GE
Security

Advisor MASTER

integrated intrusion and access control system

designers manual

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GE imagination at work

Aritech is a GE Security brand.

CONTENTS:

1 SYSTEM COMPONENTS.

1.1 Control panels

The main element of the Advisor MASTER system is the control panel. The idea behind the Advisor MASTER system is to supply a product with the best possible functional parameters for the end user, as well as for the installing technician. The control panel, as a product, is supplied as a set, consisting of:

Control panel mainboard;

- Metal housing;
- Mains power transformer;
- Mains power connector, equipped with a fuse;
- Battery connection cables;
- A set of 4k7 Ohm end of line resistors;
- User and installation manuals.

Common characteristics of the ATS system control panels:

Housing – There are three types of housing for the control panel and ATS expansions. All of them have a common characteristic set of holes and mounting points, which pattern enables the installation of every control panel type and/or other expansions and system accessories. The space allocation details for the different housing types, are contained in the appendices.

Power unit – All control panels are equipped with the same switched mode power supply unit, providing 2,2A @ 13,8V DC, enabled for buffered mode (battery back-up). The details for planning of the emergency power supply, batteries etc. can be found in chapter 2.

Mainboards – The control panels as well as other equipment parts have standardised sizes and placement of their mounting points. This enables the installation in any system housing. The control panel terminal blocks are detachable, which simplifies connection of the circuits.

Dialler – A telephone communicator comes as standard, enabling communications with monitoring stations (CS) as well as modem connections with a PC. The baud rate is limited. The configuration details can be found in section 3.3.

The MI bus– The control panel can be extended with additional communications equipment via the MI bus. The available modules enable communication with CS stations via GSM or ISDN networks, as well as voice reporting. The configuration details can be found in section 3.5.

Service connection – Regardless of the type of control panel, each is equipped with a RS232 connector, allowing for service communications with the configuration program (TITAN). This connection is time-limited. For permanent connections, an appropriate expansion needs to be used.

System timer– The central unit is equipped with an autonomous Real Time Clock (RTC) circuit, synchronized via a quartz frequency generator. It ensures an exact measurement of time regardless of the CPU load, frequency of the mains power, or other external occurrences. The systematic time correction can be set through the configuring software as –119 to 119 seconds per day.

Alarm zones– All system inputs are processed by a A/D converter and then analysed as to their state through the control panel, or DGP processor. There are 8 or 16 alarm zone connections on the control panel mainboard. Their number can be increased using the ATS1202 expansion.

End of line resistors – The system supports three types of EOL resistors: 2k2, 4k7 and 10k. By default, the 4k7Ohm resistor is used.

Signal outputs – Each control panel has 3 high-current, monitored signal outputs, allowing the attachment of an external/internal siren or a signal lamp (beacon).

Memory – The inbuilt memory of the control panel is sufficient to support a typical, medium complexity alarm system (50 users, 250 events, 10 alarm groups). The control panel memory can be expanded using the appropriate modules.

System bus – The RS485 system bus enables the attachment of manipulators (RAS stations), as well as alarm and access control expansions. The same interface is used to connect the control panels into a network, or to the local bus of other equipment.

Expansions:

The MI bus – ISDN and GSM communicators, and a voice reporting module.

Memory – The control panel supports installation of one of three available memory modules. They increase the amount of users, logged events, alarm settings and access control groups supported by the system, as well as decreasing the reaction time of the system.

PC and printer interface – Enables the user to permanently connect the control panel to a PC, connect the control panels in a network to the PC and connect the control panel to a remote system for programming, maintenance and monitoring.

Alarm zones – The onboard alarm zone connectors can be expanded using the ATS1202 expansion up to a total of 32 alarm zones. Further lines are available through the use of DGP expansions connected to the system bus.

System outputs – The control panel connector supports 4 ‘OC’ outputs. By connecting a synchronous expansion card (ATS1811/20) to the output slot, the maximum relay output count can be increased to 128 and the ‘OC’ count can be increased to 256, limited by the maximum expansion module count, the available housing space, and the supplied power. Additionally, the control panels are equipped with a NC/NO relay (not supported by the ATS2000).

System bus – Enables the connection of 16 manipulators (RAS stations) and 15 expanders (DGP modules) allowing the use of all alarm zones and additional access control functions – elevator and door controllers.

The central unit of the Advisor MASTER system that defines its capacity, and through the availability of some expansions, its functionality is the control panel. The Advisor MASTER system offers three types of control panels – ATS2000, ATS3000 and ATS4000/4518. The differences between them are in the available zone quantity, and the availability of some expansions. This way, the system, regardless of its size or the control panel used provides the same functions, uses the same software, can be connected to the same equipment and a configuration created for one panel, can be freely used on all types of ATS control panels

1.1.1.1 ATS4000

16 alarm zones on board
expandable to max. 32 zones;
256 zones in the system
16 independent areas
74-138 Alarm Groups
10-120 Door Groups
50-67k users
250-1000 alarm events
10-1000 access control events
M – ATS1643 housing
Programming controlled power output
Expansions:
- Memory
- Computer, printer interface
- Communications
- Input/Output

The ATS4000 control panel is the basic control panel type of the Advisor Master system. The other central units are modifications of this device. Because of that, in the following chapters the application examples are shown using the ATS4000.

Table 1-1 Expansion modules, available for ATS4000.

Expansion	Description	Q-ty	Size
Memory – mounted in the slot on the mainboard, only one of the following modules.			
ATS1830	1Mb	1	-
ATS1831	4Mb, IUM		-
ATS1832	8Mb, IUM		-
Computer, printer interfaces – mounted directly on the mainboard, only one of the following modules.			
ATS1801	Computer, printer interface (two RS232 ports)	1	B+
ATS1802	Printer interface(RS232 port)		B+
Communications– MI bus , mounted in housing slots, below the mainboard .			
ATS7100	ISDN communicator;	1	A
ATS7200	Voice reporting;	2	B
ATS7300	GSM communicator;	1	B+
Inputs– mounted in available housing slots.			
ATS1202	8 alarm zone expansion.	2	B
Outputs– mounted in available housing slots.			
ATS1810	4 relay outputs.	1	B
ATS1811	8 relay outputs.	16	BB
ATS1820	16 open collector outputs.	16	B+

Table 1-2 ATS4000 housing space.

M – ATS1641 housing			
Battery	**Capacity**	**Free housing slots**	**Free slots below the MBC***
BS127N	7,2Ah	4xB or 2xB+ or 2xBB	6xB or 4xB+ or 2xA
2xBS127N	14,4Ah	4xB or 2xB+ or 2xBB	
BS131N	18Ah	2xB or 1xBB	

*- Communication expansions can be mounted below the mainboard (Mother Board Circuit)

1.1.1.2 ATS4500

ATS4000 mainboard:
16 alarm zones on board
expandable to max. 32 zones;
256 zones in the system
16 independent areas
138 Alarm Groups
120 Door Groups
11k-67k users
1000 alarm events
1000 access control events
L – ATS1644 housing
Programming controlled power output
Expansions:
- Memory
- Computer, printer interface
- Communications
- Input/Output

The ATS4500 control panel is equipped with the ATS4000 mainboard equipped with the basic ATS1830 1Mb memory expansion and a L – type housing. The extended memory and the larger housing, allowing the installation of more expansions, as well as a larger battery, make the ATS4500 a control panel best suited for systems providing access control.

The expansions for ATS4500 are identical with the ones for ATS4000 shown in Table 1-1, the difference being the ATS4500's pre-installed ATS1830 memory expansion.

Table 1-3 ATS4500 housing space.

L – ATS1642 housing			
Battery	**Capacity**	**Free housing slots**	**Free slots below the MBC***
BS127N	7,2Ah	6xB or 3xBB or 4xB+ or 2xA	6xB or 4xB+ or 2xA
2xBS127N	14,4Ah		
BS131N	18Ah		
BS129N	26Ah		
2xBS129N	52Ah		

*- Communication expansions can be mounted below the mainboard (Mother Board Circuit)

1.1.1.3 ATS3000

8 alarm zones on board
expandable to max. 32 zones;
64 zones in the system
8 independent areas
74 -138 Alarm Groups
10 -120 Door Groups
50k-67k users
250 - 1000 alarm events
10 - 1000 access control events
S – ATS1642 housing
Programming controlled power output
Expansions:
- Memory
- Computer, printer interface
- Communications
- Input/Output

In this control panel, not all expansion combinations are available. Due to the layout of the device, it is not possible to install both the ATS1831/32 memory expansions and the ATS1801/02 computer/printer interface.

Apart from that, the control panel's mainboard is much smaller.

Table 1-4 Expansion modules, which can be installed in the ATS3000 control panel.

Expansion	Description	Q-ty	Size
Memory – mounted in the slot on the mainboard, only one of the following modules.			
ATS1830	1Mb	1	-
ATS1831	4Mb, IUM, interchangeable with ATS1801/02		-
ATS1832	8Mb, IUM, interchangeable with ATS1801/02		-
I Computer, printer interfaces – mounted directly on the mainboard, only one of the following modules can be installed, and not in conjunction with the memory expansions ATS1831/32			
ATS1801	Computer, printer interface (two RS232 ports)	1	B+
ATS1802	Printer interface(RS232 port)		B+
Communications– MI bus , mounted in housing slots, below the mainboard .			
ATS7100	ISDN communicator;	1	A
ATS7200	Voice reporting;	2	B
ATS7300	GSM communicator;	1	B+
Inputs– mounted in available housing slots.			
ATS1202	8 alarm zone expansion.	3	B
Outputs– mounted in available housing slots.			
ATS1810	4 relay outputs.	1	B

Expansion	Description	Q-ty	Size
ATS1811	8 relay outputs.	16	BB
ATS1820	16 open collector outputs.	16	B+

Table 1-5 ATS3000 housing space..

M – ATS1641 housing			
Battery	**Capacity**	**Free housing slots**	**Free slots below the MBC***
BS127N	7,2Ah	6xB or 3xBB or 1xA	4xB or 2xB+ or 1xA
2xBS127N	14,4Ah	6xB or 3xBB or 1xA	
BS131N	18Ah	4xB or 2xBB or 1xA	

*- Communication expansions can be mounted below the maiboard (Mother Board Circuit)

1.1.1.4 ATS2000

8 alarm zones on board
expandable to max. 32 zones;
32 zones in the system
4 independent areas
74 Alarm Groups
10 Door Groups
50 users
250 alarm events
10 access control events
S – ATS1641 housing
Expansions:
Communications
Input/Output

The central panel does not include slots for memory expansion and computer/printer interface ATS1801 as well as a programming controlled power source. Additionally, the connector clamps in this model are fixed.

The mainboard is the same size, and is supplied in the same housing as the ATS3000. Because of that the parameters for batteries and available expansion space are the same in ATS2000 and ATS3000 – see Table 1-5.

Table 1-6 Expansion modules, which can be installed in the ATS2000 control panel.

Expansion	Description	Q-ty	Size
Communications– MI bus , mounted in housing slots, below the mainboard .			
ATS7100	ISDN communicator;	1	A
ATS7200	Voice reporting;	2	B
ATS7300	GSM communicator;	1	B+
Inputs– mounted in available housing slots.			
ATS1202	8 alarm zone expansion.	3	B
Outputs– mounted in available housing slots.			
ATS1810	4 relay outputs.	1	B
ATS1811	8 relay outputs.	16	BB
ATS1820	16 open collector outputs.	16	B+

1.1.1.5 Comparison of most important characteristics

Table 1-7 Common characteristics of the control panels.

Parameter	Value
Input expansions	Up to 32 zones
Output expansions	No limit
Power source	2,2A @ 13,8V DC
Inbuilt PC communications	RS232 – service port
System bus	RS485
Inbuilt communications	Analogue dialler
Communication expansions	ISDN, GSM, voice module
Time measurement	Real-time clock circuit RTC
Alarm zones	A/D converter
End of line resistor	2k2, 4k7, 10k software defined

Table 1-8 Control panel characteristics.

Parameter	ATS4500	ATS4000	ATS3000	ATS2000
Onboard zones	16	16	8	8
With zone expansions fitted	32	32	32	32
System capacity – zones	256	256	64	32
Areas	16	16	8	4
Alarm groups	138	70-138	70-138	70
Door groups	120	10-120	10-120	10
Users	11k-67k	50-67k	50-11k-67k*	50
Alarm event log	1000	250-1000	250-1000	250
Access control log	1000	10-1000	10-1000	10
IUM ATS1831/32 memory	Yes	Yes	ATS1831/32 or ATS1801/02	No
Computer/printer interface	Yes	Yes		No
Housing type	L	M	S	S
Mainboard type	C	C	C-	C-

*- The ATS1831/32 memory expansion is interchangeable with ATS1801/02

Table 1-9 Important technical characteristics.

Parameter	Value
Mains power supply	230VAC
Max. mains power required	58VA
Mains transformer output voltage	23VAC
PSU output voltage	13,8V DC (+/-10%)
PSU output current	2,2A
Output current load:	
The lamp and sirens	1A
Relays	2A
OC type	50mA
Mainboard power consumption	170mA
Operating temperature	0-50 deg.C

1.2 User Interface

The user interface – manipulators, readers – is the only system element the user has direct contact with. It serves to inform the user of the state of the system, allow taking system control actions, and serves as a basic programming and maintenance channel for the installing technician and programmer. The Advisor MASTER system offers a whole range of RAS equipment, differing in appearance and functionality. It can also be made compatible with equipment by other manufacturers, through the use of the ATS1170 Wiegand interface.

The unique function offered by the ATS system is alarm system control – arming and disarming the alarm – through the readers and user cards. This is enabled by integrating the access control and alarm systems.

Each piece of RAS equipment can be used in the ATS system to unidirectionally control the access control passage. To ease the use of manipulators to control the doors, they have been equipped with appropriate hardware features – lock control output, door access switch (RTE) input – and software functions, through which access control on the control panel level can be provided for budget sensitive applications.

RAS stations characteristics:

Alarm system control – Arming and disarming the system is the basic function of each RAS unit. Beyond that, LCD-equipped units can serve to validate alarms, suspend zones, browse the event log etc. – the common maintenance tasks in an alarm system. It is required that there is at least one LCD manipulator present in the system configured for alarm system maintenance.

Basic programming interface – LCD manipulators are the basic programming interface for the system. It is strongly recommended that at least one LCD manipulator in the system is configured for programming the system.

State LEDs – The RAS stations are equipped with LED diodes, which serve to display the state of the system. Commonly there are 3 diodes:
Green – Power On
Orange – unit failure
Red – alert.;
In some equipment the red diode also displays the state of the RAS station area. In that case the system state is encoded as follows:
Alert – The diode is pulsing;
Arming– The diode is lit continuously, if any of the station's zones is armed
Disarmed–The diode is not lit, provided all zones of the RAS station are disarmed.

System bus– The RAS units are connected via the RS485 bus – addressed and queried (polled) by the control panel. Each unit except ATS1190/92 is capable of terminating the bus.

Output– Dedicated for controlling the execution units for control panel managed access control.

Input– Dedicated for the exit button in access control.

Access control integration– Each unit can be used as an access control interface in control panel as well as locally in the access control DGP. Access control carried out in the control panel can use the dedicated inputs and outputs of the RAS station.
Additional equipment such as the ATS1340 – door connection box – as well as software programming capabilities – blocking the door alarm zone etc., is typical for access control.

CCTV integration – Control of a multiplexer – a DVMR/DTX recorder is accessible only through LCD manipulators.

Table 1-10 RAS device list (System Bus devices)

Product	Description	User interface		
		Alarm	AC	Prog.
ATS1100	Keypad, 2*16 characters LCD/8 zone LEDs	x	x	x
ATS1105	Keypad, 2*16 characters LCD /8 zone LEDs with Wiegand reader interface.	x	x	x
ATS1110	Keypad, 2*16 characters LCD/16 zone LEDs	x	x	x
ATS1111	Keypad, 4*16 characters LCD/16 zone LEDs	x	x	x
ATS1115	Keypad, 2*16 characters LCD/16 zone LEDs with inbuilt ATS card reader.	x	x	x
ATS1116	Keypad, 2*16 characters LCD/16 zone LEDs with inbuilt ATS card reader.	x	x	x
ATS1155	Outdoor, vandal-proof keypad (metal), 3 diodes, detached electronics	x	x	
ATS1151	LED keypad (3 diodes) in metal housing, no LCD	x	x	
ATS1156	LED Manipulator (3 diodes) in metal housing with ATC600 magnetic card reader (no LCD)	x	x	
ATS1190	Proximity reader (does not require an interface)	x	x	
ATS1192	High resistance proximity reader (does not require an interface) indoor/outdoor	x	x	
ATS1170	Wiegand reader interface (single door controller) – PCB B+	x	x	

1.2.1.1 ATS1100/05

LCD 2x16 characters
8 area state display diodes
3 system state diodes
4 programmable function keys
Opening and pry-off tamper alarm
ATS1105 contains a Wiegand equipment interface.
Dimensions (LxHxD, mm): 168x126x40

The ATS1100/05 unit is one of the most basic RAS stations of the ATS system, granting access to all control, management and programming functions of the system. The limited amount of diodes does not allow display of the status of all areas at once on a single device. By choosing (using a DIP switch) the area range for display, the manipulator can be configured to display zones 1-8 and 9-16. Like all RAS devices the ATS1100/05 has an input port for the exit button, and an output port for door lock control from the control panel. Additionally, the ATS1105 is equipped with a Wiegand reader interface. It enables the connection of such a reader without installing an additional Wiegand interface – ATS1170.

The device address as well as bus termination, and other functions for example: keyboard and display backlight, can be set using DIP switches. The connector clamps and the DIP switches can be found after removing the unit's cover.

1.2.1.2 ATS1110/11

LCD display 2x16 characters ATS1110
LCD display 4x16 characters ATS1111
16 area state diodes
3 system state diodes
Pry-off tamper alarm
Dimensions (LxHxD mm): 92x165x25.4
(closed cover)

The ATS1110/11 unit is one of the most basic RAS stations of the ATS system, providing, through the LCD display, access to all system functions. The design of the unit enables access to connector clamps and the DIP switches without opening the device housing. The manipulator is attached to the surface via a metal plate. Assembling device on the mounting bracket, using only one screw. This is a major simplification of the installation process.
The DIP switch serves to set the device address and to set the bus termination. Other settings (diode light settings, LCD backlight, output control etc.) are set via the control panel programming menu.

1.2.1.3 ATS1115/16

LCD Display 2x16 characters ATS1115
LCD Display 4x16 characters ATS1116
16 area state diodes
3 system state diodes
Pry-off tamper alarm
Dimensions (LxHxD mm): 92x165x25,4
(closed cover)

This is an advanced product, containing an integrated ATS Smart Card reader. The integration allows the device to use only one bus address instead of two. The access control function ”Card and PIN” of the ATS1250 can be provided by one device.

The LCD display provides access to all system functions. The design of the unit enables access to connector clamps and the DIP switches without removing the device switches. The manipulator is attached to the surface via a metal plate. Assembling device on the mounting bracket, using only one screw. This is a major simplification of the installation process.

The DIP switch serves to set the device address and to set the bus termination. Other settings (diode light settings, LCD backlight, output control etc.) are set via the control panel programming menu.

1.2.1.4 ATS1155

3 system state diodes
1 area state diode*
Tamper switch input
Detached keyboard and electronics.
Dimensions (LxH, mm): 118x75

*- the red state diode serves to display the RAS station area state as well.

The ATS1155 keyboard is a solution for areas with high risk of vandalism. The metal, damage resistant keyboard and the electronics part of the device are mounted separately. Additional system state diodes can be mounted separately as well. The set consists of the keyboard, a PCB board and connection cables.

The address and bus termination are set using a DIP switch.

1.2.1.5 ATS1151/56

3 system state diodes
1 area state diode*
Inbuilt magnetic card reader (ACT600 cards)
Opening and pry-off tamper alarm
Metal cover
Suitable for outdoor use
Dimensions (LxHxD mm) ATS1151: 96x67x28
Dimensions (LxHxD mm) ATS1156: 96x96x40

*- the red state diode serves to display the RAS station area state as well.

The cover design has been proven in the ACC series access control systems from Aritech. The design, as well as a heater integration option, enables the unit to be installed outdoors even in low temperatures.

1.2.1.6 ATS1190/92

2 system state diodes (programmable)
Reader configurable via a proximity card, or internal programming menu.
Optical pry-off tamper alarm
Suitable for outdoor use
Vandal-proof design
RS485 or Wiegand interface, automatically detected
Dimensions (LxHxD mm) ATS1190: 36x110x20
Dimensions (LxHxD mm) ATS1192: 42x150x16

Due to its characteristics and price, the ATS1190/92 is a very attractive solution for small to medium systems. A synthetic, water-proof resin that fills the housing makes the unit resistant to damage, as well as severe weather conditions.

Compatible with:

ATS147x	cards
ATS1621	programmer

Additional accessories for the ATS1190 Reader are replaceable covers in white, red, grey, beige and black.

1.2.1.7 ATS1170

2 reader state diodes
Tamper input
Wiegand or Clock-Data reader interface
Door lock relay output
Supports autonomous mode for 20 cards
Dimensions: B+

Wiegand type card reader interface used to connect readers from other manufacturers and systems to the ATS system. This unit supports autonomous mode, independent of

the control panel. To prepare the unit for that mode, the unit has to be programmed with up to 20 user cards. The programming interface is accessible locally via setting the appropriate DIP switches.

1.2.1.8 Listing of the most important parameters

Table 1-11 Listing of the RAS stations characteristics.

Parameter	ATS1100	ATS1105	ATS1110	ATS1111	ATS1115	ATS1116	ATS1151	ATS1156	ATS1155	ATS1190	ATS1192	ATS1170
Display	2x16	2x16	2x16	4x16	2x16	4x16	-	-	-	-	-	-
State diodes	3	3	3	3	3	3	3	3	3	2	2	2
Area diodes	8	8	16	16	16	16	1*	1*	1*	(1)	(1)	-
Function keys	4	4	-	-	-	-	-	-	-	-	-	-
Integrated reader.	-	-	-	-	SC	SC	-	MC	-	SC	SC	-
Reader interface		Yes										Yes
Bus termination.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	Yes
Autonom. mode	-	-	-	-	-	-	-	-	-	Yes	Yes	Yes
OC output	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RTE input	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*- the red state diode serves to display the RAS station area state as well.
SC – SmartCard – ATS SmartCard reader
MC – MagneticCard – ACT600 Magnetic card reader

Table 1-12 Relevant technical parameters.

Parameter	ATS1100	ATS1105	ATS1110	ATS1111	ATS1115	ATS1116	ATS1151	ATS1156	ATS1155	ATS1190	ATS1192	ATS1170
Max Power cons..	185	195	95		165		45	45	70	50		95
Avg. Power cons..	73	78	32		86		34	39	70	29		65
Operating voltage	10.5 – 13.8 V DC											
Min voltage	7.19	7.25	7.4				7.35			9.6		7.99
OC output load	50mA (12VDC)											1A*
IP rating	IP30		IP30				IP30	IP30	IP30	IP54	IP54	-
Temp. max. ^{o}C	50		50				70		50.	66		50
Temp. min. ^{o}C	0		0				-25		0	-35		0
Humidity	95%		95%				93%		95%	93%		95%

*- max. load of the relay connectors

1.3 DGP Expansion modules

The DGP expansion modules are system bus devices and are designed to expand the system capabilities. The main task of the DGP is to connect faraway alarm zones, providing a local power source and system outputs. The DGP idea encompasses also access control expansions that enhance the system's functionality in its work area. Distributed intelligence philosophy allows systems configured from DGP and RAS devices to cover a wide range of most complicated applications.

