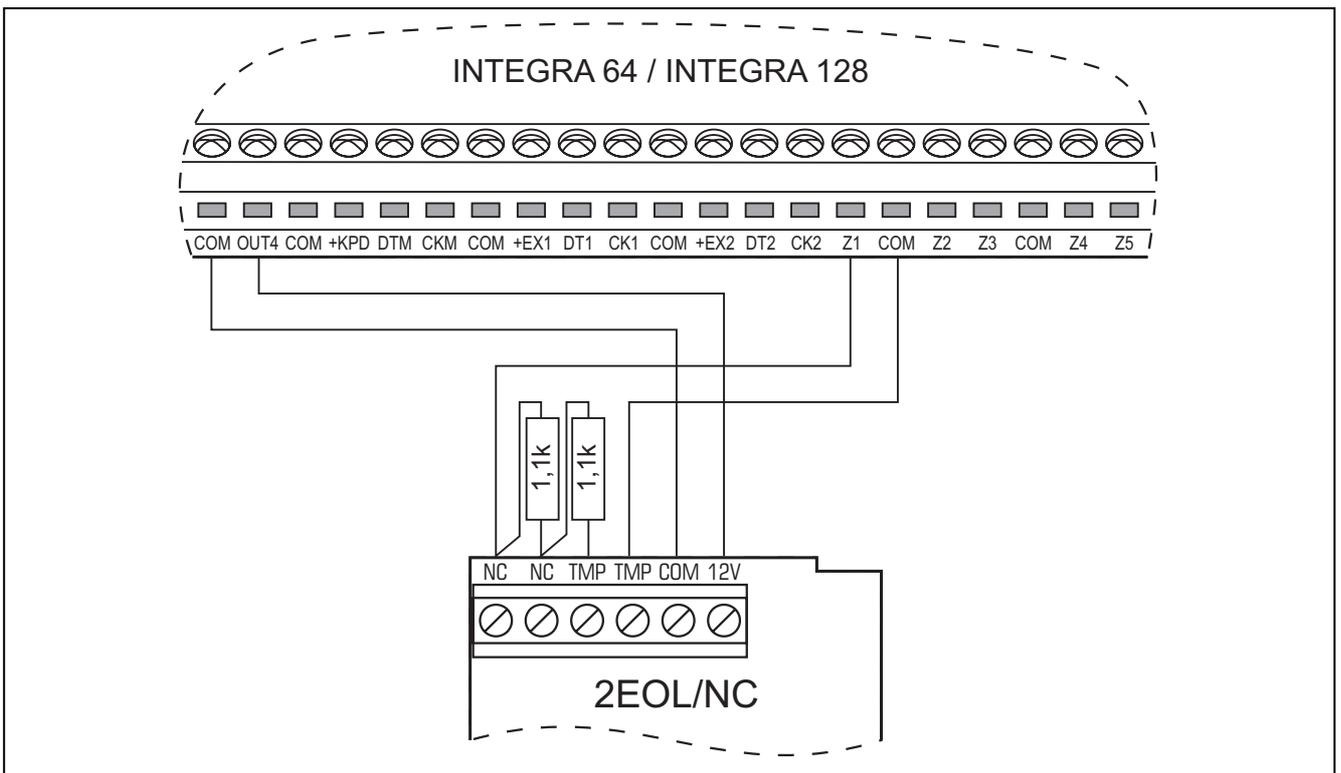


Fig. 12. Example of connecting NC type detector in 2EOL configuration to control panel (NO type detector is to be connected in the same way).