1.3.1.1 ATS1201 alarm zone DGP

8 alarm zones on board
32 alarm zones when maximally expanded
8 OC type outputs
16 outputs when maximally expanded.
High–current, monitored siren output
Integrated switched mode power supply 2,2A
Auxiliary battery back-up
M – ATS1641 housing
A type mainboard

The basic DGP device, providing remote ATS zone handling. Full support of the selected area is provided by the integrated power supply (2A) with battery back-up feature, a housing big enough to hold additional expansions, and an option of controlling a siren. Note that this device allows the alarm system to take advantage of the whole range of alarm zone addresses.

The configuration of the device is done via correct setting of the DIP switches.

Table 1-13 DGP ATS1201 compatible expansion modules:

Expansion	Description	Amt.	Size
Inputs – installed in available housing slots			
ATS1202	8 alarm zone expansion	3	B
Outputs – installed in available housing slots			
ATS1810	4 relay outputs	2	B
ATS1811	8 relay outputs	2	BB
ATS1820	16 open collector outputs.	1	B+

Table 1-14 DGP ATS1201housing space

M – ATS1641 housing		
Battery	**Capacity**	**Free housing slots**
BS127N	7,2Ah	8xB or 4xBB or 4xB+
2xBS127N	14,4Ah	8xB or 4xBB or 4xB+
BS131N	18Ah	4xB or 2xBB or 2xB+

1.3.1.2 ATS1203 alarm zone DGP

8 alarm zones on board
32 alarm zones when maximally expanded
8 OC type outputs
32 outputs when fully expanded.
High – current, monitored siren output
Integrated switched mode power supply 3A
Auxiliary battery back-up
M – ATS1641 housing

A new advanced DGP device, the ATS1203 provides support for a remote ATS area. Full support of the selected area is provided by the more powerful integrated power supply (3A) with battery back-up feature, a housing big enough to hold additional expansions, and an option of controlling a siren. Note that this device allows the alarm system to take advantage of the complete range of alarm zone addresses.

In contrast to ATS1201 all device settings are configurable remotely via a control panel programming menu, or using the TITAN software.

Table 1-15 DGP ATS1203 compatible expansion modules

Expansion	Description	Amt.	Size
Inputs – installed in available housing slots			
ATS1202	8 alarm zone expansion	3	B
Outputs – installed in available housing slots			
ATS1810	4 relay outputs	2	B
ATS1810	8 relay outputs	4	BB
ATS1820	16 open collector outputs.	2	B+

Due to the fact that both the ATS1203 and ATS1201 come in an identical housing, and the dimensions of their circuit boards are the same, the parameters for configuring the batteries and additional housing space are the same for both models, and can be found in Table 1-14.

1.3.1.3 ATS1210/11/20 alarm zone DGP

8 onboard zones – 4 for zones on ATS1220
8 OC outputs
16 outputs when fully expanded (lack of housing space)
Power supply: 12V DC
ATS1210 – metal housing – ATS1643
ATS1211/20 – plastic housing – ATS1644
Dimensions: B+

This module is supplied with power directly form the system bus, or an external power source – the power supply planning details are outlined in chapter 2. The housing supplied with the units don't provide space for any expansions. Any output expansion plans must be preceded by a housing replacement.

Table 1-16 ATS1210/11/20 DGP compatible expansion modules

Expansion	Description	Amt.	Size
Outputs – installed in available housing slots			
ATS1810	4 relay outputs	2	B
ATS1810	8 relay outputs	4	BB
ATS1820	16 open collector outputs.	2	B+

1.3.1.4 ATS1230 Wireless devices DGP

16-32 programmable channels/Wireless devices
Device learning function
Operating Frequency: 433MHz
Power supply: 12V DC
Lack of bus terminator
Dimensions (LxHxD mm):
Housing: plastic

The device is suitable for locations inaccessible by standard wired solutions. A wide range of wireless devices – transmitters – detailed in the table below shows that this product can support all security related tasks. The only difficulty is the lack of the bus terminator, meaning the maximum distance of the ATS1230 module from the control panel is 300m. For larger distances, an additional terminating resistor needs to be used. The data bus details are provided in section 3.1.

Table 1-17 DGP ATS1230 compatible list of transmitters.

Product	Description	Range m
RF320I4	Wireless magnetic sensor (or a transmitter for a wired sensor – type NO/NC), sabotage	300
RF352I4	Remote control, keyfob 2 buttons	150
RF354I4	Remote control, keyfob 4 buttons	150
RF356I4	Wireless panic button in form of a wristwatch.	150
RF360I4	Water resistant wireless panic button, belt clip or neck leash.	300
RF425I4	Wireless PIR sensor, EV425, 9/16m, 9 screens, opening and tear-out sabotage alarm	300
RF425I4PI	Wireless PIR sensor, EV425, 9/16m, 9 screens, opening and tear-out sabotage alarm, PI version	300
RF572NSTI4	Wireless optical-thermal smoke detector, sabotage alarm, internal siren	300
RF620I4	Wireless inertia and magnetic sensor, sabotage alarm, white	300
RF620I4B	Wireless inertia and magnetic sensor, sabotage alarm, brown	300
RF903I4	Wireless glassbreak detector, acoustic, plaster mounted, sabotage alarm	300
RF900I4	Diagnostic wireless sensor testing kit, 433MHz.	300

1.3.1.5 ATS1290 addressable devices DGP.

32 Point ID® addressable devices
32 system outputs
PID bus learning mode
Power supply: 12V DC

This new device in the Advisor MASTER system allows the use of the local communications bus interface of the DGP module to connect sensors to the alarm system. To communicate with the devices, an open architecture Point ID® interface is used. The bus planning details, recommended wiring etc. can be found in section 3.2.2. In addition to the DGP module a whole range of, Point ID compatible, devices is available, and listed in the table below.

The device can be programmed via the remote device menu. The DIP switches serve only to supply the DGP module address, and to activate the bus terminator.

The use of addressable sensor technology significantly reduces the cost of system wiring by simplifying it, reducing the installation time, the amount of materials used etc.

Table 1-18 List of available Point ID devices

Product	Description	Inputs	Outputs
SI-AD	Universal, single input Point ID module	1	0
AD011	Universal Point ID module, 1I/1OC	1	1
AD044	Universal Point ID module, 4I/4O, monitored, externally powered, relay outputs	4(+4)	4
AD111	Point ID module, 1I/1OC installable inside the sensor.	1	1
AP750-AD	PIR sensor, range: 15,2m; 7 curtains;	1	1
EV435-AD	PIR sensor, 9/16m, 9 curtains, Point ID interface	1	1
EV435AM-AD	PIR sensor, 9/15m, 7 curtains, antimasking, Point ID interface	2	2

1.3.1.6 ATS1250 4 door Access Control DGP

4 bi-directional passages
4 direct Wiegand reader inputs
16 remote readers on the local bus
16 onboard alarm zones
4 door lock control relay outputs
up to 48 additional outputs
Advanced access control functions
48 macrodefinitions
Full local copy of the user database
Autonomous operation mode
Integrated 4,5A switching mode power supply
Auxiliary battery back-up
L type housing
Dimensions: D

A 4 door controller provides advanced access control functions for the users of the Advisor MASTER system. The device has been designed to work independently of the control panel unit. The autonomy of the controller is assured by a full local copy of all the system settings, including both user and card databases. Additionally the equipment has been designed to directly control locks, entry buttons (RTE), readers, door and lock alarm zones, tamper alarms etc. This ensures, that even when communication problems with the control panel occur, the controlled passages will function flawlessly. Communications with the control panel is not necessary for proper functioning of the passages, although the available DGP mainboard inputs, dedicated to access control tasks, can be

programmed to act as alarm zones of the alarm system. The readers and access control keyboards of the ATS1250 DGP can be used to the alarm system control functions. Configuration details using the ATS1250 device can be found in section 4.4.2.

Table 1-19 DGP ATS1250 compatible expansion modules

Expansion	Description	Amt.	Size
Memory – mounted in the slot on the mainboard, only one of the following modules.			
ATS1830	1Mb – pre-installed	1	-
ATS1831	4Mb, IUM		-
ATS1832	8Mb, IUM		-
Outputs– mounted in available housing slots			
ATS1810	4 relay outputs	2	B
ATS1811	8 relay outputs	6	BB
ATS1820	16 open collector outputs	3	B+

Table 1-20 DGP ATS1250.housing space

L – ATS1642 housing		
Battery	**Capacity**	**Free housing slots**
BS127N	7.2Ah	6xB or 3xBB or 4xB+
2xBS127N	14.4Ah	
BS131N	18Ah	
BS129N	26Ah	
2xBS129N	52Ah	

1.3.1.7 ATS1260 4 lift Access Control DGP.

4 elevators (lifts)
64 elevator floors
4 direct Wiegand reader inputs
16 remote readers on the local bus
15 local DGP (256 zones – one for every floor in each elevator)
16 dedicated onboard inputs
4 relay outputs (expandable to 256)
Advanced access control functions
48 macrodefinitions
Full local copy of the user database
Autonomous operation mode
Integrated 4.5A switched mode power supply
Auxiliary battery back-up
L type housing
Dimensions: D

The lift controller was based on the ATS1250 4-door controller hardware. The device is supplied as a set ATS1250+ATS1260UP – a lift controller software and instruction manual package and the ATS1250. Because of that, the available space details in the ATS1260 housing, are identical with those of ATS1250, detailed in Table 1-20.

Contrary to the ATS1250 the elevator control DGP requires installation of additional local DGP modules in order o achieve the maximum amount of 256 floor request inputs (4 elevators x 64 floors), and 256 outputs for visualization of the selected floors. The ATS1260 DGP is compatible with every alarm zone DGP of the ATS system, and every RAS station of the ATS system, see Table 1-10), using the ATS1170 and the IUM function with every Wiegand interface reader, and 48-bit cards. The local bus design procedure has been outlined in section 3.2.1.

Table 1-21 ATS1260 DGP compatible expansion modules.

Expansion	Description	Amt.	Size
Memory – mounted in the slot on the mainboard, only one of the following modules.			
ATS1830	1Mb – preinstalled	1	-
ATS1831	4Mb, IUM		-
ATS1832	8Mb, IUM		-
Outputs– mounted in available housing slots.			
ATS1810	4 relay outputs.	1	B
ATS1811	8 relay outputs.	16	BB
ATS1820	16 open collector outputs.	16	B+

1.3.1.8 Listing of the most important parameters.

Table 1-22 DGP device list (RS485 bus devices)

Product	Description
ATS1201	8 zones (max.32) and 8 outputs (max.16) expander, integrated 2A power supply, M type housing
ATS1203	8 zones (max.32) and 8 outputs (max.32) expander, integrated 3A power supply, M type housing
ATS1210	8 zones and 8 outputs expander, plastic housing (ATS1644)
ATS1211	8 zones and 8 outputs expander, metal housing (ATS1643)
ATS1220	4 zones and 8 outputs expander, plastic housing (ATS1644)
ATS1290	32 addressable sensors expander
ATS1230	433MHz wireless device receiver (up to 32 sensors and 16 remotes), plastic housing
ATS1250	4-doors access controller, integrated 4,5A power supply, L type housing
ATS1260	4-elevators (64 floors) controller, set of ATS1250+firmware, requires additional DGP modules

Table 1-23 Listing of the alarm zone DGP characteristics

Parameter	ATS1201	ATS1203	ATS1210/11	ATS1220	ATS1230	ATS1290
Onboard zones	8	8	8	4	32*	32*
Max. zones q-ty	32	32	8	4	32*	32*
Onboard outputs	8 OC	8 OC	8 OC	8 OC	-	32*
Max. outputs q-ty	16	32	16**	16**	-	32*
Siren output	Yes	Yes	-	-	-	-
Power supply	230V AC	230V AC	12V DC	12V DC	12V DC	12V DC
Housing	M	M	ATS1643 ATS1644	ATS1643	Plastic 104x132x27	ATS1644
Circuit board size	A	A	B+	B+	-	B+

*- addressable and wireless devices

**-output expansions possible only after replacing the housing

Table 1-24 Listing of the access control DGP characteristics

Parameter	ATS1250	ATS1260
Number of passages	4 doors	4 lifts/ 64 floors
Number of onboard reader IF	4	4
Max. number of readers	16	16
Local DGP q-ty	-	15
Onboard zones	16	16
Max. onboard zones	16	16
Max. zone quantity	16	256
Onboard outputs	4 relay.+ 8 OC	4 relay. + 8 OC
Max. output quantity	48	256
Siren output	Yes	Yes
Power supply	230V AC	230V AC
Housing	M	M
Circuit board size	A	A

Table 1-25 DGP technical characteristics

Parameter	ATS1201	ATS1203	ATS1210/11	ATS1220	ATS1230	ATS1290	ATS1250/60
Max Power cons.	80	80	53	53	30	154	275
Avg. Power cons.	75	75	50	45	30	53	275
Operating voltage	230V AC	230V AC	12V DC	12V DC	12V DC	12V DC	230V AC
Min. voltage	±10%	±10%	10.5V DC	10.5V DC	10.5V DC	10.5V DC	±10%
Power supply unit	2A	3A	-	-	-	-	4,5A
OC output load	50mA	50mA	50mA	50mA	-	-	50mA
Relay contacts load	1A@30V	1A@30V	1A@30V	1A@30V	-	-	1A@30V
Door lock relay load	-	-	-	-	-	-	2A@30V
Temp. max. ^{o}C	50	50	50	50	60	50	50
Temp. min. ^{o}C	0	0	0	0	0	10	0
IP rating	IP30	IP30	IP30	IP30	IP30	IP30	IP30
Humidity	95%	95%	95%	95%	90%	95%	95%

1.4 System accessories

1.4.1.1 System input and output modules.

ATS1202 — 8 alarm zones.
Used for control panel and DGP expansion
Dimensions: B

ATS1810 — 4 relay outputs. Asynchronous device, not compatible with remaining output expansions. This module converts OC outputs into relay outputs.
Dimensions: B

ATS1811 — 8 relay outputs. Synchronous device, enabling cascade linking to provide additional outputs.
Dimensions: BB

ATS1820 — 16 OC outputs. Synchronous device, enabling cascade linking of modules.
Dimensions: B+

ATS1821 — 8 OC outputs. Synchronous device, it's not possible to cascade link the modules. Dedicated module for communications with external communicators not integrated with the ATS system..
Dimensions: B

1.4.1.2 Alarm communicator modules.

ATS7100 ISDN-B communicator
Connected to the control panel through the MI bus
Supports all ATS reporting functions
Uses standard protocols (SIA, CID, etc.)
Supports all ISDN configurations
Allows remote connections to the TITAN software
In case of a reporting need, takes control over the ISDN line.
Dimensions: A

ATS7200 Voice reporting module.
Connected to the control panel through the MI bus
Supports voice reporting through all communication channels.
Total message duration 35sec.
8 voice messages (including greeting)
Flexible mapping of voice messages to events.
Up to 2 modules can be installed in the control panel.
Dimensions:: B+

ATS7300 GSM communicator
Connected to the control panel through the MI bus
Supports all ATS reporting functions
Uses standard protocols (SIA, CID, etc.)
Has an unique network delay adaptation function.
Network signal monitoring
External antenna
Integrated GSM phone module
Dimensions: B+

1.4.1.3 Computer and printer communication modules.

ATS1801 Computer and printer interface
The device provides two RS232 ports for the computer and printer each.
The printer port is unidirectional, and serves to send the events to a serial printer and to integrate the ATS system with CCTV systems that use DVMR digital recorders.
The computer port serves to directly, or remotely connect to a PC without time limits with a broaden bandwidth (4800bps)
Module connects directly do the mainboard, does not use housing expansion slots.
Dimensions:: B+

ATS1802 Printer interface
This device provides one RS232 printer port.
The printer port is unidirectional, and serves to send the events to a serial printer and to integrate the ATS system with CCTV systems that use DVMR digital recorders.
Module connects directly do the mainboard, does not use housing expansion slots.
Dimensions: B+

1.4.1.4 RS485 bus accessories.

ATS1740 Bus amplifier/isolator. Provides the RS485 bus signal amplification and galvanic insulation of the bus branch up to 1.5kV. Increases the range of the bus and allows implementation of complex RS485 bus networks.
Dimensions: B

ATS1741 Bi-directional RS485 – RS232 converter. The device converts bus signal for modem communications, and for linking control panels in a network.
Dimensions: B+

ATS1742 Loop interface. Allows creation of a RS485 bus loop.
Dimensions: BB

ATS1743 Fibre-optical converter. Converts the RS485 signal into optical signal, allowing the use of optical fibres in data bus construction.

Dimensions: B

Parameters:

Wavelength:	820nm
Optical fibre:	62,5/125um multimode
Converter:	LED
Flux budget:	15dB
AGC:	none

1.4.1.5 Memory modules.

The ATS system has three memory modules:

ATS1830 1Mb memory module.

ATS1831 4Mb memory module, hardware IUM.

ATS1832 8Mb memory module, hardware IUM.

Functional details, and guidelines for choosing the right module are described in control panel configuration, section 4.1.

1.4.1.6 ATS system Wonder-Box housing

The ATS system housing provide a standard set of mounting points, which makes them compatible with every expansion. The expansions have standardised circuit board sizes. Because of that, they fit exactly into the housing slots, which can be flexibly used to build the system. Detailed information concerning the housing, the free space inside etc. can be found in the appendices at the end of this document.

1.4.1.7 Miscellaneous accessories

ATS1340 Door connection box.

Provides connectors for: a reader, an exit button, a door lock device, external power supply and the data bus..

Is equipped with lock control relays

ATS1621 Smart card programmer

ATS1630 RS232 temporary service connection cable

ATS1631 ATS18xx and ATS1202 expander connection cable

ATS1632 ATS1801 RS232 direct connection cable

1.5 ATS8100 – TITAN Software

1.5.1.1 Programming Tool

The TITAN system provides a simple, Windows® compatible interface, which simplifies programming of the Advisor MASTER system control panel.

1.5.1.2 Data Sending/Receiving

A PC with a working TITAN system can be connected to the control panel either remotely (via the inbuilt PSTN communicator), or locally (through a RS232 connection). The RS232 connection can be time-limited (60 min) – if the inbuilt RS232 port is used – or permanent if an optional ATS1801 computer/printer interface is used. In any mode the TITAN system can retrieve and store the whole database or just one setting at a time.

The TITAN system can be used to make backups, and store archive copies of the data from 9999 independent systems on one PC. Each system can consist of 1024 control panels using the same user database.

1.5.1.3 Reports

An efficient report printing function makes it possible to create detailed programming sheets for all the system information contained in the TITAN database. This provides help in quick fault removal, system expansion, programming and maintenance. It provides the option of generating a large number of customised log reports. The reports can encompass any combination of date/hour ranges, manipulators, users and other parameters. ATS Smart Card programming, can be done in place, using the TITAN system in conjunction with an optional card programmer.

1.5.1.4 Remote diagnostics

Every ATS control panel, can be subjected to diagnostic sessions by the TITAN system, which gathers the reports. The parameters verified by the diagnostic software conform to the EN50131 standard and encompass analogue signal measurement such as input loop resistance as well as voltage and supplied current for all RAS stations and DGP modules connected to the data bus.

1.5.1.5 Zone maps

Alarm map images (floor diagrams or drawings) can be configured to provide detailed information for any zone in the system. In case of zone activation, the information is displayed on the map, which enables the operator to manually control the alarm on the map. To simplify the TITAN system operation, a ”Point & Click” interface has been implemented, using a context menu. All alarm events can be handled from the map level, and not only from the ALARM menu. Several operators can use the same TITAN system, each having appropriate access privileges, and being subjected to specific restrictions.

1.5.1.6 Real-time event logging

The real-time event log contains all triggered events, along with the date, hour, and event description. The information is then stored in the history database, which can be archived, reported and displayed as a permanently visible window.

1.5.1.7 Photo ID

The TITAN system provides a fully integrated Photo ID solution, which allows creation of user, guest or client identification cards with their photo. The photographs can be captured from a camera video stream, or imported in digital format. The TITAN system enables design and priming of any user card sets either with detailed information about the company and user (taken from the database), or without.

1.5.1.8 Control panel network monitoring

The TITAN system can support up to 16 COM ports simultaneously. Each COM port can support up to 16 ATS control panels. In total there can be 64 systems connected to the TITAN software at the same time. Each control panel is an independent security system that reports to a single TITAN system.

1.5.1.9 ATS8100UP – Update

The software is provided in two versions – full and update. That way users of older versions of the software can easily extend their systems with new features. The UP version has a full range of database tools, and can, if needed, update and repair existing databases without the need to import them after finishing the update.

1.5.1.10 Licence

In Poland the TITAN software is distributed free of charge, and the associated royalties are included in the price of the control panel modules necessary to use the system's functions. Nevertheless all licence provisions hold their power – see software appendix.

Table 1-26 Technical characteristics

Parameter	Value
System requirements:	Windows OS(95/98, NT, 2000 or XP Processor: Pentium 166 or better 32 MB RAM 100 MB free hard drive space CD-ROM drive and mouse
Maximum number of connected PC's	1 (TITAN is single workstation software)
Maximum number of simultaneously connected control panels	64
Maximum number of control panels in the system:	1024
Maximum number of systems in the database:	9999 systems
Maximum number of printers:	Dependant on the number of assigned ports
Communication ports in the PC:	Serial ports installed in the system (max. 16)
Recommended connection cable for ATS1801:	4-wire shielded RS232 data cable (not twisted pair)
Recommended cable for the inbuilt RS232 port:	ATS1630 (RS232 active cable)
Maximum wiring length for RS232:	15 metres

2 SYSTEM POWER SUPPLY.

In every security system, the power supply design is an essential part. Providing the equipment with adequate working conditions in critical situations is vital for building security. Below are some of the critical aspects of the power supply problem, pertaining to system design:

- Power supply efficiency;
- Backup power – batteries and their recharging;
- Power requirements of the equipment;
- Power transmission losses;
- Shielding and grounding.

Due to the area covered, and projected flexibility the Advisor MASTER system offers a distributed power supply system. The control panels, as well as the DGP (alarm and access control) are equipped with a switched mode power supply with current draw ranging from 2.2A to 4.5A (13.8V DC). Each device is designed to provide backup power, and to supply equipment connected directly, or through the system bus. This ensures the alarm system is constantly supplied from a local power source, connected to the central unit only through the data bus.

Each ATS system power supply is equipped with a backup power system. The batteries are charged from the main power supply. Because of that, it is necessary to secure a proper margin of power supply current draw to enable recharging of the batteries appropriately fast enough for system security level.

A unique feature about the ATS equipment is verification of not only the presence of a battery, but also its condition. During the battery test, the system switches to battery power for a while, checking how much power it drains from the battery (it measures the voltage drop, current and time). After restoring the mains power supply, the system verifies the amount of energy necessary to restore the battery to its starting state (measuring the voltage, current and time). Based on the gathered data, the system verifies battery life and, if necessary, sends an appropriate service report. The event log will of course contain the appropriate entries.

Another feature of the Advisor MASTER system power supply is a battery deep discharge protection, which ensures the batteries do not get broken by complete discharge. During a longer period of operating on battery power, if the supplied voltage drops below a certain level, the system goes into a suspended state after sending the appropriate reports to a SMA station and logging the appropriate entries in the event log. When the main power supply becomes available again, the system will restore itself to full functionality, send the appropriate reports to the SMA station and log the appropriate entries in the event log.

2.1 System power supply

The system power supplies are available in the control panels, the ATS1201/03 basic system DGP and ATS1250 Access control DGP. The use of a system power supply is recommended whenever possible, due to the advanced power supply monitoring functions and the capability of testing the batteries. The power requirement data for the equipment does not include the power requirements for expansions and other system devices connected to them. The average values are given for equipment in stand-by mode – normal zones state etc. The peak values pertain to the system in alarm state – shorted zones, increased data bus communications etc. but do not include power requirements for signal outputs, and other devices supplied by the system. The power supply design should provide adequate supply for those devices. To simplify the definition of power requirements, the following lists have been assembled:

Table 2-1 Power supply efficiencies, and power requirements.