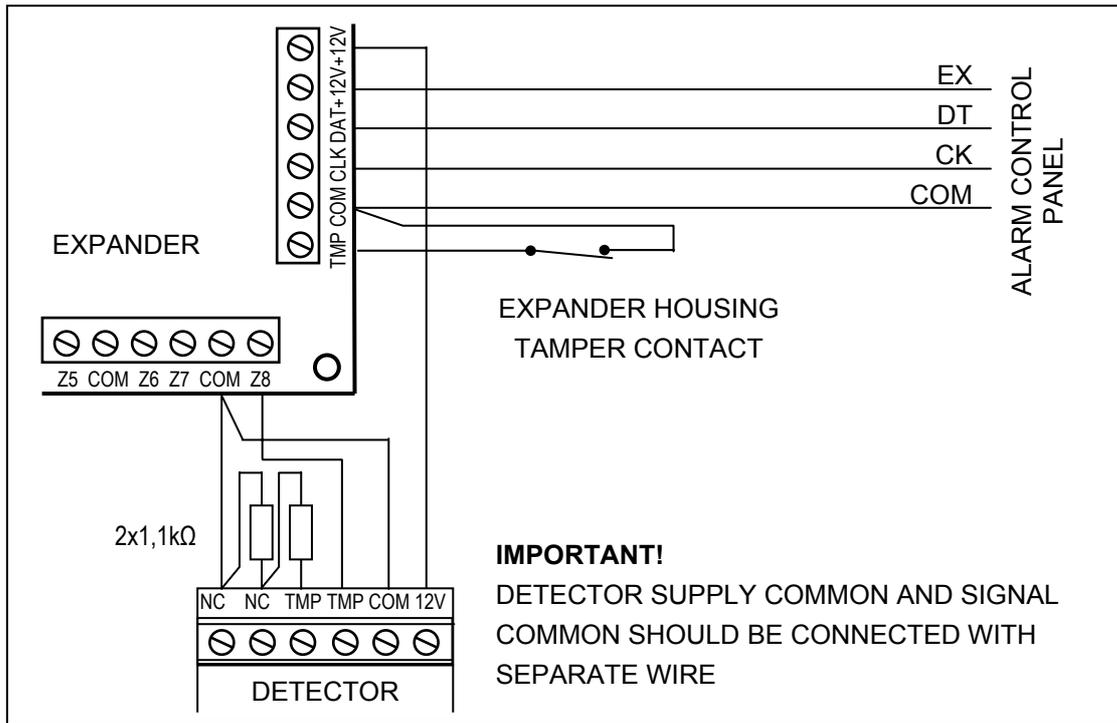


Fig. 13. Connection of 2EOL detector to expander when there is small distance between the control panel and the expander (the detector is distant from the expander).

### 4.4 Connection of sirens

The INTEGRA control panel is provided with 16 programmable application outputs. In order to connect a siren to the control panel, it is necessary to set this output as an "alarm" output.

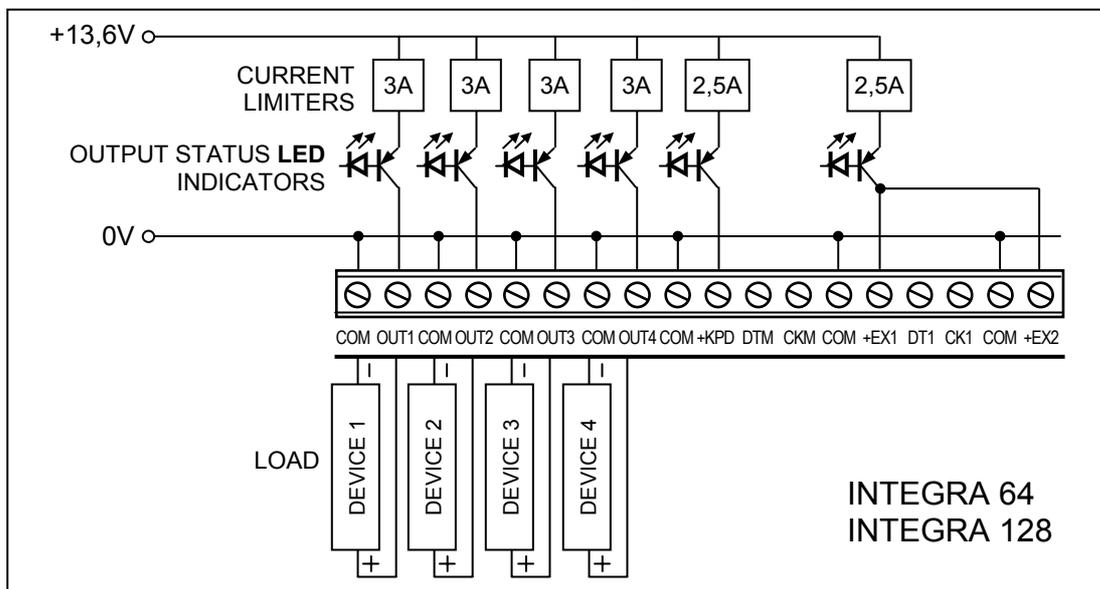


Fig. 14. Connection of a load (e.g. siren) to high-current outputs.

Each programmable high-current output has an electronic circuit breaker and a current limiter. The structure of these outputs and how the sirens without their own power supply (or other loads) are connected to them are shown in Fig. 14.

**Notes:**

- *The programmable high-current outputs are provided with a load presence detection unit, which is active when the output is not active. If a load is connected correctly and the*

control panel indicates the “No output load” trouble, connect a 2.2kΩ resistor in parallel to the load.

- When the siren connected to the output in parallel to the resistor 2.2kΩ generates undesirable sounds (if not controlled), reduce the resistance value.
- If the programmable high-current outputs are not used, they should be loaded with 2.2kΩ resistors.

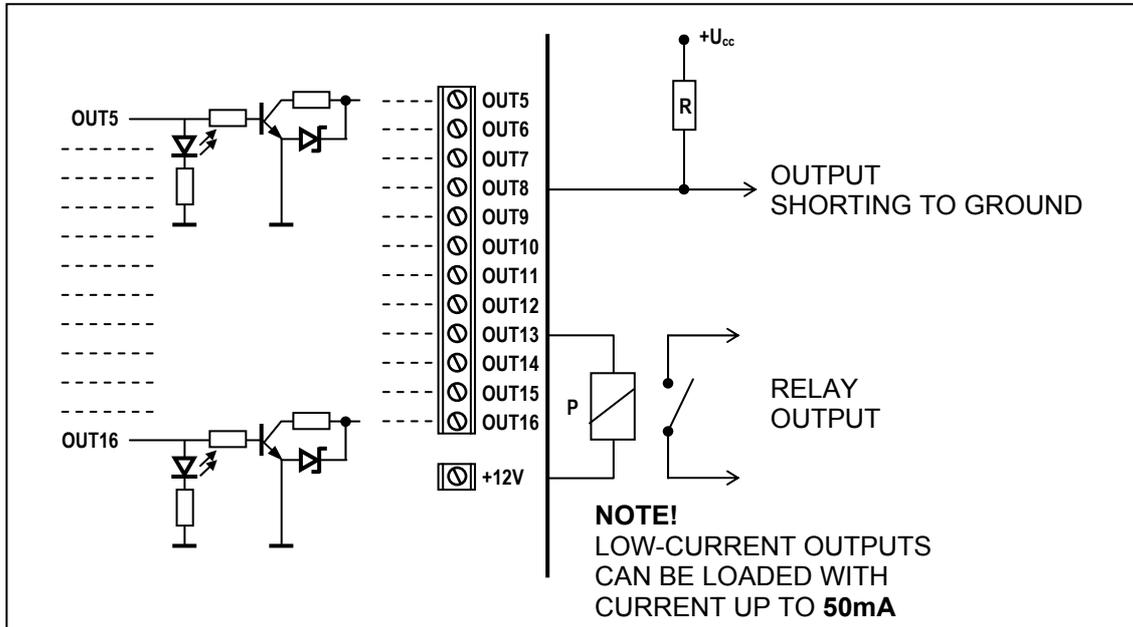


Fig. 15. Connection of loads to low-current outputs (OUT5..OUT16) and signals from these outputs (e.g. to radio messaging transmitter).

The programmable low-current outputs are designed to control equipment (for example, sirens) with their own power supply. Loads connected to these outputs (e.g. relays) must not force the current flow exceeding 50 mA. The structure of low-current outputs and their use are shown in Figure 15.

## 4.5 Connection of telephone line

If the alarm system makes use of the control panel telephone communicator (for monitoring, messaging or remote programming), it is necessary to connect the analog telephone line to the control panel. The telephone line is plugged to the terminal located in the upper right corner of the PCB. In order to ensure correct messaging function, the **control panel must be connected directly to the telephone line** (terminals marked TIP, RING), and all other equipment (telephone set, fax) – after the control panel (terminals marked T-1, R-1). Such a connection allows the control panel to fully capture the telephone line for the time of calling, which prevents the possibility of the messaging function being blocked when the handset is picked up.