Device	PSU Current Draw	Current consumption		Comment
		Max.	Average	
ATS2000	2.2A	250mA	170mA	250mA max. all inputs active
ATS3000	2.2A	250mA	170mA	
ATS4000	2.2A	250mA	200mA	
ATS4500	2.2A	250mA	200mA	
ATS1201	2.2A	120mA	75mA	120mA max. all inputs active
ATS1203	3.0A	120mA	75mA	
ATS1250	4.5A	275mA	275mA	Access control device.

To simplify the work of the designer, we gathered data for the typical power supply and battery configurations and placed them in the table below (Table 2-3). The assumption for the evaluation in Table 2-3 is system security level 3 and 4 – The system is supplied in stand-by mode for 60 hours, and the batteries are recharged to 80% capacity in less than 12 hours (EN50131).

The battery configurations listed by housing and equipment size are gathered in Table 2-2.

Table 2-2 Battery configurations for Advisor MASTER devices.

Housing	ATS1640	ATS1641	ATS1642	ATS1642	Battery capacity	Recommended configurations
Device **Battery Configurations**	***ATS2000*** ***ATS3000***	***ATS4000*** ***ATS1201*** ***ATS1203***	***ATS4500***	***ATS1250*** ***ATS1260***		
BS127N	**x**	**x**	**x**	**x**	7.2Ah	**x**
BS130N			**x**	**x**	10Ah	
BS131N	**x***	**x***	**x**	**x**	18Ah	**x**
2xBS127N		**x**		**x**	14.4Ah	**x**
BS129N			**x**	**x**	26Ah	**x**
2xBS129N				**x**	52Ah	**x**

**- lack of expansion space underneath the control panel/DGP mainboard*

Table 2-3 Security level 3 and 4 equipment power supply.

Device	Battery Ah	Device power consumption mA	Additional load mA	Charging current mA
ATS2/3/4018	18	200	85	1715
ATS1201	7,2	75	39	1880
	18	75	210	1710
	25	75	320	1600
ATS1203	7,2	75	40	2685
	18	75	220	2500
	25	75	330	2395
ATS4500	18	200	85	1715
	25	200	200	1600

2.2 System equipment power consumption.

Devices equipped with a power supply – control panels, and some DGP – have safety measures which prevent excessive battery discharging, switching them off if the voltage drops below 10.5V. For other devices, the minimum voltage required to operate correctly has been gathered in table Table 7-9 placed in the last chapter of the manual. The values for equipment connected to devices equipped with a power supply are only for orientation purposes.

Some devices have characteristic current consumption values depending on the connected equipment. In the table below the current consumption is given for the device with connected equipment. A detailed list of device parameters in different working conditions are given in chapter 7 of the manual in table Table 7-9.

Table 2-4 Characteristic power requirements for the ATS devices.

Device	Connected equipment	Description	Current con. mA	
			Max.	Average
ATS1100	-	Keypad, 2*16 characters LCD/8 zone LEDs	185	73
ATS1105	-	Keypad, 2*16 characters LCD /8 zone LEDs with Wiegand reader interface.	185	78
ATS1105+	ATS1410	ATS1105 manipulator with a magnetic card reader connected	195	150
ATS1110	-	Keypad, 2*16 characters LCD/16 zone LEDs	95	32
ATS1111	-	Keypad, 4*16 characters LCD/16 zone LEDs	95	32
ATS1115	-	Keypad, 2*16 characters LCD/16 zone LEDs with inbuilt ATS card reader.	165	86
ATS1116	-	Keypad, 2*16 characters LCD/16 zone LEDs with inbuilt ATS card reader.	169	86
ATS1151	-	LED keypad (3 diodes) in metal housing, no LCD	45	34
ATS1155	-	Outdoor, vandal-proof keypad (metal), 3 diodes, detached electronics	70	70
ATS1156	-	LED Manipulator (3 diodes) in metal housing with ATC600 magnetic card reader	45	39
ATS1170	-	Wiegand reader interface (single door controller) – PCB	45	32
ATS1170+	ATS1190	Interface with a proximity card reader connected.	95	65
ATS1190	-	Proximity reader (does not require an interface)	50	29
ATS1192	-	High resistance proximity reader (does not require an interface) indoor/outdoor use	50	29
ATS1202	-	8 zones module for expander and control panel- PCB	10	9
ATS1210/11	-	8 zones and 8 outputs expander	53	50
ATS1210/11+	ATS1810	ATS1210 with 4 relay outputs module connected	130	70
ATS1210/11+	ATS1811	ATS1210 with 8 relay outputs module connected	225	110
ATS1210/11+	ATS1820	ATS1210 with 16 open collector outputs module connected	90	38
ATS1220	-	4 zones and 8 outputs expander	53	45
ATS1230	-	433MHz wireless device receiver		39
ATS1290	-	Point ID addressable sensor expander.	154	50
ATS1740	-	Isolator/ RS485 bus repeater - PCB	90	60
ATS1741	-	RS485 / RS232 bus converter- PCB	100	100
ATS1742	-	RS485 bus loop interface – PCB	86	86
ATS1743	-	Fibre-optical bus converter- PCB	60	36
ATS1810	-	4 relay NO/NC outputs module – PCB	60	1
ATS1811	-	8 relay NO/NC outputs module – PCB	170	20
ATS1820	-	16 open collector outputs module – PCB	50	20

Device	Connected equipment	Description	Current con. mA	
			Max.	Average
ATS1801	-	Control panel RS232 computer/ printer interface (2 ports)	60	20
ATS1802	-	Control panel RS232 printer interface	60	20
ATS1830	-	ATS3000/4000 control panel 1MB memory expansion	30	3
ATS1831	-	ATS4000/4500 control panel and ATS1250 controller 4MB Intelligent User Memory.	30	10
ATS1832	-	ATS4000,4518 control panel and ATS1250 controller 8MB Intelligent User Memory.	30	10
ATS7100	-	ISDN communicator module, B channel	92	45
ATS7200	-	ATS Master control panel voice module (2+6 messages)	50	23
ATS7300	-	GSM communicator module	110	20
ATS1410	-	Magnetic card reader	75	

Several examples of power requirement calculations for expanded devices.

Table 2-5 Expanded ATS3000 control panel power requirements.

Device	Description	Current consumption mA		Comment
		Max.	Average	
ATS3000	Control panel 8 zones(max.64), 8 areas, with a dialler, S type power supply housing	250	170	Maximum current for all zones shorted
Connected equipment				
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1801	Control panel RS232 computer / printer interface (2 ports)	60	60	One port active
ATS1830	ATS3000/4018 control panel 1MB memory expansion	30	1	
ATS1811	8 relay NO/NC outputs module for control panels and expanders ATS1201 – PCB	50	20	
	Additional equipment total:	*160*	*99*	
	Together with the control panel:	**410**	**269**	

Table 2-6 Expanded ATS4000 control panel power requirements.

Device	Description	Current consumption mA		Comment
		Max.	Average	
ATS4000	Control panel 16 zones (up to 256), 16 areas, with a dialler, M type power supply housing	250	200	
Connected equipment				
ATS1801	Control panel RS232 computer/ printer interface (2 ports)	60	60	One port active
ATS1830	ATS3000/4018 control panel 1MB memory expansion	30	1	
	Additional equipment total:	*90*	*61*	
	Together with the control panel:	**340**	**261**	

Table 2-7 Expanded ATS4500 control panel power requirements..

Device	Description	Current consumption mA		Comment
		Max.	Average	
ATS4500	Control panel 16 zones (up to 256), 16 areas, with a dialler, L type power supply housing	250	200	
Connected equipment				
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1811	8 relay NO/NC outputs module for control panels and expanders ATS1201 – PCB	50	20	
ATS1811	8 relay NO/NC outputs module for control panels and expanders ATS1201 – PCB	50	20	
ATS1831	ATS4000,4518 control panel and ATS1250 controller 4MB smart memory module.	30	10	
ATS1801	Control panel RS232 computer/ printer interface (2 ports)	60	60	
ATS7100	ISDN communicator module, B channel	120	50	Maximum current while initiating the connection
	Additional equipment total:	*330*	*178*	
	Together with the control panel:	**580**	**378**	

Table 2-8 Expanded ATS1201 DGP power consumption.

Device	Description	Current consumption mA		Comment
		Max.	Average	
ATS1201	8 Inputs (max.32) and 8 outputs (max.16) expander, M type power supply housing	120	75	
Connected equipment				
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1202	8 inputs module for expander and control panel- PCB	10	9	
ATS1811	8 relay NO/NC outputs module for control panels and expanders ATS1201 – PCB	50	20	
ATS1811	8 relay NO/NC outputs module for control panels and expanders ATS1201 – PCB	50	20	
	Additional equipment total:	*130*	*67*	
	Together with the control panel:	**250**	**142**	

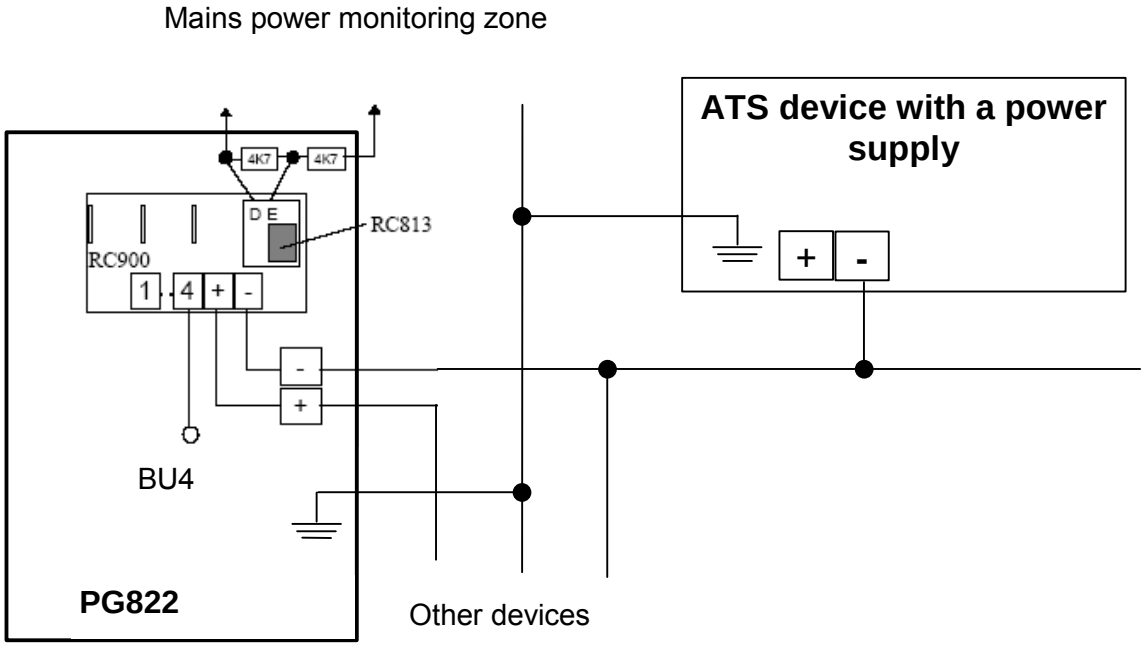
2.3 Wiring.

The proper grounding and isolation of the devices is an important issue in each wide area system. All the system elements are equipped with a grounding connector, and should be connected to a common grounding point in the central station via a 2.5mm^2 wire. The data bus shield should be connected to common ground on one end only. The data shield should not under any circumstances be grounded on both ends of the transmitting wire. The design should plan to include appropriate power supply wiring including a grounding wire connected to all devices that require it. To separate a part of the system galvanically the ATS1470 isolating module has to be used, as it provides insulation up to 1.5kV. Using the module you have to remember that it needs to be connected to system grounding on the side it's powered from.

The powering elements further away than 100m from the control panel or a power supply-equipped DGP, needs to be laid separately from the data bus. Having the power supply alongside the data bus can lead to voltage dropping below 10.5V which can hamper system stability. A further limit is the maximum current load (1A) of the power output.

2.4 Connecting other power supplies.

When planning to connect another power supply, you have to ensure the proper connection to the system grounding and not connect the positive connectors to any other power supply. The system power supply in emergency situations requires that additional power sources ensure an adequate supply in case of mains power failure. For systems with higher security levels, the power supply needs to fulfil certain criteria of back up power duration and subsequent recharging of the batteries. Examples of calculations can be found in section 2.1. A further requirement is monitoring the mains power. For that, you need to provide one alarm zone, which will be activated in case of mains power failure. Drawing 2-1 shows an example of connecting an external power supply to the ATS system. A 2A @138V DC power supply with battery backup is used. It is supplied with a transformer and housing, in which a BS127N(7.2 Ah) or BS130N(10Ah) battery can be installed. The power supply can also be installed in an empty ATS housing and use a bigger battery, but the power supply circuit board is not compliant with the ATS mounting holes standard.



Drawing 2-1 Connecting the PG822 power supply to the ATS system.

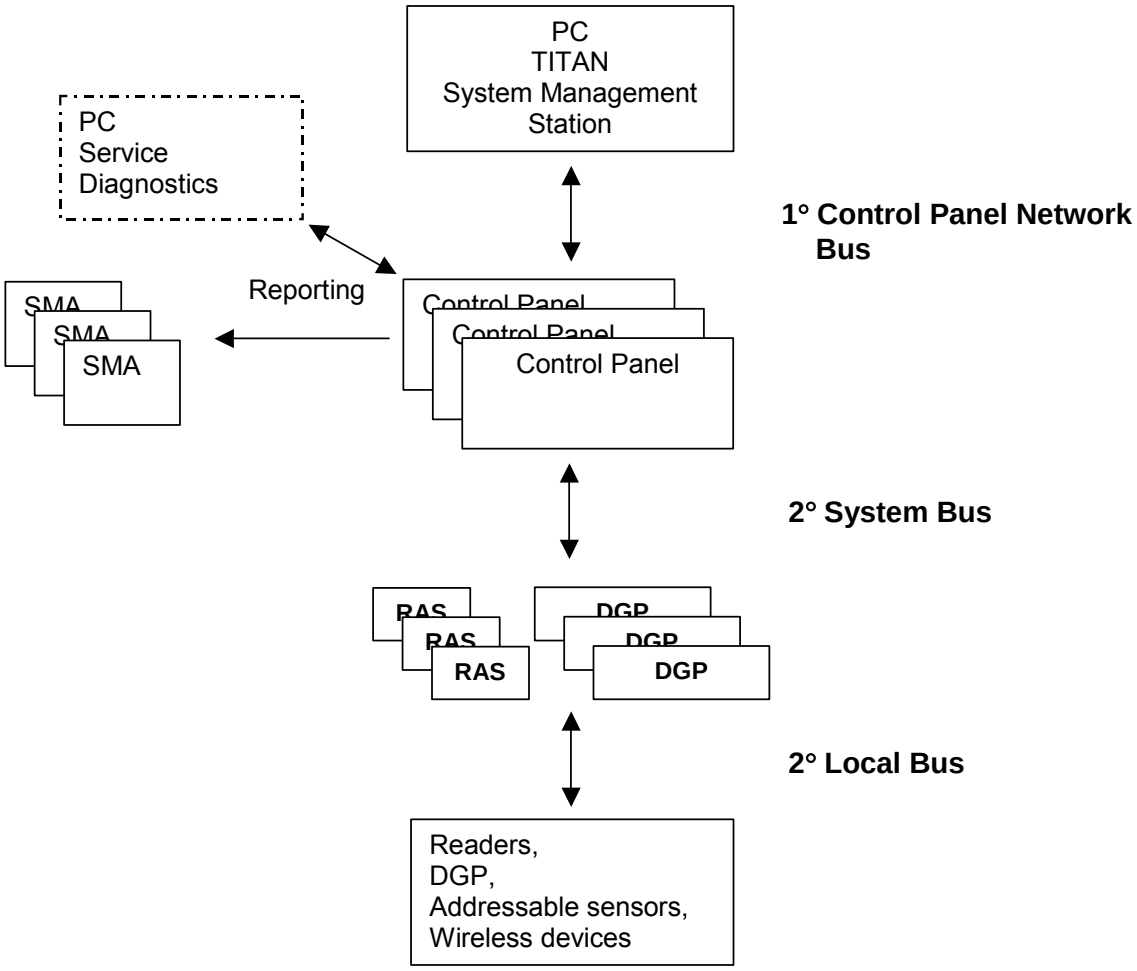
3 COMMUNICATIONS

The alarm and access control system has extended communication capabilities. Viewed globally, the communications, that is, the bi-directional data transmission, should be divided into two aspects: system internal communications, and communications between the system and the outside world – reporting events to monitoring stations.

System internal communications (Drawing 3-1) has been divided into 3 basic parts:

- Control Panel Network Bus – connecting the control panels to a computer with a managing program, connecting the panels into a network;
- System Bus – communications between the control panel and RAS, DGP expansions;
- Local Bus – communications of DGP and RAS with their peripheral equipment.

Due to its nature, the subject of Control Panel Network Bus has been divided into communication with a PC, and network operation of the control panels. Service connection with a PC has been described in the first part.

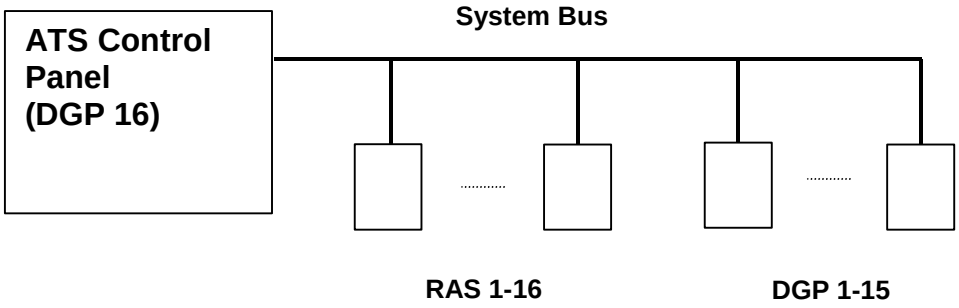


Drawing 3-1 Advisor MASTER system communications diagram.

3.1 System bus

The ATS system design assumes communications between system elements (DGP, RAS) with a master unit – the control panel (Drawing 3-2). Up to 16 RAS stations and 15 DGP devices can be connected to one control panel. The control panel itself is identified

as DGP number 16. The device number – its address – is set in each device attached to the bus by a DIP switch or through software. There are no limitations as to the sequence of addresses of the connected devices. The control panel queries each ATS system component connected to the system data bus. Lack of response to the polling signals sent triggers the tamper alarm with appropriate consequences. Therefore providing reliable communications between the control panel and peripheral equipment is very important to proper system function.



Drawing 3-2 Basic construction of the Advisor MASTER system bus.

The system bus communications are implemented using the RS485 interface – a serial data port with balanced and symmetric connection – one of the most interference resistant systems used in electronics.

Table 3-1 Characteristic parameters of the system bus

Parameter	Value
Interface	RS485
Transmission mode	Half Duplex
Bandwidth (bps)	4800
Range (m)	1500
Loop resistance (Ohm)	235

The provided bandwidth is adequate due to the system of distributed processing implemented. Each system expansion has it's own processor, and all necessary data processing equipment for analyzing the system inputs. The RS485 interface range – 1500m – is guaranteed under optimal working conditions: with proper line fitting, and appropriate wiring.

Line fitting is done using resistors placed at the start and end of the transmission line. This operation secures a typical value for system bus resistance is 235Ohm. All ATS system devices, except the ATS1190/92 Smart card readers, and hands free sensors expansion ATS1230, working with the system bus have inbuilt terminating resistors, activated via a jumper or DIP switch. Regardless of the circumstances the resistors can only be activated in the two most distant, opposite ends of the network.

3.1.1 Wiring

For proper data transmission only three wires are necessary, a twisted pair for D+ and D- signals, and power supply 0V for reference – Drawing 3-3. Nevertheless, to achieve the maximum data transfer range, care about the proper technical parameters of the wires must be taken.

Suggested cables: The suggested cables for the ATS system bus– RS485, 4800bps – are:

- Belden 8723
- Aritech WCAT52

- Aritech WCAT54

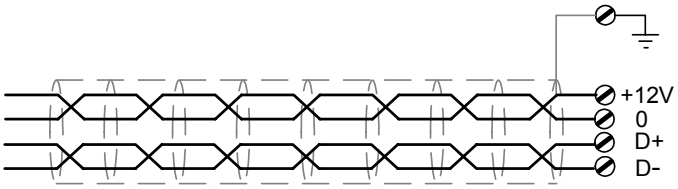
Use of the abovementioned cables guarantees failure-free operation, and the maximum declared bus range – 1500m. For data bus wiring, other cables can be used if meet following requirements: cat 5, twisted pair, STP or FTP.

Table 3-2 Technical parameters of the suggested cables.

Cable type	Belden 8723	WCAT52	WCAT54
Description	Cat 5. Shielded Twisted Pair	Cat 5. Shielded Twisted Pair	Cat 5. Shielded Twisted Pair
Wire count	4	4	8
Pair count	2	2	4
Single wire resistance (Ohm/km)	57,4	84	84
Capacity between wires (nF/km)	120	45	45
Capacity between the wire and the shield (nF/km)	200	100	100
Maximum transmission range(m)	**1500**	**1500**	**1500**

3.1.1.1 Shielding

The data cable shield needs to be connected to the system grounding. Every system ground needs to lead to a single point, and the shield cannot be grounded on both ends, due to the risk of current loops in the shield.



Drawing 3-3 Wire connections in the system bus

When using the ATS1470 isolators, the appropriate grounding rules need to be observed, and the shield needs to be connected properly. The shield has to be connected only to one cable, and only on the side of the system from which the isolator draws its power.

3.1.1.2 Power supply

Although such a solution has significant limitations, it is possible to supply peripheral equipment with power using the data bus. The Drawing 3-3 shows such a connection.. The power supply output efficiency of the data bus is limited to 1A (F4 resistor in the control panel). Much more restrictive is the transmission cable load limit. The acceptable voltage for the system components is 10.5V DC. In case of the WCAT52/54 cable a load of 100mA would cause the voltage to drop from 12V to 10.5V after only 89m of cable. In case of the Belden 8723 cable such a drop would occur after 131m due to it's lower resistance. Detailed calculations can be found in Table 3-3.

To increase the range, the number of power supply wires in the cable can be increased (in pairs of +12V and 0V), but this solution is not advisable, and under no circumstances should it exceed a distance of 100m

Table 3-3 Data bus power supply – Maximum Range.

Current mA	Belden	WCAT52/54	WS108
50	261m	179m	167m
100	131m	89m	83m
150	87m	60m	56m
200	65m	45m	42m
250	52m	36m	33m

3.1.2 Device Addressing

All the functional ATS devices – DGP and RAS – communicate with the control panel using the data bus. The data bus address space (RS485 – 32 devices) is divided into two groups, DGP and RAS, addressed separately. The system bus compatible RAS and DGP device list can be found in Table 1-10 and Table 1-22.

DGP addressing is carried out by setting the DIP switch on the PCB board of the device. There can be maximum 15 DGP devices in the system, numbered 1 to 15. For the DGP device to be visible in the system, it's pooling needs to be enabled. The ATS1250/60 devices accept addresses 1 to 12 due to the access control DGP count limit to 12 devices. The remaining addresses can be assigned to ATS1201/03/10/11/20 DGP units. The control panel is identified as DGP number 16. The DIP switch settings for the DGP module addresses are presented in Table 3-4. DGP module addressing is vital for alarm zone addressing space usage.