**The telephone line** must be made with a four-wire cable so that the control panel can be connected before the other equipment (telephone, telefax, etc.).



**Do not send telephone signals and alarm system signals by one multicore cable. This may cause damage to the system in case of a high-voltage punch-through coming from the telephone.**

**The control panel may only be connected to analog lines only. Direct connection of the telephone circuit to ISDN lines may cause damage to the equipment.**

**The system installer should provide the user with necessary information on how the control panel should be connected to the telephone network.**

### 4.6 Connection of voice synthesizers

If the function of reporting alarms by phone with a voice message is used, it is necessary to connect at least one voice synthesizer to the control panel.

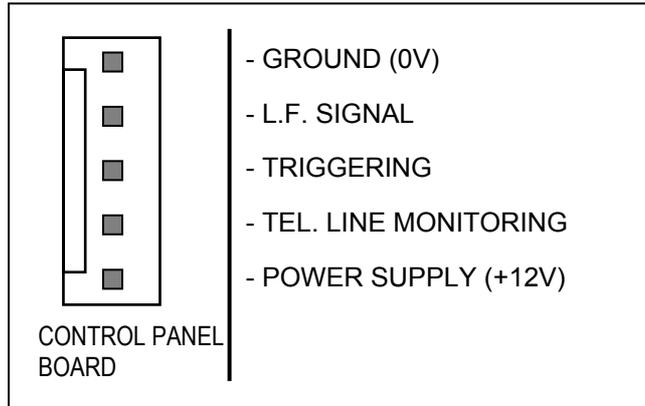


Fig. 16. Arrangement of signals on SM-2 voice synthesizer connectors.

The INTEGRA control panels are provided with one or two sockets for connecting the SM-2 voice synthesizers. The sockets are located at the right side of PCB, between telephone line connector and low-current output sockets. The SYNT1 socket on the INTEGRA 64 / INTEGRA 128 boards is used for connection of the *Synthesizer 1* message, and SYNT2 – for the *Synthesizer 2* message. Playback of the message and "monitoring" of the telephone line are possible on both connectors of the SM-2 synthesizer.

When a larger number of messages is needed, it is necessary to use the expander module type CA-64 SM, which enables 16 messages to be generated, 15s each. These synthesizers are controlled via the expansion bus, while the audio signals are connected to the SYNT1 or SYNT2 connectors on the INTEGRA 64 / INTEGRA 128 boards, or to the SM-2 VOICE SYNTHESIZER connector on the INTEGRA 24 / INTEGRA 32 boards.

### 4.7 Connection of printer

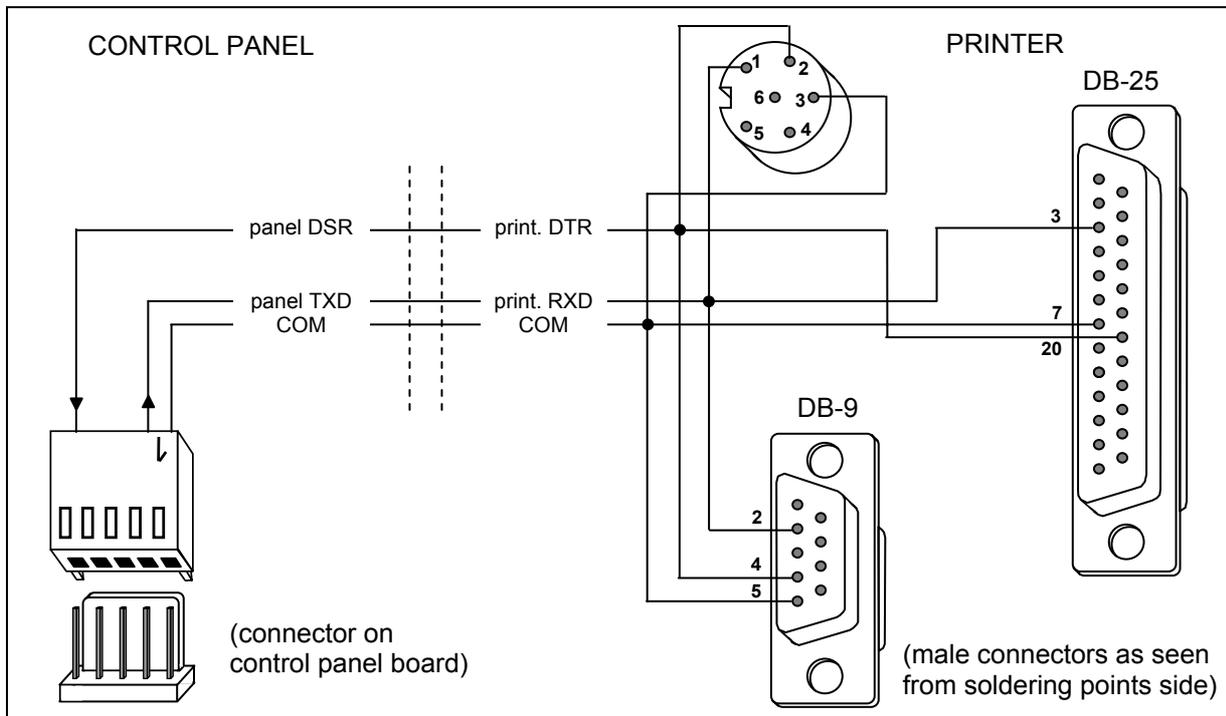


Fig. 17. Connection of a printer to the control panel serial port.

The control panel RS-232 port makes it possible to connect a printer provided with serial port. The control panel may print events in a "compressed" format (single event is printed in a single line containing up to 80 characters) or "extended" format, with names of zones, partitions, users and modules (then, the event is printed in two lines, when the printer with up to 80 characters per line is used; the descriptions of a single event are printed in one line with printers printing 132 characters per line).

## 4.8 Connection of power supply

The control panel is permanently connected to the mains supply source. Hence, before making the connections it is necessary to familiarize with the electric system in the facility. For powering the control panel choose the circuit which is always live. The power supply circuit should be protected with a proper fuse.

### CAUTION!

Before connecting the control panel to its power supply circuit, make sure that the supply circuit is not alive.

### 4.8.1 Description of electric connections

- Connect the 230V alternating voltage leads to the transformer terminals marked "0 - 230V".
- Connect the terminals of the transformer secondary winding to the "~AC" terminals on the control panel mainboard ("0 - 18V" or "0 - 20V", depending on the type of housing). Only one device with switching-mode power supply unit can be connected to one transformer.
- Connect the wire of the electric shock protection circuit to the terminal block installed next to the transformer and marked with the ground symbol . This circuit should also be connected to the control panel protective terminal.



**The INTEGRA panel mainboard can also be connected to an electric shock protection circuit (grounding). The protective cable terminal is designated by the  symbol. Never connect the "neutral" wire of the 230V AC mains supply to the ground terminal. If there is no separate electric shock protection circuit in the facility, leave this terminal unconnected.**

**Depending on the mainboard, the power supply unit is designed for 18V or 20V input voltage.**

Be careful not to cause overloading of the control panel power supply in the security system. It is advisable to make a **load balance** for the power supply. The total current inputs for the consumers (detectors, keypads) and the battery charging current may not exceed the power supply capacity. In case of a higher electric power demand, an additional power supply can be used for some of the security system consumers (e.g.: APS -15, APS-30 manufactured by SATEL). Table 1 (at the end of this manual) shows an example of estimated balance of current consumption by the system, and an example of battery selection for particular INTEGRA mainboards.

Stabilized voltage of the control panel power supply is factory set at 13.6 – 13.8V and should not be changed.

### 4.8.2 Control panel power supply starting procedure

1. Connect the backup power supply wires to corresponding battery terminals (red to battery plus, black to battery minus). The control panel is delivered complete with adapter connectors for connection of the battery with twisted ends (e.g. the 17Ah capacity battery). Therefore, the ends of the battery cables must not be cut off. **The control panel will not start after connecting the battery alone** (without mains power supply) but it will operate in case of 230VAC failure provided that it was started earlier.