Table 3-4 RAS and DGP addresses and numbers in the ATS system (DIP switch settings)

Device Number	DGP Address		RAS Address
	ATS1201/03 ATS1210/11 ATS1220	ATS1250 ATS1260	ATS11xx
1	1000	1000	0000
2	0100	0100	1000
3	1100	1100	0100
4	0010	0010	1100
5	1010	1010	0010
6	0110	0110	1010
7	1110	1110	0110
8	0001	0001	1110
9	1001	1001	0001
10	0101	0101	1001
11	1101	1101	0101
12	0011	0011	1101
13	1011	-	0011
14	0111	-	1011
15	1111	-	0111
16	Control panel		1111

The RAS station addressing is done either through software, or by an appropriate setting of the DIP switch on the device's PCB board. The devices that can have their address set by programming are ATS1190 and ATS1192 – smart card readers. The default address value for their address is 16. There can be up to 16 RAS devices in the system, numbered 1 to 16. For the RAS devices to be visible in the system, they have to be activated by switching on the pooling of the appropriately numbered RAS device. By

default, after system memory restart, only the RAS number 1 is pooled. All RAS device activity is saved in the system according to their number. The RAS station number also defines the door number for central station based access control.

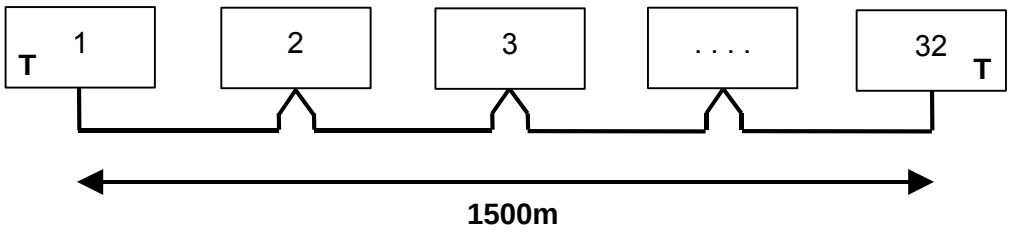
3.1.3 Bus topology

In accordance with the RS485 interface specification, the basic layout for the system bus is a cascade connection of 32 devices. 16 RAS devices and 15 DGP devices can be connected to the Advisor MASTER system data bus, which, along with the control panel, gives 32 sending/receiving devices connected to the RS485 interface.

The bus configuration limits are imposed by the signal propagation in complex networks. The signal “echoes” – a consequence of the signal bouncing in long network branches due to different branches delay time – can cause multiple responses from one module, which would be interpreted by the control panel as system sabotage. According to its design, a system of class 3 and 4 should recognize and react to subsystem shutdown attempts by switching devices. The echo effect can be mitigated through the use of ATS174x bus expansion modules. The maximum bus length limits come from timing dependencies of the device querying procedure. Any pooling errors or problems can be read from the system menu, or through the diagnostic module of the TITAN software. Each device connected to the ATS control panel has an inbuilt communication error counter (max 255). That information can be used to test the bus configuration after system installation.

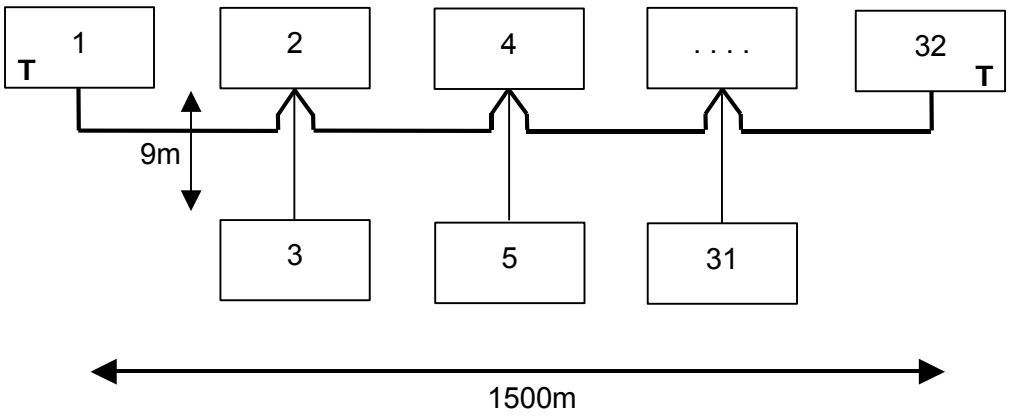
3.1.3.1 Standard configurations

Because using only the cascade connection of system devices could be problematic, some modifications of the cascade connection, as well as developing more complex networks is permissible using the system bus accessories – the ATS174x devices.



Drawing 3-4 Cascade connection

Standard data bus connections are the cascade connection and cascade connection with branches up to 1500m. The control panel can be located in an arbitrary location in the chain creating two branches. It has to be kept in mind that the total length of the bus cannot exceed 1500m.

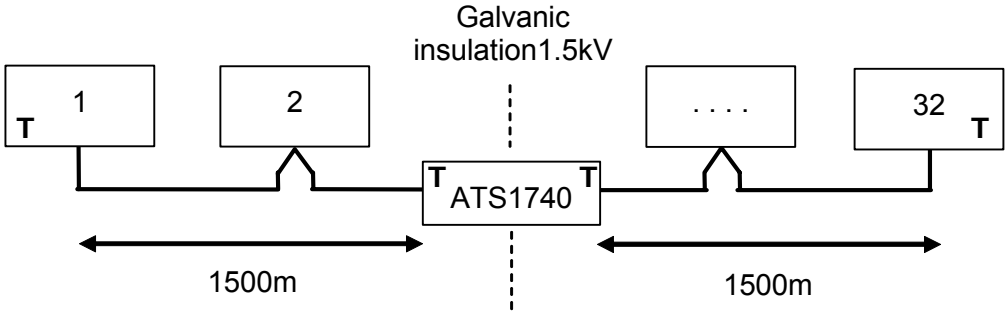


Drawing 3-5 Chain connection with branches from the main bus course.

3.1.3.2 Increasing the system bus range

- **ATS1740 Repeaters - Isolators**

The system bus can be increased using the insulator/amplifier ATS1740. Each repeater increases the bus range by 1500m. The total bus range is limited to 6km which means that the maximum number of cascade connected repeaters is 3.



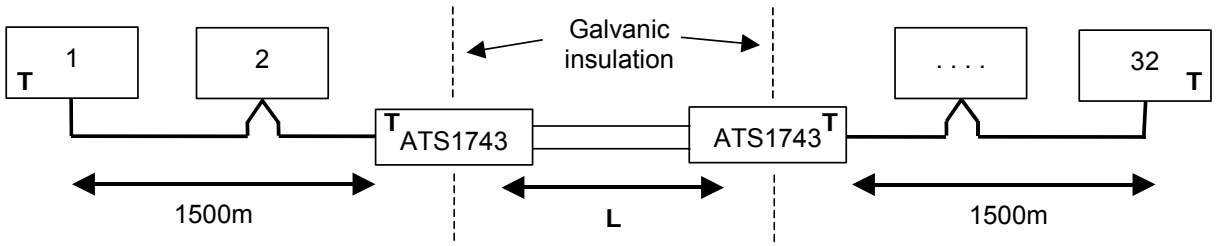
Drawing 3-6 Using the ATS1740 amplifier to increase the bus range.

- **ATS1743 Optical fibre interface.**

Another method of increasing the bus range is by using optical fibres and the ATS1743 interface. The device uses the popular, and relatively cheap multi-mode 62,5/125um optical fibres, working in the lower infrared range – 820nm wavelength. It provides a cheap and tested solution to the bus range problem. The device can work in two modes:

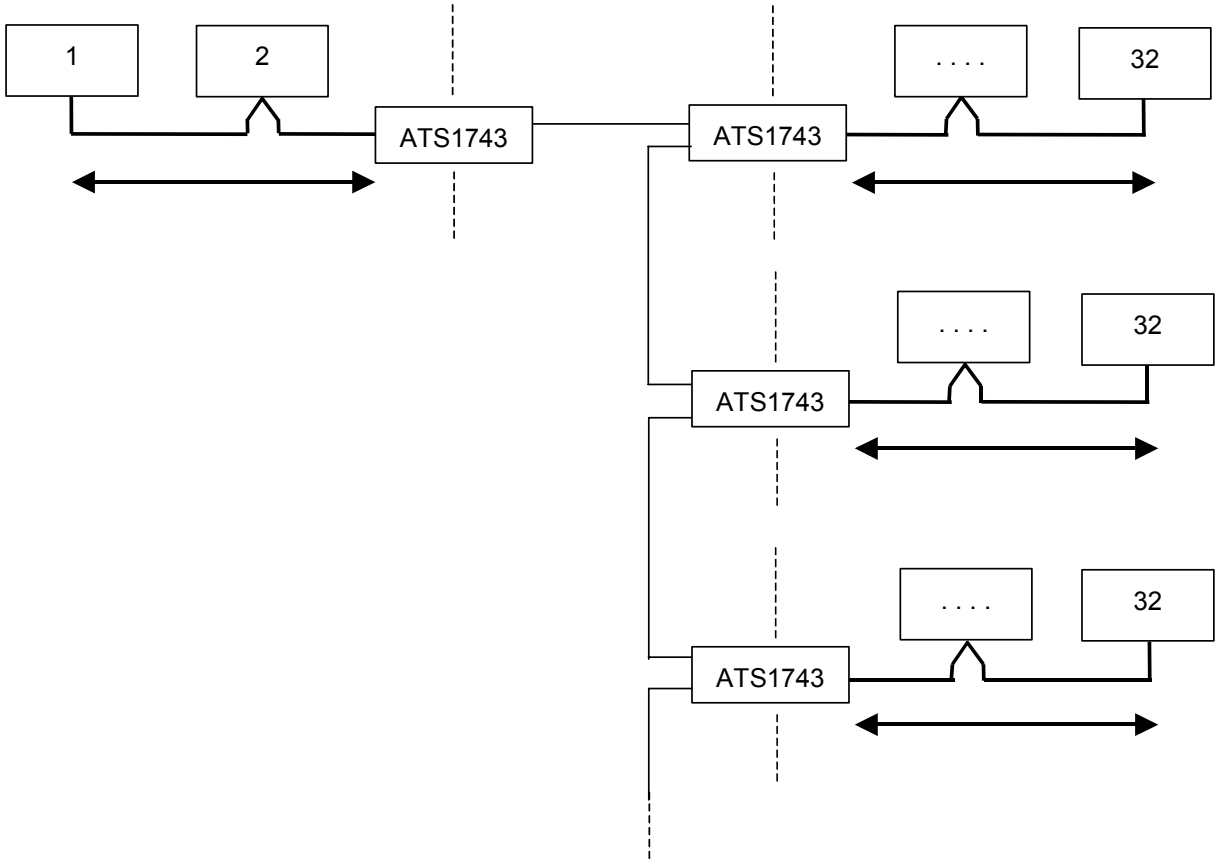
- Point-To-Point – with a double optical fibre – this way 2 system branches, 1500m each, can be connected.
- Multi drop – with a single optical fibre– in this way the whole system bus can be designed using only optical fibres, or more branches can be connected in a star configuration (see chapter ***Star configuration***) or branched bus.

The maximum distance between two ATS1743 interfaces is dependant on the parameters of the installed optical fibre and on the quality of the connections. A typical value of optical budget for the connection is 15dB.



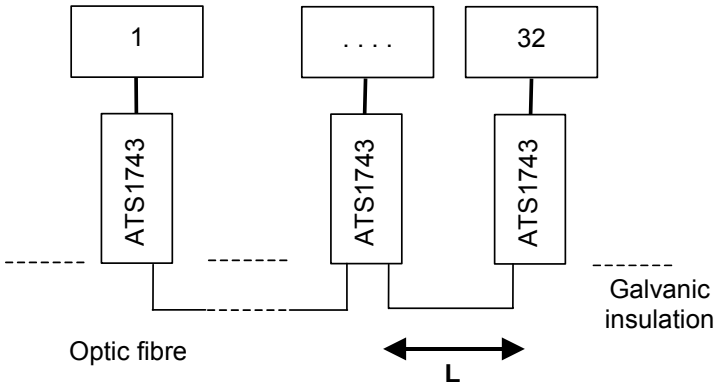
Drawing 3-7 Connecting two branches using two optical fibres via the ATS1743 interface.

A typical use of the fibre-optic modules, besides extending a single bus branch, is a branched bus configuration. The main bus is laid out using an optical channel, and the branches using the RS485 interface. This way, many branches can be designed that should total less than 6km in length and not exceed 1500m for a single branch. The fibre-optic bus length is dependant on the parameters of the fibre used.



Drawing 3-8 Optical bus with RS485.branches

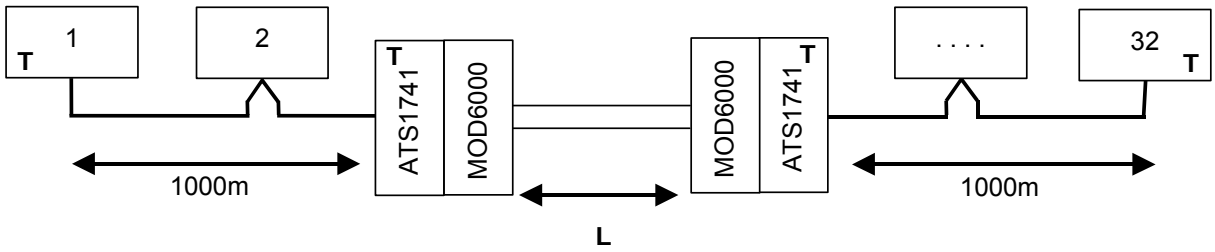
Basing the bus design on optical fibres creates a need for every device to have its own power supply. This can be troublesome in a system with control panel driven access control, because every RAS controlled door would need to have its own power supply with battery back-up.



Drawing 3-9 Fibre-optic bus design using the ATS1743 interfaces

- **Dedicated leased line modem**

A modem connection on a dedicated line can be used to extend the bus range. Maximum range of the connection is 3km – minimum cat. 2 phone cable, line without amplifiers, MOD6000 modems. It is not permissible to use the internal phone network to connect the subsystems. Due to security concerns, the line must be dedicated to ensure permanent connection. Maximum length of connected bus branches is 1000m.



Drawing 3-10 Extending the bus, using modems and a dedicated leased line

3.1.3.3 Star configuration

More than two bus branches can be achieved using the ATS1470 repeater/insulator modules, or the fibre-optic modules. At the centre of the network is always the control panel.

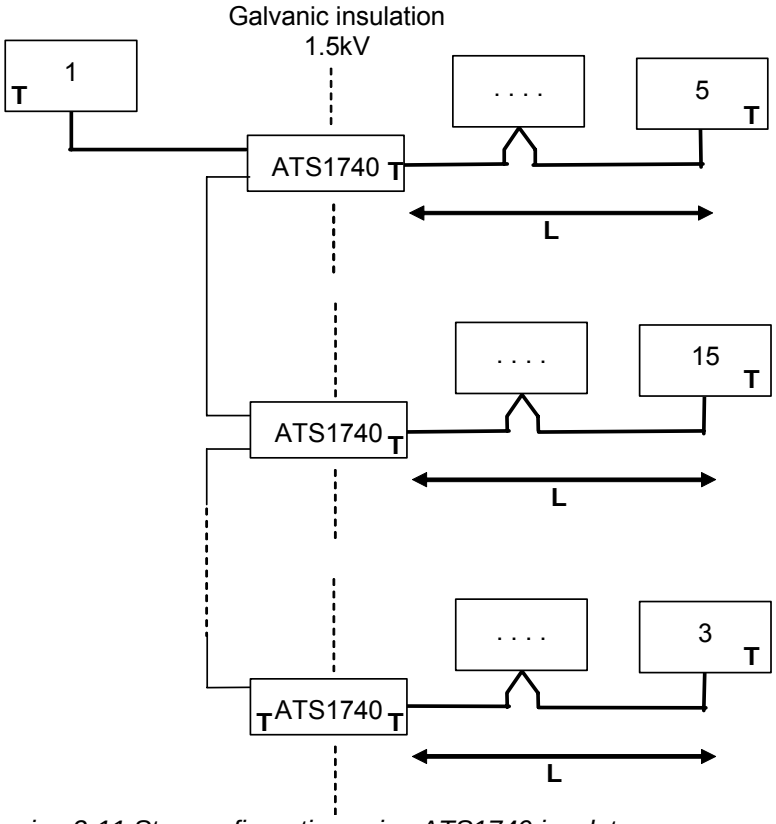
- **ATS1740 Amplifier modules**

When creating a star configuration network using the ATS1470 repeater/insulator modules up to 6 branches can be connected, with up to 1000m length each.

Table 3-5 Branch length L (m) depending on the number of branches.

Branch count Number of ATS1740	Branch length L (m)
1	1500
4	1500
6	1000

Expanding single branches using additional ATS1470 amplifier/insulator modules is possible if the total bus length would not exceed 6km. If the planned bus range is larger than this limit, the use of ATS1743 fibre-optic modules should be taken into consideration.

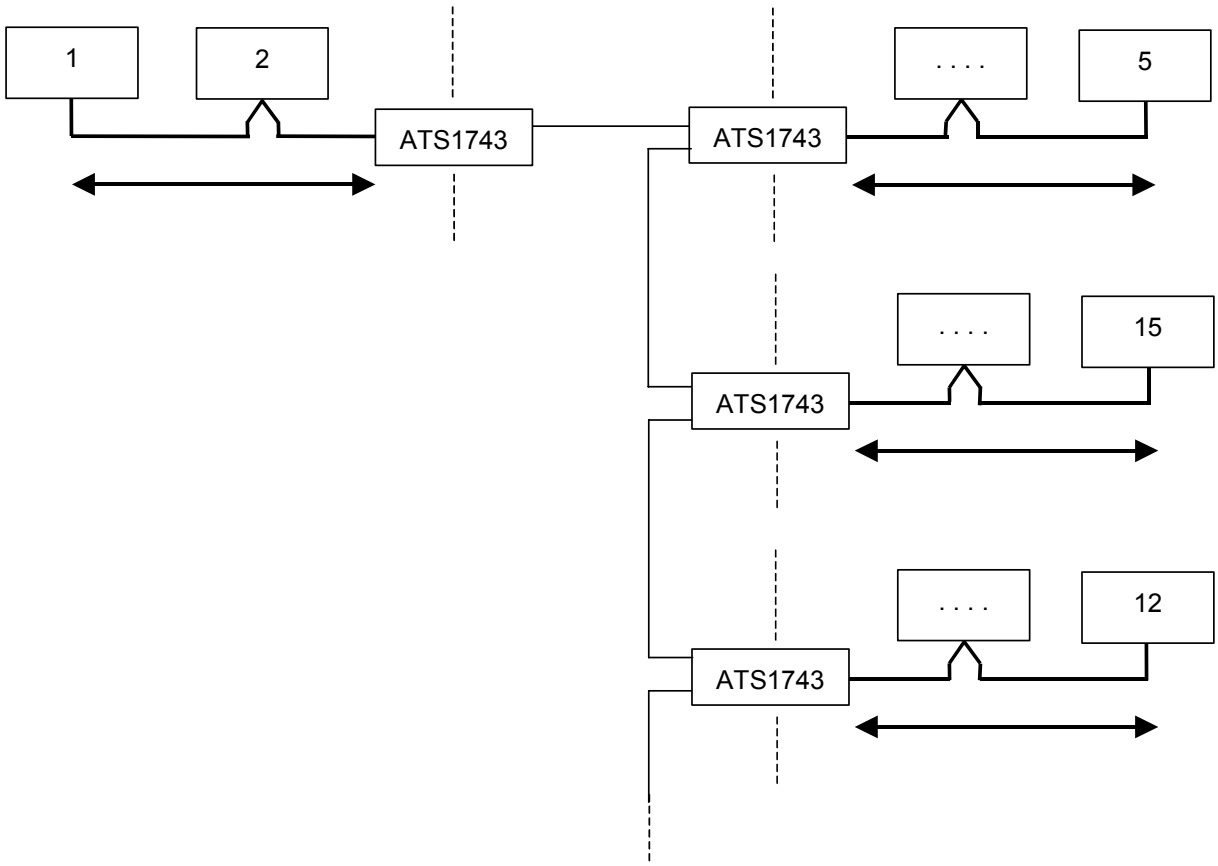


Drawing 3-11 Star configuration using ATS1740 insulators.

In case of replacing an older system with Advisor MASTER, the existing bus wiring can be adapted. In that case, using ATS1470 amplifier/insulator modules, up to 6 branches of non-twisted, non-shielded 300m cable can be connected.

- **ATS1743 fibre-optic modules**

Using optical fibres for communications gives many possibilities for system expansion. Creating a star configuration using fibre-optic modules is justified if the star configuration is both extensive and remote, or if the available bus branch range is not sufficient. In that case, the modules can be used to expand the range of single branches.

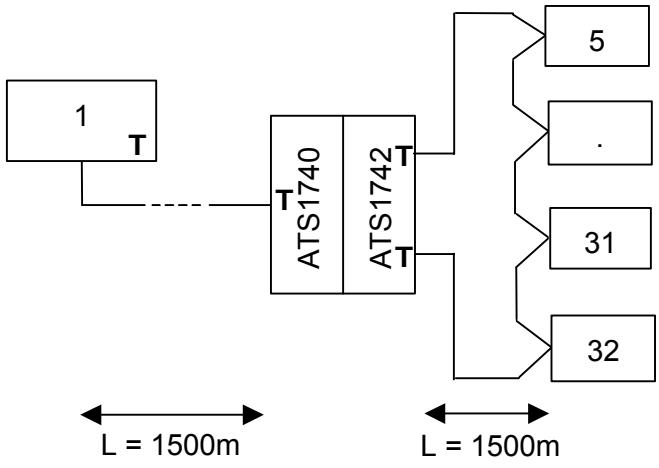


Drawing 3-12 Star configuration using ATS1743 modules.