**Note:** *If during the control panel battery operation the voltage drops to approximately 11V, the control panel will report a battery failure. After the voltage drop to approx. 9.5V, the control panel disconnects the battery (the system is stopped).*

2. Connect the 230VAC mains supply – the control panel starts operating.

The above mentioned power-up sequence (battery first, then 230VAC mains) will enable the power supply unit and control panel electronic protection circuits to work properly, thus avoiding any defects of the alarm system components caused by possible installation errors. Modules fitted with their own power supply should be started in much the same way.

**Caution:** *Should a situation occur when total disconnection of control panel power supply is necessary, disconnect in turn the mains and the battery. When reconnecting the power supply, observe the above mentioned sequence (first the battery, then the 230VAC mains).*

After all electrical connections are made and checked for correctness, you may proceed to starting the system. It is recommended that operation with the control panel begin without sirens connected, the high-current outputs being loaded with 2.2k $\Omega$  resistors. The sirens may only be connected after completion of parameter programming for the installed alarm system. For systems with expansion modules having their own power supply, it is recommended that the control panel be started first, and then successively the other system components.

### **CAUTION !**

Since the control panel is not provided with main switch to disconnect mains, it is important to instruct the alarm system owner or user on how to disconnect it from mains (e.g. by showing the fuse which protects the control panel power supply circuit).

## **5. Starting the control panel**

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If correctly installed, the control panel should start without any problems after mains power supply is switched on, as described in section **Starting the system**.

The control panel with the firmware (after restart of settings) can handle all the keypads installed just as if they have been identified. However, it does not monitor keypad tampers and keypad zones, nor does it permit programming of keypad operation parameters – most of the service functions are unavailable until identification of keypads and expanders is completed.

When connected to the computer, it forces generation of a new data set.

### **Notes:**

- *Hardware identification enables access to the service mode functions.*
- *If the control panel is to be remotely programmed via the telephone line, it is necessary to program telephone number of the service computer.*
- *Hardware identification and programming of the service telephone number are made available by proper service functions.*

### **5.1 Starting the system**

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After power-up, the control panel start takes place in two stages:

1. First, the STARTER program starts and checks the contents of the control panel program memory. During this operation, the DIALER LED is blinking and appropriate message is displayed on LCD keypads. When the contents of FLASH program memory is correct, the STARTER launches the control panel program.
2. The control panel program starts with checking the memory of settings (RAM memory with backup battery 3.6V/60mAh). If any differences are detected, as compared with the service programmed settings, the proper settings will be restored from FLASH memory (this test is skipped when the control panel settings are not saved in FLASH memory;

question about saving the settings appears when exiting the service mode). After the settings are checked, the control panel starts working.

**Notes:**

- *If an error in the control panel program is detected, the "Load correct program to control panel" message appears on LCD keypad displays and the STARTER program waits for new program from the computer. An error in the program may only happen when the control panel software up-dating process has been interrupted by switching mode power supply off.*
- *When the control panel is deenergized, removal of the MEMORY jumper will erase the contents of memory of settings, user data, event memory and clock. After reconnection of power supply, the control panel only restores the memory of settings. The user data must be programmed again. The information on administrator and service codes is stored in separate EEPROM memory and is not lost after removal of the MEMORY jumper.*

## **6. Compliance with CLC/TS 50131-3 requirements**

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To meet the requirements of CLC/TS 50131-3:

- for the detectors provided with the antimasking feature, connect the detector alarm output in parallel with the masking attempt alarm output and program the "Maximum zone violation time" so that it is slightly longer than the violation signaling on the detector alarm output;
- for all the expansion modules with integrated power supplies, an additional supervised overcurrent protection (like the ZB-2) must be used for each power supply output. Overload signaling output (OVL) should be connected to zone programmed as type 62 (TECHNICAL-OVERLOAD).

## 7. Basic specifications

### 7.1 Technical data - alarm control panels

		Control panel type			
		INTEGRA 24	INTEGRA 32	INTEGRA 64	INTEGRA 128
Mainboard supply voltage, nominal ( $\pm 10\%$ )		18V AC, 50-60Hz		20V AC 50-60Hz	
Mainboard current consumption	minimum	110mA	115mA	135mA	
	typical	121mA	127mA	149mA	
	maximum	204mA	234mA	337mA	
Power supply type, control panel		A			
Power supply unit voltage, nominal ( $\pm 10\%$ )		13,8V DC			
Output voltage range		9,5V...14V			
Batt. failure voltage thr. ( $\pm 10\%$ )		11.0V			
Battery cut-off voltage ( $\pm 10\%$ )		9.5V			
Power supply load capacity		1,2A		3A	
Load capacity, high-current programmable outputs ( $\pm 10\%$ )		2A		3A	
Load capacity, low-current programmable outputs		50mA			
Load capacity, +KPD output ( $\pm 10\%$ )		500mA		2.5A	
Load capacity, AUX output		500mA			
Load capacity, +EX output		500mA			
Load capacity, +EX1, +EX2 outputs				2.5A	
Battery charging current ( $\pm 20\%$ )		350mA	400/800mA	500/1000mA	
Environmental class		II			
Operational temperature range		-10°C...+55°C			

## 7.2 Technical data - keypads

		Keypad type				
		INT-KLCD-GR INT-KLCD-BL	INT-KLCDR-GR INT-KLCDR-BL	INT-KLCDK-GR	INT-KLCDL-GR INT-KLCDL-BL	INT-KLCDS-GR INT-KLCDS-BL
Supply voltage, nominal ( $\pm 15\%$ )		12V DC				
Current consumption	minimum	15mA	55mA	25mA	55mA	30mA
	typical	17mA	60mA	30mA	61mA	33mA
	maximum	101mA	156mA	110mA	147mA	151mA
Housing dimensions width x height x thickness		140x126x26mm		160x126x38mm	145x115x26mm	114x94x23.5mm
Environmental class		II				
Operational temperature range		-10°C...+55°C				

### 7.3 Technical data - expansion modules

		Module type								
		INT-S-GR INT-S-BL	CA-64 E	CA-64 EPS	CA-64 O	CA-64 OPS	CA-64 PP	CA-64 ADR	ADR-MOD	CA-64 SM
Supply voltage, nominal (±15%)		12V DC	12V DC	18V AC	12V DC	18V AC	18V AC	18V AC	12V DC	12V DC
Current consumption	minimum	22mA	16mA	35mA	15mA	35mA	41mA	42mA	1,5mA	15mA
	average	24mA	18mA	39mA	17mA	39mA	45mA	46mA	1,8mA	17mA
	maximum	66mA	70mA	91mA	116mA	138mA	194mA	55mA	5mA	72mA
Supply unit capacity		-	-	2.2A	-	2.2A	2.2A	2.2A	-	-
Current-carrying capacity of AUX output with ZB-2 module connected				1.7A		1.7A	1.7A	1.7A		
Output voltage, nominal		-	-	13.8V	-	13.8V	13.8V	13.8V	-	-
Output voltage	minimum	-	-	9.5V	-	9.5V	9.5V	9.5V	-	-
	maximum	-	-	14V	-	14V	14V	14V	-	-
Battery charging current (±20%)		-	-	400/800mA	-	400/800mA	400/800mA	400/800mA	-	-
Battery failure voltage thr. (±10%)		11V								
Battery cut-off voltage (±10%)		9.5V								
Battery charging time, maximum		24h								
Environmental class		II								
Operational temperature range		-10°C...+55°C								

## 7.4 Battery selection



The control panel power supply unit has been designed for work with lead batteries or other batteries with a similar charging curve.

It is impermissible to connect to the alarm panel a fully discharged battery (with voltage on unloaded terminals less than 11V). To avoid damage to the equipment, a fully discharged / never used battery should be precharged with the use of a proper charger.

	Control panel type			
	INTEGRA 24	INTEGRA 32	INTEGRA 64	INTEGRA 128
Battery type	lead-acid, sealed			
Capacity, maximum	8Ah	19Ah	24Ah	24Ah
Max. charging time, 80% capacity	24h			

The batteries should be individually selected for each system. Presented below are some examples of accumulator batteries energy balance as recommended by EN 50131-1:2005 for the power supply units Type A, Grade 3. They assume that in the event of mains supply failure the alarm system will have to work for 30 hours on emergency power supply, while being able to remotely report the on the power supply trouble.