3.1.3.4 Other bus configurations

- **RS485 Loop**

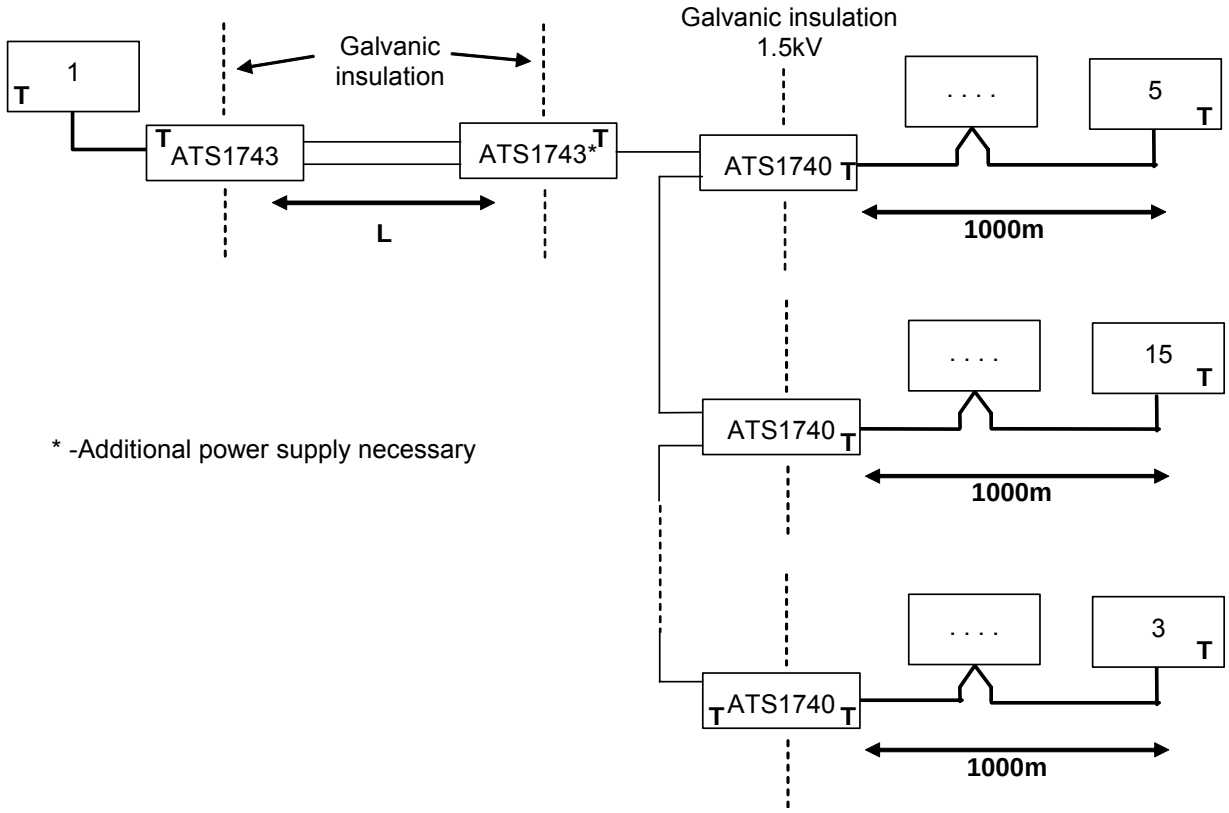
In the case of a risk of system bus severance, an ATS1742 loop interface can be used. The device provides bus cut signalling, and sustains communications with both bus branches after bus cut. The loop interface also has an amplifier, so the length of the loop is not dependant on the connection topology. Unfortunately extending the loop using the methods described in paragraph ***Increasing the system bus range*** is impossible. Therefore the maximum loop length is 1500m. Nevertheless all limitations mentioned there are valid.



Drawing 3-13 System bus loop configuration.

- **Remote star**

In case the need arises to design a remote star configuration too extensive to allow the use of the ATS1740 amplifier modules (the total of the branch length is more than 6km), the fibre-optic modules can be used – Drawing 3-14.



Drawing 3-14 Remote star configuration.

3.2 Local bus

3.2.1 ATS1250/60 access control DGP

3.2.1.1 RS485

The ATS1250/60 access control DGP local bus has the same parameters as the system bus and is therefore subjected to the same design rules. All system bus specifications – the wiring, device addressing, topology etc. – hold their power when designing the access control DGP local bus.

Using the local bus, up to 16 readers and 15 DGP modules can be connected to the access control DGP. DGP expansions are used in the ATS1260 elevator controller only.

3.2.1.2 Wiegand/Clock&Data Interface

The ATS1250/60 controllers are equipped with 4 interfaces for direct connections with Wiegand and Clock&Data readers. The interface automatically recognizes type of connected reader.

The maximum distance from the reader to the controller is 70m – the wiring should be done using UTP/FTP cat. 5 cables. Connection D0 and D1 within single pair of wires should be avoided. It is recommended to pair the D0 and D1 signals with the ground. The

reader inputs have been doubled as local bus devices – readers (local bus RAS) with addresses from 1 to 4.

3.2.2 ATS1290 addressable sensor DGP

The ATS1290 addressable sensor DGP uses the PointID® interface for communications. It is a serial, bi-directional, open–topology interface. Its range is limited only by the load of the devices connected to the bus. The bus can have either two or four wires, depending on the power supply assumptions for the devices.

A supplement for the DGP is a set of sensors and other addressable devices, listed in Table 3-10. These are popular PIR sensors, also equipped with anti-masking capabilities, and a set of universal devices for use with standard alarm equipment.

Using the addressable device technology enables:

- Shortening of the installation time;
- Decreasing the cost and complexity of the wiring;
- Simplifying extensions for existing systems and projects.

Connecting advanced sensors, equipped with anti-masking, Walk-Test capabilities, or the control of LEDs, often requires cables with 6 or more wires. Besides, each sensor needs to be connected via a separate, cable, and should be properly installed. Often the wiring loom consists of tens of cables many wires each. Adding new elements often requires laying out a cable from the nearest expansion to the detector. The addressable device system is free from such limitations. Only one cable is necessary, laid out from sensor to sensor, DGP to connection box etc. in an arbitrary fashion. The cable can also be the same one that provides the system bus signal, and adding a new sensor consists of only connecting it to the nearest existing device.

Table 3-6 Point ID interface parameters

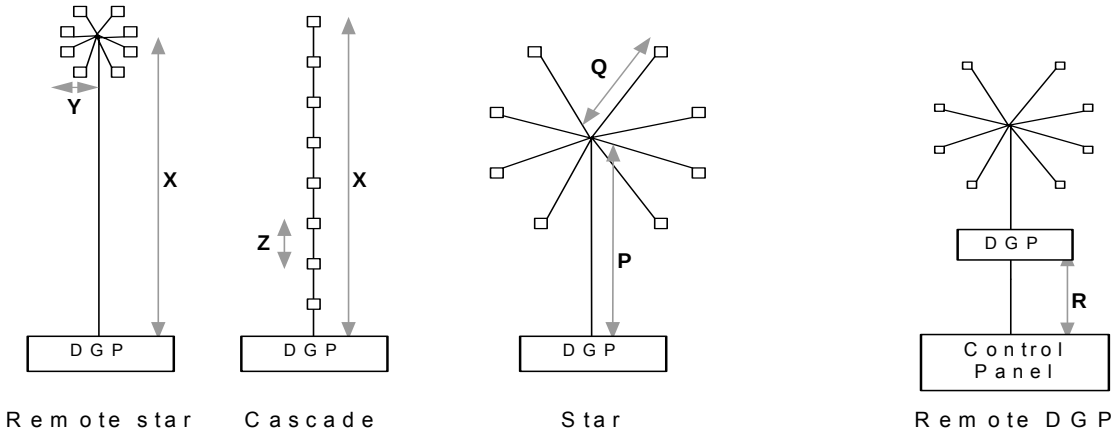
Parameter	Value
Device communications	Voltage based PPM
DGP communications	Synchronous CPM
Addressing	Device: DIP, DGP: learning
Packet transmission time	Device 8ms, DGP 4ms
Number of wires	2/4
Number of devices	32 (256 addresses max.)
Max. Length	1500m
Termination	No

3.2.2.1 Wiring.

There are two ways to design a Point ID® bus, depending on the power supply of devices connected to it:

- Power supplied directly form bus – two wire bus;
- Power supplied form an external source – 4-wire bus.

Although there are no limitations as to the type of wires used for the bus, it is necessary to use wires with the lowest possible resistance and capacity to achieve the maximum bus length – 1500m. Drawing 3-15 shows several possible bus topologies used during testing.



Drawing 3-15 Typical Point ID® configurations.

The cables in Table 3-7 have been listed by preference. When using shielded cables, the shield should be left unconnected, as this causes an increase of bus wiring capacity.

Table 3-7 Tested cable types.

Product	Description	Diameter mm^2
WCAT54	FTP cat.5, 4 twisted pairs	0,22
WN108	Unshielded, 8 non-twisted wires	0,22
WS108	Shielded, 8 non-twisted wires	0,22

The two tables– Table 3-8 and Table 3-9 – contain the test result for different numbers of connected devices under different power demand conditions of the two and four wire system bus. The load is given in UL (1 Unit Load = 300 uA) – a typical load of one transmitter/receiver device of the Point ID® bus. All the available wires in the cable have been used for connections. The presented data clearly shows that the bus range depends mostly on the load of the connected devices.

The minimum bus voltage is 9,5VDC.

Table 3-8 Characteristic lengths of w 2-wire Point ID® bus.

Devices Q-ty	Load UL	Cascade, Remote star. X (m)			Star Q (m)		
		WN108	WS108	WCAT54	WN108	WS108	WCAT54
32	1	1600	1200	1600	200	160	200
16	16	200	200	200	150	120	150
16	32	100	100	100	100	75	100

When using cables with less wire cores (less wire gauge), the range should be appropriately reduced. Example: WN104 – 4 wires, 0.22mm^2 – the range is reduced by 50%. In case of twisted pair cables, the pair separation between PID+ and PID- should be avoided.

Table 3-9 Characteristic lengths of w 4-wire Point ID® bus.

Devices Q-ty	Load UL	Cascade, Remote star. X (m)			Star Q (m)		
		WN108	WS108	WCAT54	WN108	WS108	WCAT54
32	1	400	300	400	50	40	50
16	16	50	50	50	35	30	35
16	32	25	25	25	25	20	25

3.2.2.2 Device Addressing.

The Point ID® interface address space contains 256 entries from 0 to 255. This allows addressing of a different number of devices depending on the number of supported inputs and outputs. The Point ID® interface assumes sequent addressing of the inputs and outputs and providing direct access to them in the alarm system. Each device connected to the bus has an address definable by DIP switch settings – it is the address of the first input of the Point ID® device – the following inputs and outputs are automatically assigned the proper addresses. The device maps the PID bus inputs to the system zones appropriate for the DGP address.

Table 3-10 Point ID® device load.

Product	Description	Inputs	Outputs	PID Load
SI-AD	Universal, single input module	1	0	1UL(330uA)
AD011	Universal IO module	1	1	1UL(330uA)
AD044	Universal 4I/4O module, external power supply	4(+4)	4	1UL(330uA)
AD111	IO module, installed inside the sensor	1	1	1UL(330uA)
AP750-AD	PIR sensor, range: 7 screens, 15.2m;	1	1	1-10UL(250u-3mA)
EV435-AD	PIR sensor, 9/16m, 9 screens	1	1	16UL(4.8mA)
EV435AM-AD	PIR sensor, 9/15m, 7 screens, anti-masking	2	2	16UL(4.8mA)

3.2.3 ATS1230 Wireless devices DGP

The ATS1230 wireless sensors DGP is a receiver for RF series devices – listed in Table 3-12. The characteristic parameters of the communications protocol are listed in Table 3-11.

Table 3-11 ATS1230 transmission parameters.

Parameter	Value
Frequency	433Mhz
Transmission	Data batch, asynchronous, ITI
Transmitter testing	Random , max. 64 minutes
Packet count	3, Alarm/Tamper 8
Packet transmission time	20ms
Time between packets	Random 125 - 487ms
Transmitter code bits	20 bits
Information per packet	66 bits

Communications are unidirectional, the sensor sending packets 58-66 bits long, containing the identification data, and information about its state, at random time intervals no longer than 64 minutes. Each time 3 packets (8 in case of activation or sabotage) are sent at random intervals from 120ms to 450ms. It prevents an accidental signal overlapping from several transmitters. The receiver device also detects the lack of an antenna and radio signal.

Each transmitter has a unique, factory assigned, 20 bit code. The unique code used to identify the device is stored during the programming of the device. Because of that, it is impossible to substitute the device or to wrongly identify the device by the DGP. Apart from the code, the transmitter sends information about the state of the sensor (normal /alarm /tamper), and the battery condition. The RF devices use standard, commonly available lithium batteries. The average battery life is 4-5 years.

Table 3-12 List of ATS1230 DGP compatible transmitters.

Product	Description	Range m
RF320I4	Wireless magnetic sensor (or a transmitter for a wired sensor – type NO/NC), sabotage	300
RF352I4	Remote control, keyfob 2 buttons	150
RF354I4	Remote control, keyfob 4 buttons	150
RF356I4	Wireless panic button in form of a wristwatch.	150
RF360I4	Water resistant wireless panic button, belt clip or neck leash.	300
RF425I4	Wireless PIR sensor, EV425, 9/16m, 9 screens, opening and tear-out sabotage alarm	300
RF425I4PI	Wireless PIR sensor, EV425, 9/16m, 9 screens, opening and tear-out sabotage alarm, PI version	300
RF572NSTI4	Wireless optical-thermal smoke detector, sabotage alarm, internal siren	300
RF620I4	Wireless inertia and magnetic sensor, sabotage alarm, white	300
RF620I4B	Wireless inertia and magnetic sensor, sabotage alarm, brown	300
RF903I4	Wireless glassbreak detector, acoustic, plaster mounted, sabotage alarm	300
RF900I4	Diagnostic wireless sensor testing kit, 433MHz.	300

The device programming is very simple and consists of ”learning” the DGP all the transmitters that it shall work with. The learning process consists of putting the DGP in transmitter storing mode, and activating the devices in order, in which they should appear in the system as alarm zones.

3.2.4 ATS1105 and ATS1170 RAS station reader interface

Both the RAS devices – ATS1105 and ATS1170 – have their own interface, for connecting a Wiegand/Clock&Data standard compliant reader. The ATS1170 has the reader type selectable by a DIP switch, and also can control the reader’s LEDs and buzzer. Additionally it can locally store data for 20 cards in case of a loss of contact with the superior unit.

The maximum distance form the reader to the controller is 70m – the wiring should be done using UTP/FTP cat. 5 cables. Connection D0 and D1 within single pair of wires should be avoided. It is recommended to pair the D0 and D1 signals with the ground.

3.3 PC connection.

A modern system, regardless of its complexity should offer an ability to connect to a PC. The connection should enable communications with computer programs that provide automated system maintenance, system programming, managing and monitoring etc. This chapter summarises the basic information regarding the configuration of a PC connection for communications with appropriate utilities.

3.3.1 Service connection

Each ATS control panel has a RS232 service connector (J18), which enables a direct connection to a PC with the TITAN® software installed. This approach enables system programming and maintenance without additional costs (required equipment in

Table 3-14), which is especially important in small systems, that do not require advanced system monitoring functions. The connection has some limits:

- Have to be initiated from the system keyboard;
- Must be confirmed by the Master User Code;
- The connection is limited to 40min – after that the connection is automatically discontinued.

Those limits, while protecting the system from unauthorized user access, define the use of the connection only for control panel programming and maintenance purposes.

Table 3-13 J18 transmission parameters.

Parameter	Value
Interface	RS232
Cable length	10m
Bandwidth	4800bps
Connection duration	40min.
Initiation	Keyboard/Master User
Pooling	Yes

Table 3-14 List of equipment necessary for J18 maintenance connection.

Required equipment	Description
ATS1630	RS232 port programming cable (from the J18 service port)

This approach enables system programming and maintenance without additional costs (the necessary equipment consists of a RS232 cable), which is especially important in small systems that do not require constant system monitoring functions.

3.3.2 PC direct connection

A permanent connection between the control panel and a computer with a managing program is established in a different way. Besides the ATS2000, all control panels are equipped with a connector (J11) for installing the ATS1801 computer interface. Using the ATS1801 interface, allows time – unlimited connection to a PC and system monitoring software. The connection is initiated by the managing software. The connection parameters are set via the control panel, and are the only parameters not available for modification by the managing software. They define the connection properties with regard to allowed operations depending on the system state – programming, system control in armed and disarmed state. In this mode, all the functions of the TITAN software are available.

Table 3-15 ATS1801 direct connection parameters.

Parameter	Value
Interface	RS232
Bandwidth	4800bps
Connection duration	Not limited
Initiation	Titan software
Querying	Yes

Table 3-16 List of equipment for ATS1801 direct connection.

Required equipment	Description
ATS1801	Computer, printer interface (two RS232 ports) for the control panel
ATS1632	PC-RS232 connection cable for the ATS1801 interface (5m)

The ATS1801 interface has two RS232 ports that enable communications with a computer and printer or a digital video recorder. The connection isn't time-limited and the connection security is ensured by a 10-digit security code that must be the same in the control panel, and the PC to activate the connection.

3.3.3 Increasing the range between the control panel and PC.

Often the control panel is located a considerable distance from the PC on which the system management program is running. Therefore the issue is vital for system design, and it is necessary to predict what elements are required to connect the control panel to the monitoring computer.

3.3.3.1 RS485

To increase the connection distance between the Advisor MASTER control panel, and the PC with the managing software the system bus accessories can be used. By converting the RS232 into RS485, we can achieve a maximum distance of 1500m. Bigger distances can be achieved by following the steps described above in section 3.1.3 paragraph Increasing the system bus range

Table 3-17 Equipment list for remote RS485 connection.

Required equipment	Description	Amt.
ATS1801	Computer, printer interface (two RS232 ports) for the control panel	1
ATS1741	RS485 / RS232 bus converter	2

3.3.3.2 Modem and a dedicated leased line

Another solution is to use a leased phone line. Modems need to be installed on the control panel and computer side of the line.

Table 3-18 Equipment necessary for remote modem connection

Required equipment	Description	Amt.
ATS1801	Computer, printer interface (two RS232 ports) for the control panel	1
MOD6000	External modem for communication with ARITECH systems.	2

3.3.3.3 TCP/IP

By using RS232 – TCP/IP converters, the Ethernet network can be used to communicate with the control panel. Although the bandwidth used by the Advisor MASTER system is small the security system communications need to be made using separate wiring. This is dictated by the need to protect the system from access by unauthorised persons.

Table 3-19 Equipment necessary for TCP/IP connection.

Required equipment	Description	Amt.
ATS1801	Computer, printer interface (two RS232 ports) for the control panel	1
ACA300	TCP/IP to RS232 converter	1

A serial port emulator is supplied together with the ACA300. Using the program enables the use of a network card for communications with the TITAN® software, which only uses serial ports for communications.

3.3.4 Modem connection

The control panel communicators are equipped with a modem, which can be used for service communications, and for system programming. Using the inbuilt communication methods is limited by the small bandwidth, which excludes them from being used for system monitoring. Apart from that, it is the main reporting route to the CS station. As a result, blocking it for longer periods of time is not good practice.

The ATS system can be equipped with additional communications equipment that provides additional reporting channels. By design all communication routes for event reporting are equal. The same holds true for data transmissions.

Table 3-20 Equipment and connection parameters for a modem connection.

Communication channels	Expansion	Bandwidth
PSTN	None	300bps
ISDN	ATS7100	300bps
GSM	ATS7300	1200bps

All channels support connections in two modes:

- Multi-ring – the control panel responds to a connection attempt after a given number of rings and tries;
- Call-back – the control panel calls back a pre-programmed number after a given number of rings and tries;

Both modes are available on demand, or according to a pre-programmed connection schedule.

3.4 Control Panel Network

In cases when, due to any circumstances, one control panel is not enough to fill the requirements of the system, a network of control panels can be created by connecting them to a common computer system, equipped with system management and monitoring software. One computer system can support 64 control panels at the same time. Using time-limited connections, the TITAN software can support up to 1024 control panels, but at the same time only 64 control panels can be communicated with.

The basic control panel network configuration is the direct connection using the RS485 interface with the same communication parameters as the system bus. Using the available system bus accessories, a system bus branch is connected to the computer's serial port. Up to 16 control panels can be connected to the branch.

Table 3-21 Advisor MASTER control panel parameters.

Parameter	Value
Number of connections (ports)	16
Number of control panels with active connection.	64
Number of control panels connected to one port (max.)	16
Number of control panels in one TITAN system	1024

3.4.1 Control panel bus topology and wiring

The basic control panel bus implementation is the RS485 interface. The design guidelines for the control panel bus are the same as the wiring– see 3.1.1 – and topology guidelines – see section 3.1.3 – for the system bus. Drawing3-17 shows a basic control panel network using the system bus interface and accessories.

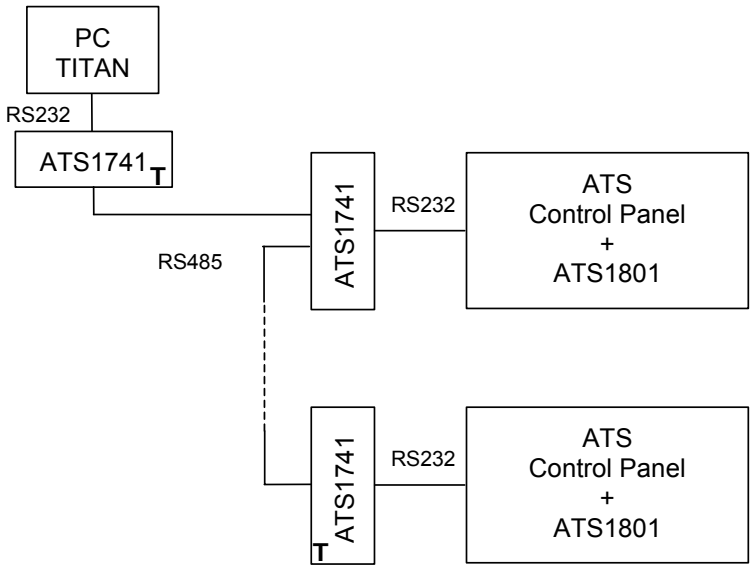
To implement a single bus branch, the following components are necessary:

- Control panels with the ATS1801 interface;
- ATS1741 RS232-RS485 converters;

The table below (Table 3-22) shows how to select equipment necessary to connect the control panels this way.

Table 3-22 Equipment necessary to connect a network of N<16 control panels.

Product	Description	Amt.
ATS1801	Computer, printer interface (two RS232 ports)	N
ATS1741	RS485 / RS232 bus converter	N+1



Drawing 3-16 Basic control panel networking bus design.

The flexibility of querying the control panel by the TITAN software (the poling time, and timeout is set by software) allows the design of more complex networks than those based only on the RS485 interface. For more complex implementations, the connections described in sections 3.3.2 and 3.3.3 can be used. The paragraphs contain information about direct connections between the computer and the control panel, as well as increasing the distance between them. The following paragraph shows an example of a control panel network using the Ethernet network and other connection methods.

3.4.2 Examples of CP networks connected by various communications interfaces.

All control panels in the system are queried according to a programmed schedule, which means a lack of response from any of the control panels will be stored in the system event log. Depending on the system functions, and the security level expected from the system, the control panel network can be implemented in various ways. The provided example shows only one of the methods.

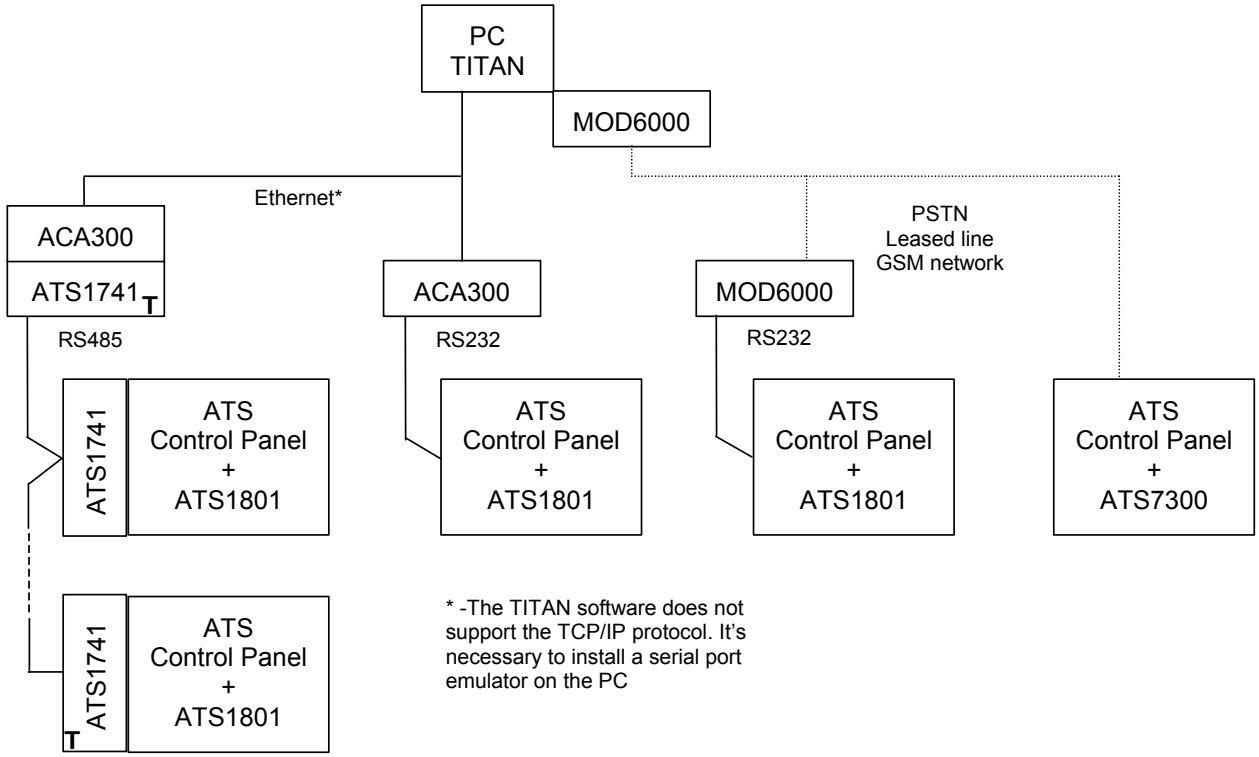
The network design assumes:

- The monitoring station has a direct connection to the control panels in the given location.
- One of the control panels is located in a separate building, connected only by Ethernet wiring.
- Beyond the premises (eg: another city) are two additional control panels, which should be queried once a day, at a given time to synchronise the event log. One of them doesn't have access to a phone line.