### 7.4.1 INTEGRA 24 – battery 7Ah

The available 30 hr current for the 7Ah battery is:

$$I_{30h} = 7Ah/30h \approx 0.233A \text{ (233mA)}$$

The average currents consumed by the components of the model alarm system based on the INTEGRA 24 control panel:

- mainboard, INTEGRA 24: 121mA;
- zones, NC: 4 x 5mA;
- keypad, INT-KLCD-GR: 17mA;
- partition keypad, INT-S-GR: 24mA;
- 2 movement detectors, PIR: 2 x 10mA;
- 2 magnetic detectors: 0 (require no power supply).

$$\sum I_s = 0.121 + 4 \times 0.005 + 0.017 + 0.024 + 2 \times 0.010 = 0.202A \text{ (202mA)}$$

The summed average current consumed by the system is 202mA, therefore it is lower than the current that can be provided by the battery.

### 7.4.2 INTEGRA 32 – battery 7Ah

The available 30 hr current for the 7Ah battery is :

$$I_{30h} = 7Ah/30h \approx 0.233A \text{ (233mA)}$$

The average currents consumed by the components of the model alarm system based on the INTEGRA 32 control panel:

- mainboard, INTEGRA 32: 127mA;
- zones, NC: 8 x 5mA;
- keypad, INT-KLCD-GR: 17mA;
- partition keypad, INT-S-GR: 24mA;
- 2 movement detectors, PIR: 2 x 10mA;

- 6 magnetic detectors: 0 (require no power supply).

$$\sum I_s = 0.127 + 4 \times 0.005 + 0.017 + 0.024 + 2 \times 0.010 = 0.228 \text{ A (228mA)}$$

The summed average current consumed by the system is 228mA, therefore it is lower than the current that can be provided by the battery.

### 7.4.3 INTEGRA 32 – battery 17Ah

The available 30 hr current for the 17Ah battery is:

$$I_{30h} = 17\text{Ah}/30\text{h} \approx 0.566 \text{ A (566mA)}$$

The average currents consumed by the components of the model alarm system based on the INTEGRA 32 control panel:

- mainboard, INTEGRA 32: 127mA;
- zones, NC: 8 x 5mA;
- 2 keypads, INT-KLCD-GR: 2x17mA;
- 2 partition keypads, INT-S-GR: 2x24mA;
- 3 movement detectors, PIR: 3 x 10mA;
- 3 microwave detectors: 3 x 25mA
- 2 magnetic detectors: 0 (require no power supply).

$$\sum I_s = 0.127 + 8 \times 0.005 + 2 \times 0.017 + 2 \times 0.024 + 3 \times 0.010 + 3 \times 0.025 = 0.354 \text{ A (354mA)}$$

The summed average current consumed by the system is 354mA, therefore it is lower than the current that can be provided by the battery.

### 7.4.4 INTEGRA 64/128 – battery 17Ah

The available 30 hr current for the 17Ah battery is:

$$I_{30h} = 17\text{Ah}/30\text{h} \approx 0.566 \text{ A (566mA)}$$

The average currents consumed by the components of the model alarm system based on the INTEGRA 64 or INTEGRA 128 control panel:

- mainboard, INTEGRA 64/128: 149mA;
- zones, NC: 16 x 5mA;
- 3 keypads, INT-KLCD-GR: 3x17mA;
- 4 partition keypads, INT-S-GR: 4x24mA;
- 10 movement detectors, PIR: 10 x 10mA;
- 3 microwave detectors: 3 x 25mA
- 2 magnetic detectors: 0 (require no power supply).

$$\sum I_s = 0.149 + 16 \times 0.005 + 3 \times 0.017 + 4 \times 0.024 + 10 \times 0.010 + 3 \times 0.025 = 0.551 \text{ A (551mA)}$$

The summed average current consumed by the system is 551mA, therefore it is lower than the current that can be provided by the battery.

### ATTENTION!

**An efficient security system does not prevent burglary, assault or fire from happening, however it diminishes the risk that such a situation will cause no alarm or notification.**

**Therefore, the SATEL Company recommends that operation of the whole security system be regularly tested.**

All circuits are designated by their version and date. The program periodically checks the memory content. The program run is supervised by hardware means. If a memory error occurs, the trouble signal is generated. In case of a run-time error, the processor is restarted.

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