The provided solution assumes communications between the PC monitoring station and the local control panel using TCP/IP local network, and further along using the RS485 interface and bus accessories. The remote control panel can be accessed using the Ethernet network, or connected directly. The control panels outside the premises can be contacted by modem using a phone connection (for the control panel with phone line access) and GSM connection (the control panel is equipped with the ATS7300 GSM communicator for connecting to the monitoring station and the CS reporting station).

The provided solution requires the use of 3 branches/ports of the TITAN software. Note that the maximum number of connections is 16 (older TITAN versions – 4 only).

If the remote location would require a service connection – programming, diagnostics without event archival and system control – the modem can be left out and the inbuilt communicator can be used. This solution is not advisable, as it doesn't allow reporting events to the CS station during the connection to a system monitoring station.



Drawing3-17 Control panel network implementation diagram.

3.5 Reporting events to the CS station

Quick and effective reporting of events to several CS stations, using several communication channels is essential for systems with higher levels of security. The ATS system event reporting concept assumes availability of the same functions regardless of the control panel type. Up to 4 independent CS stations can be programmed in the Advisor MASTER system, each having 2 alternative phone numbers. The reporting can work in two modes:

- Serial – The system sends the message until the first successful transmission to any of the programmed CS stations;
- Parallel – The system sends reports to each programmed CS stations until all confirm receiving the message.

Table 3-23 CS station communication channels and the necessary expansions

Communication channels	Expansion
PSTN	None
ISDN	ATS7100
GSM	ATS7300

Every CS station can be programmed for reporting on different communication channel – the available channels are analogue (PSTN), digital (ISDN) and cellular (GSM) phone lines. Each channel supports every event transmission protocol implemented. Due to a timing conflict between the transmission protocol and the GSM network delay, the ATS7300 communicator has been equipped with an algorithm to disqualify the influence of the network delay on the CS station communications.

Table 3-24 ATS control panel reporting system parameters.

Parameter	Value
Number of CS stations	4
Phone number count	2 each CS (8 in total)
Communication channels	Analogue PSTN/ISDN/GSM
Number of protocols	17

Besides the abovementioned communication characteristics, the system can freely shape the event reporting method. That option is available through the event class database, a programming option available in each control panel.

Table 3-25 Reporting protocols.

Protocol	Remarks
Tecom V1 phone communicator	Used in Australia only
Contact ID – Small	
Contact ID – Large	
SIA – Small	
SIA – Large	
XSIA – Small	
XSIA – Large	
200 Baud FSK Format 1	
200 Baud FSK Format 2	
200 Baud FSK Format 3	
200 Baud FSK Format 4	
4x25 Enai	
Voice reporting with confirmation	Requires the ATS7200 module
Voice reporting without confirmation	
Secure Stream	
Securitel serial number	
Securitel PIN code	

4 CONFIGURATION OF THE ADVISOR MASTER INTEGRATED SYSTEM

The design of an integrated system is limited to a configuration for a single control panel – the systems controlled by a single control panel. Designing larger systems – networked systems – consists of steps described in chapter 5 and multiple repeats of the procedure described here.

The core integrated system design issue is the translation of design requirements to the system implementation – the control panel type, and the type and number of necessary expansions. At it's most general, the design requirements for the Advisor MASTER system are shown in Table 4-1. Based on those parameters the control panel type, as well as the number of expansions in the system can be tentatively defined – see Table 4-2. The design limits lie mainly in the selection and configuration of the DGP expansions, which not always use all the available alarm zones – see section 4.2. Defining the control panel type and the placement of DGP expansions is also dependant on the functional requirements for the system.

Table 4-1 Design parameters of the ATS integrated system.

Parameter	Description
Number of alarm zones	Defines the type and the number of control panels in the system, also the type and number of expansions. The access control passage zones need to be included if they are to be monitored.
Number of areas	Defines the type and number of control panels, also the number of manipulators and other devices in the system.
Number of users	For access control, defines the necessary system memory expansions and number of cards.
Number of manipulators	The number of areas and access control functions define the type and number of manipulators present in the system
Unidirectional passages	Doors with a reader on one side, and an exit button on the other; define the number of readers and other access control expansions, as well as the use of access control functions of the control panels.
Bi-directional passages	Doors with readers on both sides – antipassback function, card and PIN etc. Define the number of ATS1250 DGP, the number of readers an other access control accessories.
Elevator control	Defines the number of DGP expansions and the number of readers in the system;
Number and type of readers	The number of readers, keyboards – dependant on the number and type of passages ; The type of readers – defines the number and type of expansions (memory, DGP etc.) and the card type.
Special functions:	
System Monitoring	Unlimited (HDD) common event log, system control, monitoring the system state, graphical user interface – maps.
Event reporting	Defines the channels and methods of communication with the CS stations.
Integrated access control	The use of access control functions in the system influences the use of the expansion address range, but also the availability of additional functions : user counting – automatic system arming and disarming, changing access rights depending on user presence etc.
CCTV integration	Registering events along with a video signal, controlling the video recorder from the ATS system keypad, controlling the CCTV system from the ATS system

The access control functions in the Advisor MASTER system are integrated with other system components. It allows the same devices that control the alarm system to verify user access rights. The same applies to alarm zones – the sensors used to check door opening can be used to secure the area in the alarm section. In this regard, the system is unified and consistent but needs to be carefully designed.

4.1 Control panel selection and configuration

The control panel selection should be based on the system design requirements – both the functional and quantitative. The most important parameters influencing the functionality of a system based on a given type of control panel are gathered in Table 4-2. Only a small number of parameters differentiates the use of a control panel in a system of a required functionality.

Table 4-2 Control panel parameters.

Parameter	ATS2000	ATS3000	ATS4000 ATS4500
Alarm zones	32(8)	64(8)	256(16)
Areas	4	8	16
Users	50	50-11k (67k)	50-67k / 11k-67k
Manipulators	16	16	16
DGP Expansions (AC)	15 (12)	15 (12)	15 (12)
Unidirectional passages*	16	16	16
Bi-directional passages	48	48	48
Elevators/Floors	4/64	4/64	4/64
Alarm event log	250	250-1000	250-1000
AC event log	10	10 – 1000	10-1000
Special functions			
System monitoring	No	Yes**	Yes
Event printer	No	Yes**	Yes
Access control	Yes*	Yes**	Yes
CCTV integration	No	Yes**	Yes
Network capabilities	No	Yes**	Yes
Service connection	Yes	Yes	Yes

*- the limits of the ATS2000 results from hardware limitations – see section 1.1.

**- the limits of the ATS3000 for access control systems results from the hardware limit of the possible configurations of memory and other expansions. – see section 1.1 – it is not possible to install the IUM ATS1831/32 memory expansion and the ATS1801 computer/ printer interface together.

Only two parameters are directly dependant on the control panel type – the maximum number of alarm zones, and system areas. Other parameters depend on the capability to install other expansions:

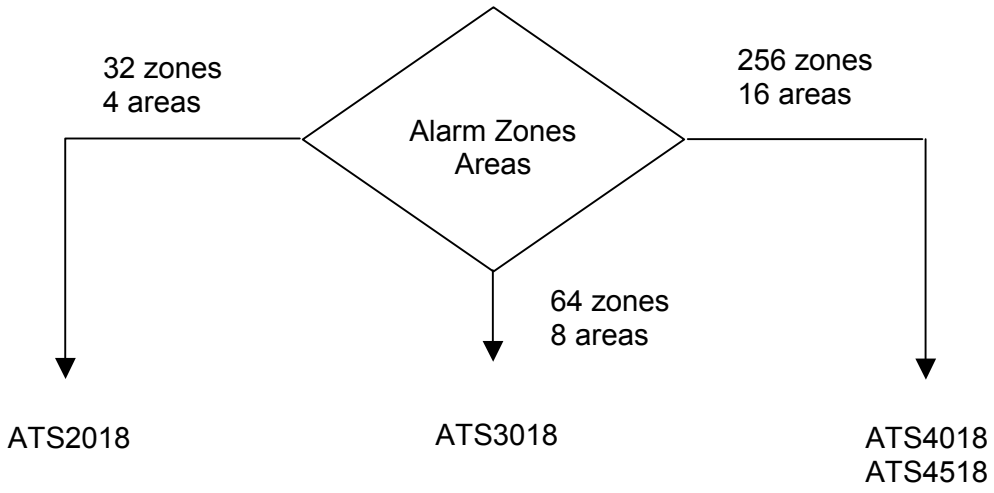
- The control panel memory expansion – influences the size of the event log, the number of users, and indirectly the format of access control cards.
- The computer/printer interface – influences the availability of a fast, permanent connection between the control panel and the computer or a control panel network. Lack of such an expansion excludes the control panel networking capability, monitoring, connecting the event printer etc.
- The number of zones and outputs in the control panel;
- Available reporting channels.

The control panel parameters and design requirements should be analysed in the following order:

- The characteristic values of the alarm system – alarm zones, areas – those parameters describe the capacity of a system based on a selected control panel. Although they depend on the DGP expansion configuration (number of alarm zones), the control panel type unequivocally defines their maximum number in the system.
- Computer or control panel network connection – system monitoring, event printer, network operation – define the need to install the ATS1801/02 computer/printer interface.
- Users and access control range – selection of a memory expansion influencing the number of users, access control card types and their range, the size of the event log etc.
- Alarm zones and system outputs expansions – the type and size of the installed expansions influences the size of the control panel housing.
- Reporting communications (CS) – appropriate communications modules need to be installed in the system.

4.1.1 The procedure of selecting and configuring the alarm system control panel

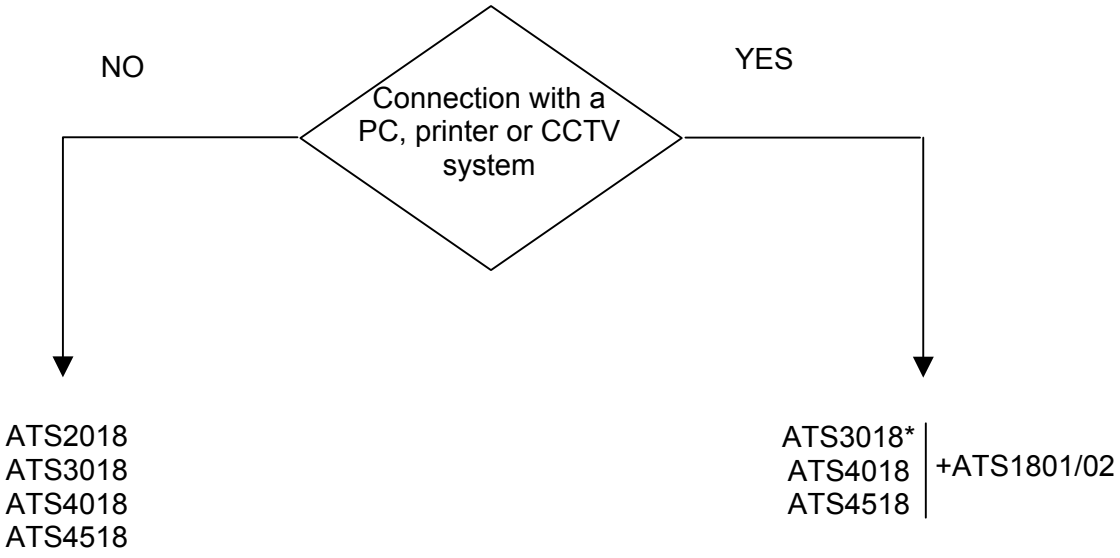
4.1.1.1 Step I. Characteristic parameters – zones, areas



Drawing 4-1 System Capacity

The characteristic parameters of the control panels, independent of the installed expansions define the maximum system size, that is the number of alarm zones and areas of the alarm system. Alarm zones, areas – maximum system capacity, regardless of installed expansions.

4.1.1.2 Step II. Connecting the system to a PC



Drawing 4-2 Connecting the control panels to a computer, printer or CCTV system.

If any of the abovementioned functions is required, the control panel needs to be equipped with the ATS1801 module – the computer/printer interface; or ATS1802 – printer interface; This excludes the ATS2000 control panel – it doesn't provide a connector for the abovementioned modules, and limits the choice of memory expansions for the ATS3000 control panel.

Monitoring and managing the system from the computer station, either remote or local;

- Event printer;
- Digital recorder integration;
- Control panel network connection;

4.1.1.3 Step III. Users and access control range

Each memory expansion extends the system functionality through:

- Increasing the number of alarm groups from 70 to 138
- Increasing the number of door groups from 10 to 128
- Increasing the alarm log size from 250 to 1000 entries.
- Increasing the access control log from 10 to 1000 entries.

Besides that, the use of memory expansion modules increases the number of users in the system, and provides additional functions:

- IUM – storing the whole (up to 48 bits) data stream of the card;
- Quick searching of the database–the ATS1831/32 expansions.

The IUM functions frees the system from limits imposed by the access card formats. Drawing 4-3 shows a diagram of the access card range, and the number of users in the system depending on the memory expansion. Detailed information about access cards can be found in section 4.4.

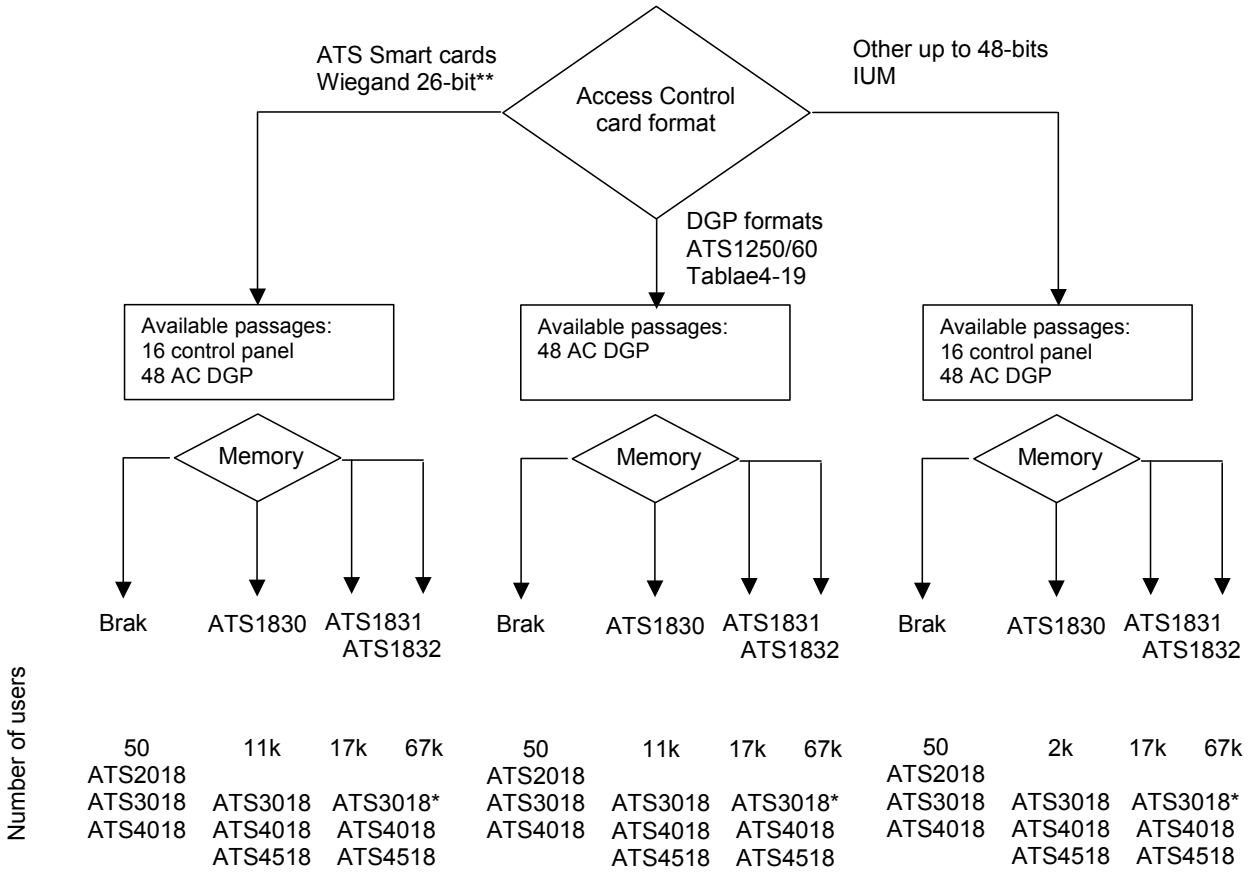
The Table 4-3 below contains the available memory expansions and user configurations. Because the access control DGP stores a local copy of the user database, the same memory expansion needs to be provided for both the DGP and the control panel. Not all memory and expansion configurations are available for every control panel. This is shown

on Drawing 4-3. However every configuration shown below is available for the ATS1250/60 access control DGP. The manual's appendices contain a table with all memory and control panel configurations.

Table 4-3 Memory configurations

Configuration	Expansion	Users			Card format
		Name	PIN	Card	
Standard	None	50	50	50	Table 4-19
TIUM	None	50	50	50	All up to 48-bits, IUM
MIUM	ATS1830 – 1Mb	200	2000	2000	All up to 48-bits, IUM
LM	ATS1830 – 1Mb	200	1000*	11000	Table 4-19
SIUM	ATS1831 – 4Mb	200	17000	17000	All up to 48-bits, IUM
LIUM	ATS1832 – 8Mb	200	67000	67000	All up to 48-bits, IUM

*- for users above 1000 the PIN codes are generated automatically, and cannot be changed.



*- Unavailable if ATS1801/02 was selected in the previous step
**-card format offering a small number of card and system codes. Not recomended.

Drawing 4-3 Access card range, and memory expansion application.

- **Additional system functions.**

User verification functions are available in the system through the TITAN software, equipped with the Photo ID module, which allows storing of user photographs in the database. The photos can be supplied as a file, or made using a digital camera and added to the database on the fly. The photographs can be shown on screen whenever the user passes a door.

The TITAN software is equipped with access card personalisation functions. It provides a card design editor, which uses the information from the user database along with the

Photo ID database to cost effective and simple design and print custom, personalised access cards. The TITAN software works with every Windows compatible card printer.

4.1.1.4 Step IV. Expanding alarm zones and system outputs.

The control panels allow extending the number of available alarm zones using DGP modules (described in section 4.2) and by using the ATS1202 control panel expansion. Connecting the ATS1202 modules in cascade up to 32 alarm zones can be achieved. Each ATS1202 module occupies one B – type slot in the housing.

If the design requires control panel outputs, relay output or OC output, expansions can be installed. Besides the power supply and free housing space, there are no limits as to the outputs supported by the control panel. The available expansion combinations can be found in 1.1.

The ATS4500 control panel is functionally identical with ATS4000. This model comes with the ATS1830 memory expansion preinstalled. The device is delivered with the ATS1644 housing, which provides ample space for additional expansions. The same memory expansion and housing are provided with the ATS1250/60 access control DGP. That's why it is a recommended combination for systems with higher security standards and integrated access control.

4.1.1.5 Step V. Central Station Reporting communications

Depending on the requirements for the system based on the CS station reporting, the appropriate communicator module needs to be selected. As all communication modules use a dedicated MI bus, and can be mounted under the control panel mainboard, this configuration step is independent of the rest.

4.2 Configuring the DGP expansion modules.

Further alarm system design is described for the ATS4000 control panel. This is the basic control panel type, from which the other types differ only by the size of the system, and the availability of certain expansions. Details can be found in section 1.1.

4.2.1.1 Inputs

The address space of the alarm zones is divided between the control panel and the 15 remaining DGP modules. The division is predefined and does not depend on the installed control panel or other equipment. Thus, the alarm zone numbers are permanently fixed to the DGP expansions of a given address. Only the total number of zones is limited in a control panel, not the addresses. This simplifies the system design in terms of the area covered and the possibility of using any expansion types.

It has to be noted that the control panels and DGP modules are expandable up to 32 zones, and the address space division assumes 16 zone numbers per DGP. If the control panel or the DGP is expanded beyond 16 zones, the next zones occupy addresses from the next DGP address range. While there are no technical limitations for address doubling, it is not recommended because of good practice of security system design.

The opposite is a situation in which devices with less than 16 addresses are used. For example the ATS1220 provides only 4 alarm zones and cannot be expanded, meaning, the whole 16 zone range being reserved, 12 alarm zone addresses stay unused.

Table 4-4 Available DGP modules and their expansions.

Expansion	Zones		Outputs			Remarks
	MBC	ATS1202	ATS1810	ATS1811	ATS1820	
ATS1201	8	3x8	2x4	2x8	1x16	Max outputs 16
ATS1203	8	3x8	2x4	4x8	2x16	Max outputs 32
ATS1210/11	8		2x4	2x8	1x16	The housing does not allow installation of additional expansions , device without a power supply.
ATS1220	4					
ATS1290	32					
ATS1230	32					

Planning for maximum DGP expansion the maximum system capacity – 256 zones- can be achieved using 7 DGP modules. In an opposite case – using the mentioned 4 zone DGP – after installing all possible DGP modules – 15 – all the expansions would make total of 60 alarm zones.

4.2.1.2 Outputs

A similar rule is valid for the division of the system output address space. The output addresses for a given DGP are defined by it's address – number – in the system. DGP can support a maximum of 16 outputs, which is the same as it's assigned zone address space. The control panel can support all the outputs, but due to power supply limits the number is capped at 150. A higher number of outputs can be made available by installing an additional power source.

Each system output is limited by a timezone. The system supports 16 areas, and for each one a separate external and internal siren. The ATS1201 DGP is equipped with dedicated, monitored siren output, addressed like the rest of the system outputs.

Table 4-5 Alarm zone and output addressing in the ATS system.

Input Range	Output Range	DGP Address	Remarks
1-16	1-16	16 (CP)	Control panel alarm zones
17-32	17-32	1	
33-48	33-48	2	
49-64	49-64	3	
65-80	65-80	4	
81-96	81-96	5	
97-112	97-112	6	
113-128	113-128	7	
129-144	129-144	8	
145-160	145-160	9	
161-176	161-176	10	
177-192	177-192	11	
193-208	193-208	12	
209-224	209-224	13	
225-240	225-240	14	
241-256	241-255	15	Output 256 is not available

4.2.1.3 Sirens

Each of the 16 areas can have two signallers defined: internal and external. Configuring the sirens in the system is the same as configuring the outputs: the event flag is assigned to an output. Apart from the control panel, the siren outputs are available in the ATS1201, ATS1203 and ATS1250/60 DGP. The signaller outputs are protected by fuses and monitored. By default the system is programmed to activate all external sirens in case of an alarm in any area.

Table 4-6 DGP siren address map.

DGP	Output	Description
16	2, 15, 16	Control panel : Lamp, internal, external Siren.
1	32	External siren
2	48	External siren
3	64	External siren
4	80	External siren
5	96	External siren
6	112	External siren
7	128	External siren
8	144	External siren
9	160	External siren
10	176	External siren
11	192	External siren
12	208	External siren
13	224	External siren
14	240	External siren
15	-	Output 256 is not available

4.3 Areas

The control panels, depending on their type, have 4, 8 or 16 independent areas. Each area can have independently set entry and exit times, internal and external sirens as well as the beacon, reporting method etc. Common areas can be created in two ways: connecting the areas or assigning zones from the common location to all areas. The area linking mechanism is also used to create a cascade of vault areas. The areas linked with the vault areas will be armed automatically once the vault areas are armed.

In systems where the number of independent areas exceeds 16, a network of control panels needs to be used.

In cases when a large number of one-zone areas is necessary, for example, a shopping mall with one zone for each shop, armed separately, the zone type 33 can be used – 24h alarm and inhibit – which allows suspending of the zone using a keyswitch. This application requires a different method of zone wiring. This way, it's possible to achieve up to 256 such security spots on one ATS4000 control panel.

4.4 Access control

The access control functions are available in the control panel. The RAS stations in the control panel can control doors. Though access control implemented this way has some limitations of the functions provided, it's an affordable solution. It provides the basic system functions for 16 doors at an attractive price. If the system requirements are bigger, however, the ATS system can be equipped with a dedicated access control DGP, implementing the advanced functions of such a system while at the same time staying an integral part of the system. Four door – ATS1250 – and four lift – ATS1260 – modules are available. They act as a DGP, and to a single control panel, up to 12 access control DGP can be connected, which gives additional 48 doors per control panel. A detailed description of configuring the access control functions of the control panel and the ATS1250/60 DGP is provided in the following paragraphs.

The door, or elevator numbers are permanently assigned to the DGP addresses, a detailed list can be found below.

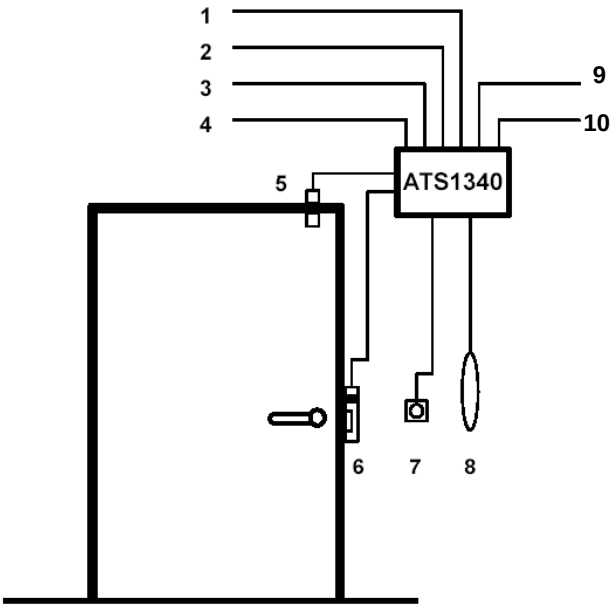
Table 4-7 Passage and elevator addressing in the ATS system.

Door number	Elevator number	DGP address	Remarks
1-16	None	16	The RAS stations of the control panel – unidirectional door control
17-20	17-20	1	ATS1250/60 Access control DGP: Bi-directional door control, Advanced access control functions
21-24	21-24	2	
25-28	25-28	3	
29-32	29-32	4	
33-36	33-36	5	
37-40	37-40	6	
41-44	41-44	7	
45-48	45-48	8	
49-52	49-52	9	
53-56	53-56	10	
57-60	57-60	11	
61-64	61-64	12	

4.4.1 Basic Access Control in the Control Panel

The control panel has 16 RAS stations, of which every one can be used for unidirectional door control. Each RAS station is equipped with an exit button input, and a lock control output. The load of the outputs is limited to 50mA, so additional controlling equipment needs to be used. For that, the use of the ATS1340 connection box is recommended. It contains the appropriate connections to the system bus, power, RAS station, exit button, and executing devices. The control panel is not suited for powering the executing equipment (for example. electromagnetic locks), so the proper power supply needs to be included during the design phase.

The doors controlled by the RAS station can be monitored constantly by the alarm system, thanks to the programming option of suspending (shunting) the door zone. The access control system uses the same PIN codes, and the same devices as the alarm system. At the same time the access control devices can be used to control the alarm system. In particular, the card readers can use its user counting functions to change its state. Arming the system, for example, can be performed after the user uses the card three times while exiting.



Number	Description
1	External power supply 12 or 24VDC
2	RS485 data bus
3	ATS system power supply12VDC – optional
4	Two alarm zones
5	Door open sensor – one alarm zone
6	Lock – with optional activation sensor
7	Exit button
8	RAS station – reader or keyboard
9	Data bus output for additional devices – optional
10	Power output for additional devices – optional

Drawing 4-4 Control panel based access control.

The doors controlled by the control panel have some functional limits. The advanced access control functions required in high security standard installations are not available. The ATS1250 and ATS1260 are designed to implement those functions, controlling 4 doors and elevators respectively and providing all advanced access control functions.

Table 4-8 A selection of the most important access control functions.

Function	Control Panel	DGP ATS1250/60
Card disarms the system and opens the door	Yes	Yes
Card x3 arms the system	Yes	Yes
Card valid if are disarmed	Yes	Yes
Power supply with battery back-up for executing equipment	No	Yes
Card formats	Wiegand-26 or IUM mode	12 formats and IUM mode
Two cards to open door	No	Yes
PIN and card to open door	No	Yes
Two PIN and two cards to open door	No	Yes
Bi-directional passage control	No	Yes
Security level change outside of the time window	Only access or lack thereof	Yes
Card series	2	40
Locating the user on premises	No	Yes
Anti-passback	No	Yes
Lock chamber	No	Yes
Limiting the number of users on premises	No	Yes
Macro functions for access control	No	Yes

4.4.2 Advanced Access Control of the ATS1250 DGP.

The ATS1250 controllers support 4 doors, and all the functions listed in Table 4-8. The devices are equipped with controlling circuits for the executing equipment, adequate power supply with battery support, and a set of inputs for providing the basic functions (door monitoring, exit button etc.). By default, the ATS1250 is equipped with the basic memory expansion – ATS1830 – and 4 Wiegand interfaces. It enables the

implementation of all the basic access control functions without requiring additional expansions

The access control DGP– ATS1250/60 – stores a local copy of the user database and other settings pertaining to access control. This causes the reaction to the user presenting the card to be instantaneous even with a high number of users. The ATS1831/32 IUM modules used with 17k and 67k users support not only the card learning functions but also the quick searching of the database. This causes the system to respond within less than 0.5s.

Table 4-9 basic parameters of the ATS1250 access control DGP.

Parameter	Value
Number of doors	4
Number of interfaces on board	4 – door entry readers 1 - 4 (local)
Number of readers	16 max.
Local bus	RS485 – the same as system bus
Power supply	4.5A
Batteries	50Ah max.
Lock outputs	2A@30V AC relay
Housing	ATS1642 – L
Offline mode	YES – full functionality
Zones on board	16 (by default assigned to: 4 door zones, 4 exit buttons, 4 DOTL zones, 4 reader blocking zones)
Memory	ATS1830 – interchangeable with IUM ATS1831/32
Card series	40
Database	Local
Antipassback	Local

The antipassback function requires passage control on both sides that require readers/keypads on both sides of the door. The access control DGP has a RS485 local bus interface, which supports connecting of up to 16 identification devices. Those can be the RAS stations of the ATS system having the RS485 inbuilt and other devices through the ATS1170 if they are compatible with the Wiegand interface. The device function is defined by its address on the local bus. The first four addresses double up as the reader inputs. This is important if the controller is further away from the readers than 70m – see the bus wiring in section 3.2.1. – that enables them to be installed as local bus components.

Table 4-10 Reader/RAS station addressing on the local bus.

Local passage address	RAS station local address	
	Input	Output
Door 1	1, 5	9, 13
Door 2	2, 6	10, 14
Door 3	3, 7	11, 15
Door 4	4, 8	12, 16

Unused passage addresses can be used to install additional manipulators. The RAS station can be configured to emulate any control panel RAS station, to which the ATS1250/60 DGP is connected. Such a device will work exactly like the emulated RAS station, not excluding event log entries. This functionality is especially interesting in cases when the number of manipulators of the control panel is not sufficient.

The ATS1250 DGP board outputs are, by default, configured for access control functions. They support exit buttons, DOTL (Door Open Too Long) alarms, door monitoring etc. Their use must me analysed based on the implemented access control functions. The table below contains the default zone mappings of the access control functions to local addresses for the ATS1250 DGP.

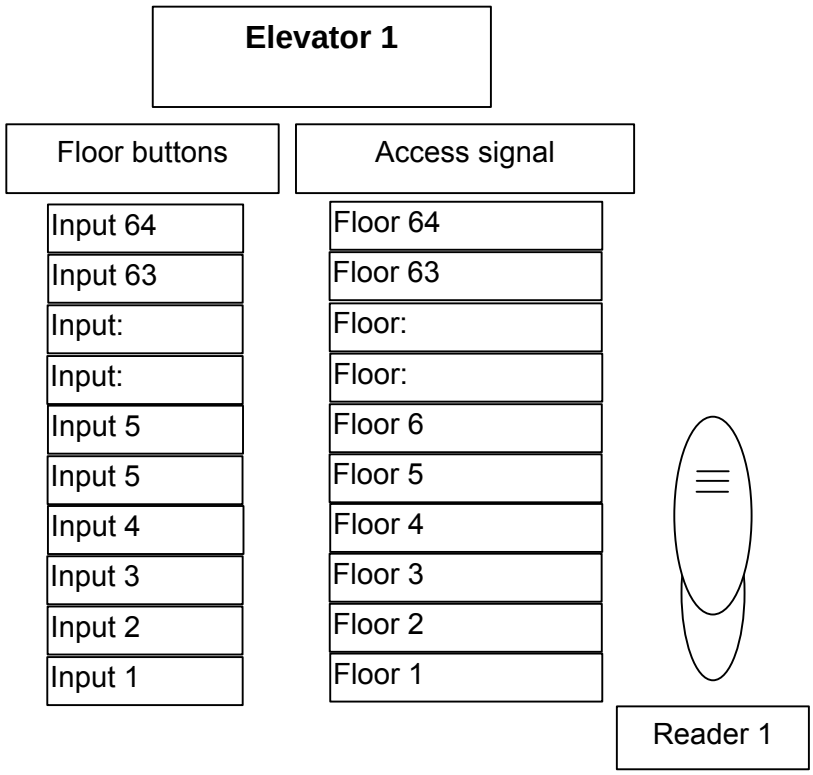
Table 4-11 Mapping zones to access control functions – local addressing.

Passage	Open door blocked zone	Exit button	DOTL	Spare
Door 1	1	3	16	2
Door 2	4	6	15	5
Door 3	7	9	14	8
Door 4	10	12	13	11

4.4.3 Advanced Access Control of the ATS1260 DGP

The elevator controller uses 256 inputs and 256 local outputs. They are used to control the elevators buttons (inputs) and enforcing access rights for the floors (outputs) As the controller supports 64 floors and 4 elevators, it needs to have 256 inputs and outputs. There are only 16 inputs on the controller's board, so additional inputs need to be provided by expanders – access control DGP – installed on the local bus.

Besides monitoring the choice of a floor by the user, the inputs can be used to monitor the elevator, registering stopping/opening the elevator doors. Also in this case, the whole input address range is needed.



Drawing 4-5 ATS1260 elevator control input and output diagram.

Mapping the inputs and outputs to a particular elevator can be found in Table 4-12.

Designing the local DGP is no different from designing the system bus devices. The same devices as well as the same approach are used.

Table 4-12 Mapping zones and outputs in the elevator controller.

Elevator – local address	First input	First zone
Elevator 1	1	1
Elevator 2	65	65
Elevator 3	129	129
Elevator 4	193	193

4.5 Cards and Readers

4.5.1 Advisor MASTER System Readers

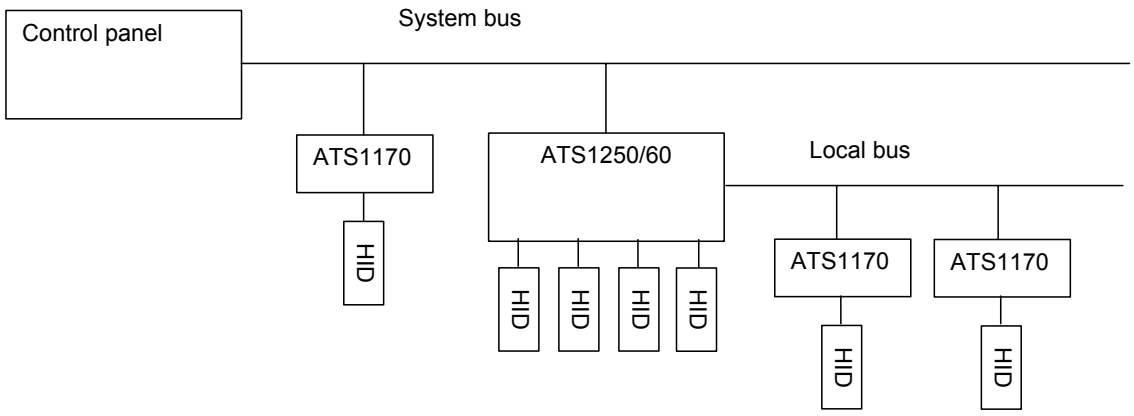
The list of ATS system devices that can serve as user interface for access control is contained in Table 1-10. These are keyboards, readers, keyboards with integrated readers and the interface to connect other readers. Each of these devices can be used for user verification in access control and a significant simplification is the ability to connect them directly to the system or local bus. This decreases the complexity of the wiring and reduces the installation time. The smart cards and readers offered with the ATS system deserve special attention. They have been described in detail in chapter ***6. ATS system Smart Cards.***

4.5.2 Other readers

Often the system design guidelines contain specific requirements as to the type of access control cards and readers. The ATS systems can use any reader compatible with the Wiegand hardware interface, and any card or token that sends a data stream of up to 48 bits. The details of using cards of different formats are described in paragraph 0. To connect a Wiegand interface reader to the ATS system the ATS1170 interface, or any of the reader outputs of the ATS1250/60 need to be used – it has to be kept in mind, that the maximum distance from the reader to the interface cannot exceed 70m, see section 3.2 which describes the wiring. The method of connecting the devices to the control panel – the system bus – or access control DGP – local bus and ATS125 reader inputs – has been detailed in the following paragraphs.

4.5.2.1 HID

HID readers use the Wiegand interface. They can be used in the Advisor Master system by connecting them to the system, to the direct reader inputs of the access control DGP, or through the ATS1170 to the system bus, as well as the access control DGP local bus – see Drawing 4-6. This method can be used to connect any Wiegand interface reader..



Drawing 4-6 Connecting the Wiegand interface readers to the ATS system.

Besides hardware compatibility, the user card compatibility needs to be ensured. The ATS system supports many access card formats - see Table 4-19 – but not all of them are supported by the control panel. The HID readers – see Table 4-13 – are compatible with the HID access control cards in the ATS Wiegand 32 bit format – see Table 4-14. Cards of this format are supported by the ATS1250/60 DGP, which means it's sufficient to program the card series for it to be active in the system. The control panel does not support this format directly so for them to be connected directly to the system bus, the IUM option of the ATS system needs to be used. This means that each card in the system will have to be read during installation and stored in the user database.

Table 4-13 HID readers

Product	Description
ACI730	Proximity card reader HID ProxPro Plus, range up to 20 cm, external
ACI755	Proximity card reader HID ProxPro, range up to 20 cm, external
ACI757	Proximity card reader HID ProxPro, range up to 20 cm, with keyboard
ACI760	Proximity card reader HID ProxPoint, range 5cm, low cost
ACI765P	Proximity card reader HID MiniProx, range up to 10cm, miniature, external
ACI775	Proximity card reader HID MaxiProx, range 70 cm, waterproof, external
ACI795	Proximity card reader HID, range up to 14 cm, in flat housing, external . (optional colour – white)

Table 4-14 HID cards

Product	Description
ACT725-xx	Proximity card for HID ProxCardII readers
ACT736-xx	Dual card DuoProxII (magn.+ proximity HID), thin (ISO), printable
ACT745-xx	ProxKeyII key fob, for HID readers
ACT786-xx	Proximity card for HID ISO ProxII readers , thin (ISO), printable
ACT790-xx	Active proximity HID identifier (with battery) for vehicles, Dimensions: 10*7 cm

Table 4-15 Technical parameters of the HID readers.

HID Parameter	ACI730	ACI755	ACI757	ACI760	ACI766	ACI775	795
Reader range	25cm	20cm		7,6cm	14cm	73cm	14cm
Keyboard	-	-	Yes	-	-	-	-
Voltage	10-28,5VDC			5-16VDC	5-16VDC	12/24VDC	5-16VDC
Power cons.	100mA	100mA		30mA	20mA	200mA	20mA
Power cons., max.	120mA	120mA		75mA	110mA	1,2A	115mA
Dimensions	190x190x23	127x127x25		79,6x43,7x17	152x43x25	300x300x25	119x76x17
Housing	Polycarbonates UL94						
Operating temp.	-30 – 65^{o}C						
Operating freq.	125kHz						
Humidity	95%						

4.5.2.2 MIFARE

MIFARE readers –Table 4-16 – are connected to the ATS system exactly like any other Wiegand interface reader. (Ex. HID – see Drawing 4-6.) The offered readers are universal multi-protocol devices, identifying the MIFARE cards (smart cards) by the serial number of the card's chip. Readers of this type – often called serial readers – are used to integrate an existing installation, based on MIFARE smart cards, with the Advisor MASTER system.

The MIFARE card format - Table 4-17 – is not supported directly by any ATS module. Therefore, to use cards of this type, the IUM function needs to be used. This function allows storing the data stream (up to 48 bits) of the card in the user database. To program the cards, all of them must be read.

Table 4-16 MIFARE readers

Product	Description
ACI406	MIFARE proximity card reader (requires Wiegand interface and IUM module), external
ACI407	MIFARE proximity card reader with keyboard (requires Wiegand interface and IUM module), external

Table 4-17 MIFARE cards

Product	Description
ACT407	MIFARE standard card (25 cards pack)
ACT430	MIFARE standard key fob

Table 4-18 Technical parameters of the readers.

MIFARE parameter	ACI406	ACI407
Reader range	5-6cm	5-6cm
Keyboard	-	Yes
Operating Voltage	8-28.5VDC	
Power cons.	100mA	
Power cons., max.	100mA	
Dimensions	110x43x24	
Housing	IP47	
Operating temp.	-40 – 55^{o}C	
Operating freq.	13.56MHz	
Humidity	95%	

4.5.3 Cards.

The ATS system supports many card types listed in the table below

Table 4-19 A list of available card formats.

Format	Description	Control Panel	ATS1250/60
Wiegand 27 bit	Used with Indala ESP type readers produced by ARITECH.		x
Aritech ASC	Used with ATS1190.	x	x
Kastle 32 bit	Kastle format cards.		x
Wiegand 26 bit (ID = 16, FC = 8)	Standard 26 bit Wiegand readers, along with ARITECH Wiegand readers. Has a 16 bit card number (0-65534) and 8 bit system code (0-255).	x	x
Indala ASC 27 bit	Indala ASP proximity reader family, which uses a 27 bit Wiegand format		x
Indala ASC 26 bit	Not used in Europe		x
Wiegand 32 bit	32 bit Wiegand format readers .Has a 16 bit card number and a 16 bit system code.		x
Mag.Card Aritech	Aritech/TECOM magnetic card format.	x	x
Mag.Card Midas	Midas magnetic card format.		x
C36 bit	C36 bit card format.		x
ATS Wiegand 30 bit	Aritech Wiegand 30 bit card format		x

Format	Description	Control Panel	ATS1250/60
ATS Wiegand 32 bit	Aritech Wiegand 32 bit card format		x

The control panel supports only formats supplied with the Advisor MASTER system. The flexibility of memory configurations of the system enables using all the cards mentioned in Table 4-19 in the control panel as well as throughout the system. Using the IUM Intelligent User Module and it's emulation the system can store any data stream of up to 48 bits read from the card in it's user database, regardless of it's format or the reader type. All ATS1250/60 store a local copy of the user database, so all devices of this type need to be equipped with the same memory expansion as the control panel to which they are connected.

5 NETWORK SYSTEM CONFIGURATION

Designing the alarm system described in this chapter consists of translating the design requirements to the number and type of control panels, optionally the expansions used to build the system. In the most general view, the design requirements for an integrated system are outlined in Table 4-1. Based on those parameters, assuming full use of the system address space, the number of control panels can be assessed – see Table 5-1 – keeping in mind the design limits. They consist mostly of alarm expansion configuration, that is using the alarm zone address space – see section 4.2 – and passage configuration – see section 4.4.

Table 5-1 Assessing the number of control panels in a networked system.

Parameter	ATS4000/4518	ATS3000
Number of alarm zones	Number_of_Control_Panels x 256	Number_of_Control_Panels x 64
Number of areas	Number_of_Control_Panels x 16	Number_of_Control_Panels x 8
Number of users	50 do 67000	50 do 11000
Number of manipulators	Number_of_Control_Panels x 16	Number_of_Control_Panels x 16
Result–alarm requirements	Max. From above	Max. From above

Parameter	ATS30/40/4518	Comment
Number of unidirectional passages	Number_of_Control_Panels x 16	Simple unidirectional passages without additional functions
Number of bi-directional passages	Number_of_Control_Panels x 48	Bi-directional passages or advanced functions required see Table 4-8
Result – AC requirements	Max. From above	

Total control panels: (Result–alarm requirements) + (Result–alarm requirements)

Depending on the expansions used, the maximum number of zones (unused zone address space) and doors supported by one control panel will change. In that case, the method of calculating the number of required control panels needs to be changed.

After finding the number of alarm zones, the appropriate zone and/or passage address range needs to be assigned to each, keeping in mind the control panel capabilities. After that the subsystems can be designed, as per paragraph 4.

Table 5-2 Capacity of the system with 64 ATS4000/4518 control panels.

Parameter	Value	Remarks
Alarm zones	16384	Completely expanded alarm system – 1024 unidirectional doors in the control panel manipulators, lack of advanced access control functions.
Areas	1024	
Users	67000	Identical user databases in each control panel
RAS stations	1024	In certain situations the control panel manipulators can be doubled.
Unidirectional doors	1024	Control panel manipulators
Bi-directional doors	3072	Completely expanded access control system – 3072 alarm zones

6 ATS SYSTEM SMART CARDS.

The Smart card technology is an integral part of the ATS system. The ATS product list contains a whole range of products (cards, readers, key fobs programmer, etc.) providing a complete access control solution. Card programming and reader support are an integral part of the TITAN software. The program is supplied with additional tools, card and user support functions (Photo ID, card customization and printing, etc.), which makes the solution interesting especially for small and medium systems, due to it's attractive price, and flexibility of the solutions. An additional advantage of the solution is the autonomous mode capabilities of the ATS1190/92 readers, which can then work in credit applications, or be integrated with other access control, as well as working time registration systems.

6.1 Readers and cards

A set of readers can be easily adjusted for any application. The basic device is the ATS1190 reader. It has a discreet, inconspicuous shape, a white colour, and five other colours are available by swapping the device cover. Applications that require a heightened mechanical or weather resistance of the reader can use the ATS1192 reader, functionally identical with the ATS1190. Although both devices have a robust design – the housing is filled with an elastic polymer, protecting the electronics from environmental influence and possible mechanical damage – the ATS1192 additionally has a reinforced housing. This allows the housing resistance to be declared at the IP54 level.

Table 6-1 List of available readers

Product	Description	Interface
ATS1190	Proximity reader (does not require an interface)	RS485/Wiegand
ATS1192	High resistance proximity reader (does not require an interface) indoor/outdoor	RS485/Wiegand
ATS1115	Keypad, 2*16 characters LCD/16 zone LEDs with inbuilt ATS card reader.	RS485
ATS1116	Keypad, 2*16 characters LCD/16 zone LEDs with inbuilt ATS card reader.	RS485
Accessories		
ATS166x	Reader cover – 10 pcs. – available colours: 0-white, 1-red, 2-gray, 3-beige, 4-black	

Complementing the offered readers is a wide range of cards and keyfobs. The cards conform to the ISO-Prox format and can be printed upon in all typical access card printers. Foreseeing the need to use the ATS system alongside other access control or time registration systems that use magnetic cards, we offer cards with a magnetic strip. The strip isn't programmed. Complementing the cards are three key fob types.

Table 6-2 Smart cards and key fobs.

Product	Description
ATS1471	Smart keyfob– 1pc.
ATS1473	Plastic smart keyfob–1pc.
ATS1475	Smart card, package – 10pcs.
ATS1476	Smart card with magnetic strip– 10pcs.
ATS1477	Smart keyfob package – 10pcs.

Table 6-3 Characteristic parameters of the Smart card readers.

Parameter	Value			
	ATS1190	ATS1192	ATS1115	ATS1116
Reader range	6-12 cm		6-8 cm	
Work temperature	-35 – 60*C		0 – 50*C	
Housing resistance	IP54		IP30	
Current consumption	30mA		86mA	
Voltage	12V DC			
Output load	50mA			
Credit applications	Yes		NO*	

*- a keyboard not connected to the system bus displays the ”System error” message

6.2 Programmer and software

The programmer is sold as ATS1621 and contains all necessary equipment for use:

- Programmer
- RS232 cables for computer connection
- Power supply

The software for accessing the programmer, and controlling all the aspects of work with smart cards is an integral part of the TITAN program. It’s equipped with a module for communication with the programmer, containing safeguards allowing only authorised users to access the equipment. It also contains the tools to program reader configuration cards, and a series of other additional functions and tools, not related directly with smart cards, but with cards in general:

- Photo ID module for gathering and storing user photographs;
- User verification capabilities – the information is retrieved form the database whenever the user passes a secure door.
- Card customisation module, with a template wizard, and support for printing cards with information contained in the system database.
- Credit applications – see section 6.3 below – a function allowing the readers to be used outside of the security system, to control other equipment (Xerox access, coffee, gym etc.)

6.3 Credit Applications

Each card contains four memory banks for storing credit units, access to four locations and priority. Each reader can be assigned to one of four locations with priority from one of the 16 levels, and the number of consumed credits. The reader output needs to be configured for credit applications to assure the desired response the user presenting the card. The reader doesn’t need to be connected to the system!

The user who received access rights to the location programmed in the reader will have the ability to use the device connected to the reader if his priority level is higher than the one programmed in the reader, and the number of credits on his card exceeds the number of credits withdrawn. Thanks to bi-directional communications card-reader, if the reader accepts the card, the proper changes to the amount of credits available are stored on it.

Using the TITAN software, the credit unit names and locations can be defined. This way, access to office equipment, canteens, gyms and other building facilities can be limited. This function is available in the TITAN software without additional licences and payments.

6.4 Safeguards

Due to the sensitivity of the problem, the security of the system using the ATS Smart technology is detailed in a separate chapter.

The reasons, why the programmable card and reader solution might seem insecure are:

- Availability of software and equipment for generating new cards - the ability to generate a duplicate by unauthorised persons (external sabotage);
- The ability to program a duplicate of the card by an unauthorised employee (internal sabotage);
- Compromising security in case of card loss;
- Compromising security in case software and/or equipment (programmer) loss.

The ATS Smart card safeguards provide a high level of security for installations in which they are used.

- **Securing equipment against unauthorized access;**

The programmer requires a password when connecting to the computer. The default password is blank and is not verified to simplify the process for new users. However if a password is used, the programmer will later require password authentication every time the connection is made. The connection password is stored only in the programmer which decreases the risk of revealing the password in case of a hacker attack or equipment loss.

There are two methods for deleting the programmer memory: software function or use of the programmer erasing card. Although the software function requires the programmer to be connected with the TITAN software, the use of the card allows the programmer memory to be deleted without a computer connection. Due to the possibility of losing the connection password (forgetting, disloyal employees etc.), it is recommended that an erasing card be supplied with every system that uses a programmer.

- **Card security;**

The basic protection of the cards and readers is the 4 byte security code. It's set in the programmer activation phase and is remembered in the computer profile and it's internal memory. The card security code is stored in each programmed user and configuration card. The configuration cards, besides storing the programmed options in the accessed reader, also store the card security code. The reader ignores all tokens with a different security code than the one it's programmed with. The reader-card configuration is bi-directional and encrypted. Every time the reader receives 112 bits of information from the card.

Each attempt to change a user card once it's programmed requires password verification. Only programming blank cards does not require authentication.

An additional safeguard is the option to block programming of the security code. By blocking the change of the code, erasing the card is also blocked.

The security code cannot be read either form the card or from the reader. It can only be read from the programmer, and only if an active connection to the TITAN software is present – activating such a connection requires authorisation.

The programmer profile contains the range of system codes and programmed cards for the current system/profile. The system will only accept cards that have the system codes from this range. This is an additional protection for systems in which the programmed cards are supplied by the installing technician. This solution is widely used in many countries as it allows reducing the system costs.

- **Card uniqueness.**

Thanks to several safeguard parameters mentioned above:

- The security code of the card has 128^4 possible combinations.
- The values for the system codes can be from 0 to 2047
- The cards can have numbers from 1 to 65535

There are $3.6*10^{16}$ different user cards.

A high level of uniqueness of each of the programmed card, along with the implemented safeguards, and limitations in the access to them, causes the card and reader system to provide a high level of security, taking into account all of the abovementioned risks.

7 TECHNICAL DESIGN DATA.

7.1.1 Housings dimensions.

Table 7-1 Available housings.

Housing	Description	Dimensions		
		W	L	D
ATS1640	Empty metal housing – size S	315	388	85
ATS1641	Empty metal housing – size M	315	445	85
ATS1642	Empty metal housing – size L	475	460	160
ATS1643	Empty metal housing for expanders	126	166	37
ATS1644	Empty polycarbonate housing for expanders	87	124	34

Dimensions in mm

Table 7-2 Housing equipment.

Product	Description	Trafo	Trafo output voltage
ATS1670	Housing equipment for housing sizes S, M, L	58VA	24V AC
ATS1671	Housing equipment for housing size L	120VA	24V AC

Table 7-3 Products delivered with housings.

Product	Description	Housing	H. Equipment
ATS1201	Zone expansion DGP – 8 inputs (max.32) and 8 outputs (max.16)	ATS1641	ATS1670
ATS1203	Zone expansion DGP – 8 inputs (max.32) and 8 outputs (max.32)	ATS1641	ATS1670
ATS1210	Zone expansion DGP – 8 inputs and 8 outputs	ATS1644	
ATS1211	Zone expansion DGP – 8 inputs and 8 outputs	ATS1643	
ATS1220	Zone expansion DGP – 4 inputs	ATS1644	
ATS1230	Zone expansion DGP – 32 wireless devices	Dedicated	
ATS1290	Zone expansion DGP – 32 addressable devices	ATS1244	
ATS1250	Access Control DGP – 4 door controller	ATS1642	ATS1671
ATS2000	Control Panel 8 zones (max.32), 4 areas, dialer on board	ATS1640	ATS1670
ATS3000	Control Panel 8 zones (max.64), 8 areas, dialer on board	ATS1640	ATS1670
ATS4000	Control Panel 16 zones (max.256), 16 areas, dialer on board	ATS1641	ATS1670
ATS4500	Control Panel 16 zones (max.256), 16 areas, dialer on board	ATS1642	ATS1671?

7.1.2 Space in Hosings.

Table 7-4 Battery configurations.

Housing	ATS1640	ATS1641	ATS1642	ATS1642	Battery capacity	Recommended configurations
Device **Battery configurations**	***ATS2000*** ***ATS3000***	***ATS4000*** ***ATS1201/03***	***ATS4500***	***ATS1250***		
BS127N	**x**	**x**	**x**	**x**	7,2Ah	**x**
BS130N			**x**	**x**	10Ah	
BS131N	**x***	**x***	**x**	**x**	18Ah	**x**
2xBS127N		**x**		**x**	14,4Ah	**x**
BS129N			**x**	**x**	26Ah	**x**
2xBS129N				**x**	52Ah	**x**

**- lack of space for expansions below Control Panel or DGP board.*

Table 7-5 Space for expanders – Products delivered with housings.

Housing	Product	Battery	B	BB	B+	A
ATS1640	ATS2000 ATS3000	BS131N	4	2	2	1(2)
		Other	6	3	4	1(2)
ATS1641	ATS4000	BS131N	2	1	0	0(1)
		Other	4	2	2	1(2)
	ATS1201/03	BS131N	6	2	2	1
		Other	8	4	4	2
ATS1642	ATS1250	-	6	3	4	2
	ATS4500	-	6	3	4	2(3)

() – dialer and communication devices (pcb A) can be mounted under Control Panel PCB

Table 7-6 Space for expanders – Empty housings.

Housing	B	BB	B+	A	C-	C	D
ATS1640	8	4	4	2	2	1	-
ATS1641	10	5	6(8)	3	2	1	-
ATS1642	12	6	8	5	4	2	2
ATS1643	-	-	1	-	-	-	-
ATS1644	-	-	1	-	-	-	-

7.1.3 Dimensions of devices PCB.

Table 7-7 Dimensions of devices PCB

Product	B	BB	B+	A	C-	C	D
	80x52	176x52	80x90	80x176	130x200	202x218	218x254
ATS1170			**x**				
ATS1201				**x**			
ATS1202	**x**						
ATS1203	**x**						
ATS1210			**x**				
ATS1211			**x**				
ATS1220			**x**				
ATS1290			**x**				
ATS1250							**x**
ATS1740	**x**						
ATS1741			**x**				
ATS1742		**X**					
ATS1743	**x**						
ATS1801			**x**				
ATS1802			**x**				
ATS1810	**x**						
ATS1811		**X**					
ATS1820			**x**				
ATS1830			**x**				
ATS7100				**x**			
ATS7110				**x**			
ATS7200	**x**						
ATS7300			**x**				
Control Panels							
ATS2000					**x**		

Product	B	BB	B+	A	C-	C	D
ATS3000					x		
ATS4000						x	
ATS4500						x	

7.1.4 Control Panel and Memory configurations.

Table 7-8 Control Panel and Memory configurations.

Control Panel	Zone q-ty (on board)	Areas	Event Log	Access Control Card Formats	Access Control	Users.	IUM/Std.	AYS1801 AYS1802	Memory Expansion
ATS2000	32(8)	4	250	None	(16 PIN)	50	Std.	N	
ATS2000	32(8)	4	250	ATS/Wiegand 26-bit	16+48	50	Std.	N	
ATS2000	32(8)	4	250	F. supp. by ATS1250	48	50	Std.	N	
ATS2000	32(8)	4	250	F. supp. by ATS1250	16+48	50	IUM	N	
ATS2000	32(8)	4	250	Other up to 48-bit	16+48	50	IUM	N	
ATS3000	64(8)	8	250	None	(16 PIN)	50	Std.	Y	
ATS3000	64(8)	8	250	ATS/Wiegand 26-bit	16+48	50	Std.	Y	
ATS3000	64(8)	8	250	F. supp. by ATS1250	48	50	Std.	Y	
ATS3000	64(8)	8	250	F. supp. by ATS1250	16+48	50	IUM	Y	
ATS3000	64(8)	8	250	Other up to 48-bit	16+48	50	IUM	Y	
ATS3000	64(8)	8	1000	None	(16 PIN)	11k	Std.	Y	ATS1830
ATS3000	64(8)	8	1000	ATS/Wiegand 26-bit	16+48	11k	Std.	Y	ATS1830
ATS3000	64(8)	8	1000	ATS/Wiegand 26-bit	16+48	17k	Std.	N	ATS1831
ATS3000	64(8)	8	1000	ATS/Wiegand 26-bit	16+48	65k	Std.	N	ATS1832
ATS3000	64(8)	8	1000	F. supp. by ATS1250	16+48	2k	IUM	Y	ATS1830
ATS3000	64(8)	8	1000	F. supp. by ATS1250	48	11k	Std.	Y	ATS1830
ATS3000	64(8)	8	1000	F. supp. by ATS1250	48	17k	Std.	N	ATS1831
ATS3000	64(8)	8	1000	F. supp. by ATS1250	48	65k	Std.	N	ATS1832
ATS3000	64(8)	8	1000	Other up to 48-bit	16+48	2k	IUM	Y	ATS1830
ATS3000	64(8)	8	1000	Other up to 48-bit	16+48	17k	IUM	N	ATS1831
ATS3000	64(8)	8	1000	Other up to 48-bit	16+48	65k	IUM	N	ATS1832
ATS4000	256(16)	16	250	None	(16 PIN)	50	Std.	Y	
ATS4000	256(16)	16	250	ATS/Wiegand 26-bit	16+48	50	Std.	Y	
ATS4000	256(16)	16	250	F. supp. by ATS1250	48	50	Std.	Y	
ATS4000	256(16)	16	250	F. supp. by ATS1250	16+48	50	IUM	Y	
ATS4000	256(16)	16	250	Other up to 48-bit	16+48	50	IUM	Y	
ATS4000	256(16)	16	1000	None	(16 PIN)	11k	Std.	Y	ATS1830
ATS4000	256(16)	16	1000	ATS/Wiegand 26-bit	16+48	11k	Std.	Y	ATS1830
ATS4000	256(16)	16	1000	ATS/Wiegand 26-bit	16+48	17k	Std.	Y	ATS1831
ATS4000	256(16)	16	1000	ATS/Wiegand 26-bit	16+48	65k	Std.	Y	ATS1832
ATS4000	256(16)	16	1000	F. supp. by ATS1250	16+48	2k	IUM	Y	ATS1830
ATS4000	256(16)	16	1000	F. supp. by ATS1250	48	11k	Std.	Y	ATS1830
ATS4000	256(16)	16	1000	F. supp. by ATS1250	48	17k	Std.	Y	ATS1831
ATS4000	256(16)	16	1000	F. supp. by ATS1250	48	65k	Std.	Y	ATS1832
ATS4000	256(16)	16	1000	Other up to 48-bit	16+48	2k	IUM	Y	ATS1830
ATS4000	256(16)	16	1000	Other up to 48-bit	16+48	17k	IUM	Y	ATS1831
ATS4000	256(16)	16	1000	Other up to 48-bit	16+48	65k	IUM	Y	ATS1832
ATS4500	256(16)	16	1000	None	(16 PIN)	11k	Std.	Y	
ATS4500	256(16)	16	1000	ATS/Wiegand 26-bit	16+48	11k	Std.	Y	
ATS4500	256(16)	16	1000	ATS/Wiegand 26-bit	16+48	17k	Std.	Y	ATS1831
ATS4500	256(16)	16	1000	ATS/Wiegand 26-bit	16+48	65k	Std.	Y	ATS1832
ATS4500	256(16)	16	1000	F. supp. by ATS1250	16+48	2k	IUM	Y	
ATS4500	256(16)	16	1000	F. supp. by ATS1250	48	11k	Std.	Y	
ATS4500	256(16)	16	1000	F. supp. by ATS1250	48	17k	Std.	Y	ATS1831
ATS4500	256(16)	16	1000	F. supp. by ATS1250	48	65k	Std.	Y	ATS1832
ATS4500	256(16)	16	1000	Other up to 48-bit	16+48	2k	IUM	Y	
ATS4500	256(16)	16	1000	Other up to 48-bit	16+48	17k	IUM	Y	ATS1831
ATS4500	256(16)	16	1000	Other up to 48-bit	16+48	65k	IUM	Y	ATS1832

7.1.5 Current consupmtion.

Table 7-9 ATS devices current consumption.

Device	Connected Expansion	Description	Current cons. mA		Required voltage V	Notes
			Max.	Typical		
ATS1100	-	System keypad, LCD 2x16 character display, 8 area status LED	185	73	7,19	All areas armed + Power status LED 220VAC
				152		All areas armed + Power status LED 220VAC + LCD backlight
ATS1105	-	System keypad, LCD 2x16 character display, 8 area status LED with Wiegand reader interface	185	78	7,25	All areas armed + Power status LED 220VAC
				166		All areas armed + Power status LED 220VAC + LCD backlight
	ATS1410	ATS1105 system keypad with ATS1410 magnetic card reader connected	195	150		ATS1410 functions until keypad stops at 5.5Vdc
ATS1110	-	System keypad, LCD 2x16 character display, 16 area status LED	95	32	7,4	All areas armed + Power status LED 220VAC
				91		All areas armed + Power status LED 220VAC + LCD backlight
ATS1111	-	System keypad, LCD 4x16 character display, 16 area status LED	95	32	7,4	All areas armed + Power status LED 220VAC
				91		All areas armed + Power status LED 220VAC + LCD backlight
ATS1115	-	System keypad, LCD 2x16 character display, 16 area status LED with ATS Smart Card reader	165	86	7,4	All areas armed + Power status LED 220VAC (reader operates until 8.5 VDC)
				103		All areas armed + Power status LED 220VAC + LCD backlight (reader operates until 8.5 VDC)
ATS1116	-	System keypad, LCD 4x16 character display, 16 area status LED with ATS Smart Card reader	169	86	7,4	All areas armed + Power status LED 220VAC (reader operates until 8.5 VDC)
				109		All areas armed + Power status LED 220VAC + LCD backlight (reader operates until 8.5 VDC)
ATS1151	-	System keypad, 3 system status LED, metal housing, without LCD display	45	34	7,35	Each LED lit add: +9mA;
ATS1155	-	Outdoor keypad, vandal resistant metal housing, separate electronics.	70	70	7,35	

Device	Connected Expansion	Description	Current cons. mA		Required voltage V	Notes
			Max.	Typical		
ATS1156	-	System keypad, 3 system status LED, metal housing, with magnetic card reader (ACT600)	45	39	7,35	Each LED lit add: +9mA; Card swipe add: +5mA.
ATS1170	-	Wiegand reader interface, PCB only	45	32	9,6	
	ATS1190	Wiegand reader interface, with proximity reader connected	95	65		
ATS1190	-	ATS proximity Smart Card reader (do not require interface)	50	29	7,99	
ATS1192	-	ATS proximity Smart Card reader (do not require interface), vandal resistant housing	50	29	7,99	
ATS1202	-	Zone expansion module 8 input for control panel and DGP, PCB	10	9		
ATS1210/11	-	Zone expansion DGP – 8 inputs and 8 outputs	53	50	6,73	Sends „Low Voltage” message at 10,5VDC
	ATS1810	ATS1210/11 with 4 relays module connected	130	70	9,6	All relays active. Minimum voltage to activate relays 10,3VDC. Pooling continues up to 5,5VDC.
	ATS1811	ATS1210/11 with 8 relays module connected	225	110	9,6	All relays active. Minimum voltage to activate relays 10,1VDC. Pooling continues up to 5,5VDC.
	ATS1820	ATS1210/11 with 16OC module connected	90	38	6,73	All outputs active without any additional load.
ATS1220	-	Zone expansion DGP – 4 inputs	53	45	6,73	
ATS1230	-	Zone expander DGP - wireless devices receiver, 433MHz freq. Up to 32 detectors and 16 keyfobs		39	7,48	
ATS1290	-	Zone expander DGP – addressable devices with Point ID bus. Up to 32 devices.	53	50	9,5	Without Point ID load, no addressable devices connected
	PID bus	ATS1290 with PID bus connected with max. load of 512UL	154	154	9,5	PID bus with maximum specified load of 512UL (UL Unit Load)

Device	Connected Expansion	Description	Current cons. mA		Required voltage V	Notes
			Max.	Typical		
ATS1740	-	ATS bus isolator/repeater – PCB	90	60	4,75	
ATS1741	-	ATS bus converter RS485 / RS232 - PCB	100	100	6,1	
ATS1742	-	ATS bus loop interface RS485 - PCB	86	86		
	ATS1201	DGP connected to bus loop	155	97	6,79	
ATS1743	-	ATS bus converter RS485/Fibber optic - PCB	60	36	10,24	
ATS1810	-	Output expansion module 4 relays (NO/NC) – PCB	1	1		Prąd spoczynkowy
			100	60		All relays active
ATS1811	-	Output expansion module 8 relays (NO/NC) – PCB	50	20		Prąd spoczynkowy
			250	170		All relays active
ATS1820	-	Output expansion module 16 OC – PCB	50	20		
ATS1801	-	Computer and printer interface, 2 RS232 ports	25	20		Prąd spoczynkowy
			60	60		One port communication
			150	137		Two ports communication
ATS1802	-	Printer interface, RS232 port	20	60		Prąd spoczynkowy
			100	60		One port communication
ATS1830	-	Memory expansion module, 1MB	30	3		
ATS1831	-	Memory expansion module, IUM, 4MB	30	10		
ATS1832	-	Memory expansion module, IUM, 8MB	30	10		
ATS7100	-	ISDN communicator, B-channel	50	45		Prąd spoczynkowy
			120	92		Connection active
ATS7200	-	ATS voice module, 2+6 messages	50	23		
ATS7300	-	GSM communicator	110	20		110mA current consumption during GSM transmission
			2A			Peek current consumption during connection negotiating
ATS1410	-	Magnetic cards reader	75		4,5	While card swipe.

7.1.6 Card Readers Technical Data.

Table 7-10 Proximity Readers Technical Data.

Parameter	ATS			MIFARE		HID						
	ATS1190	ATS1192	ATS1115/16	ACI406	ACI407	ACI730	ACI755	ACI757	ACI760	ACI766	ACI775	ACI795
Reading range	6-12 cm		6-8 cm	5-6cm	5-6cm	25cm	20cm		7,6cm	14cm	73cm	14cm
Keypad	-		Tak	-	Tak	-	-	Tak	-	-	-	-
Operating voltage	8-13,8VDC		9-13,8VDC	8-28,5VDC		10-28,5VDC			5-16VDC	5-16VDC	12/24VDC	5-16VDC
Current Cons. Typical	29mA		30mA	100mA		100mA	100mA		30mA	20mA	200mA	20mA
Current Cons. Max.	50mA		165mA			120mA	120mA		75mA	110mA	1,2A	115mA
Dimensions	34x110x17	42x149x15	92x165x25	110x43x24		190x190x23	127x127x25		79,6x43,7x17	152x43x25	300x300x25	119x76x17
Housing	IP54		IP30	IP47		Polycarbonate UL94						
Operating temp.	-35 – 60st.C		0 – 50st.C	-40 – 55st.C		-30 – 65st.C						
Frequency	127kHz		127kHz	13,56MHz		125kHz						
Humidity	95%											

Reading range for ACT7xx readers given for reader mounted on the diamagnetic surface and ACT724 card.