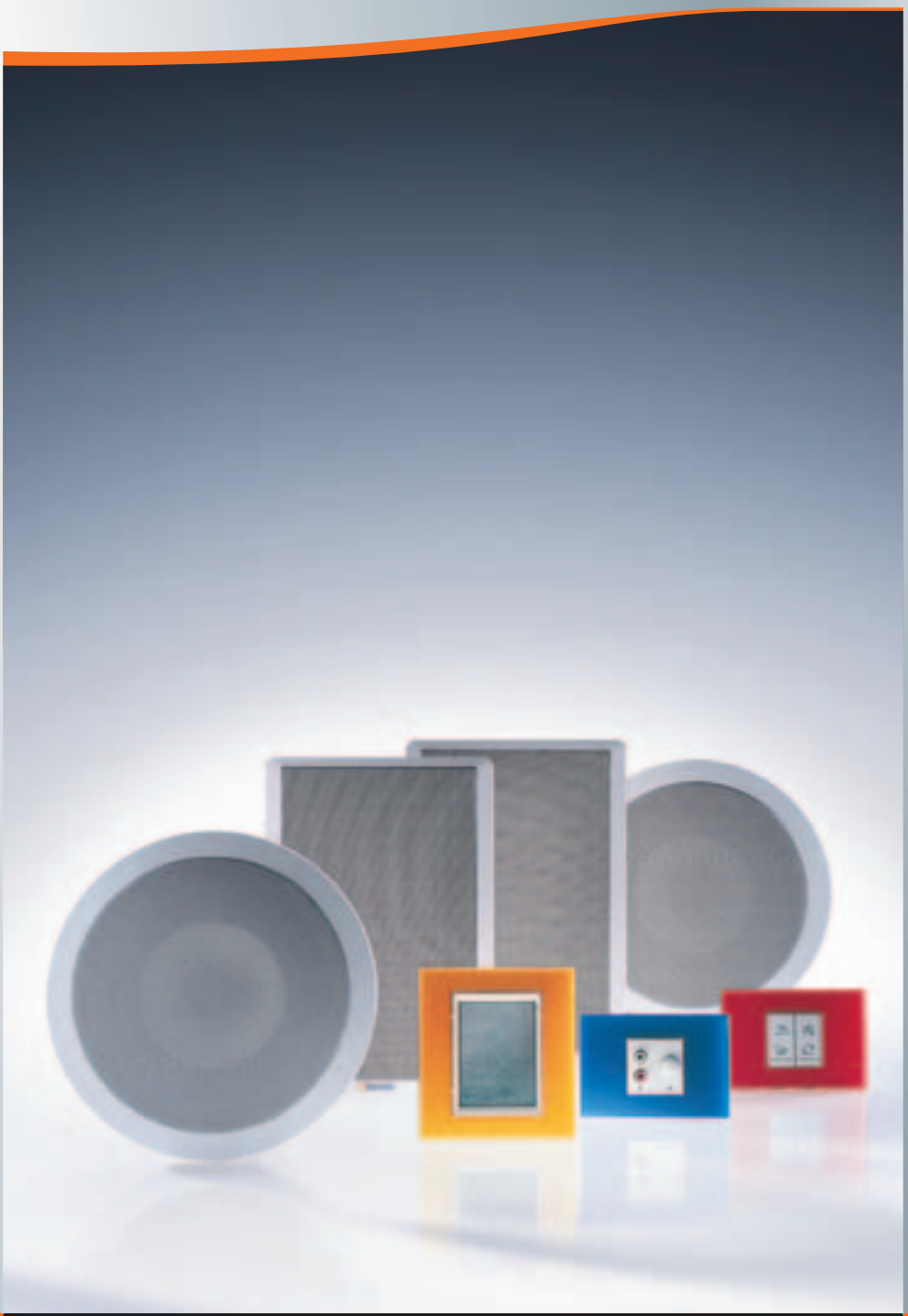
bticino

MY HOME

2-wire sound system

TECHNICAL GUIDE 04




Radio
OFF
ON
Soggiorno
OFF
ON
Camera

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The pleasure of being surrounded by pure sound

The new stereo sound system lets you choose and control the sound playing it in several rooms at the same time with high sound quality.

The system technology uses amplifiers and loudspeakers perfectly integrated in the electrical system which allow you to listen both to an external sound source, like a Hi-Fi system, and an internal source, like the integrated FM radio.

Flush-mounted amplifier

TOUCH SCREEN

Music wherever you want it

Thanks to its complete range and its many functions it is the ideal solution for applications which range from the residential to the service sector. The performance, possibility of extending the system and its sound quality mean that it can be used in both the classical home environment and in service rooms such as doctors' or dentists' surgeries, shops, cafes, restaurants and supermarkets.

Wall-mounted loudspeakers

MUSIC IN THE HOME WHERE AND WHEN YOU WANT IT

The sound sources can be controlled from every room, for example changing the radio stations or altering the volume.

A complete range for all needs

Flush-mounted, wall-mounted and ceiling-mounted loudspeakers solve every installation need in both the residential and service sectors. Complete control of the sound source from every room: for example the stereo can be switched on or off, CD track changed or your favourite radio station chosen from any control point.

The new sound system can be commanded either via TOUCH SCREEN, or by flush-mounted controls which fit in perfectly with the LIVING INTERNATIONAL, LIGHT and LIGHT TECH lines.

In the residential sector
In the service sector

The BTicino stereo sound system is recommended not only to anyone who wants to hear quality sound in his home, but also to anyone working in the service sector, professionals who always need a system which not only plays music but also lets them communicate with their co-workers and with customers.

Wall-mounted loudspeakers for applications in the home

Flush-mounted amplifiers in just two modules and thin wall-mounted loudspeakers (only 37 mm) allow a discreet installation.

Ceiling-mounted loudspeakers for applications in the service sector

Loudspeakers dedicated to the service sector and DIN amplifiers directly supplied at 230V to expand the system up to 80 loudspeakers.

A MY HOME solution

The new stereo sound system has been studied and designed to fit into MY HOME solutions, such as the video door entry system or automation.

TWO APPLICATIONS

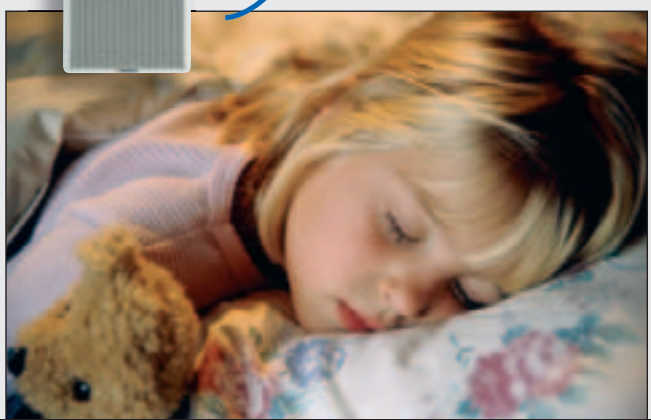
1. It is morning. Press just one pushbutton to raise the rolling shutters and switch on the radio or stereo, playing the music desired in the background.

2. The music goes quiet automatically to let you hear any calls from the video door entry system. Also voice messages from the video internal unit can be sent through the loudspeakers.

TWO WIRES OF SIMPLICITY

Installation of the system is simple and flexible because it uses the MY HOME two-wire system. Like all the MY HOME solutions this can be simply expanded and altered later. The new sound system uses the same power supply and cable as the 2-wire video door entry system.

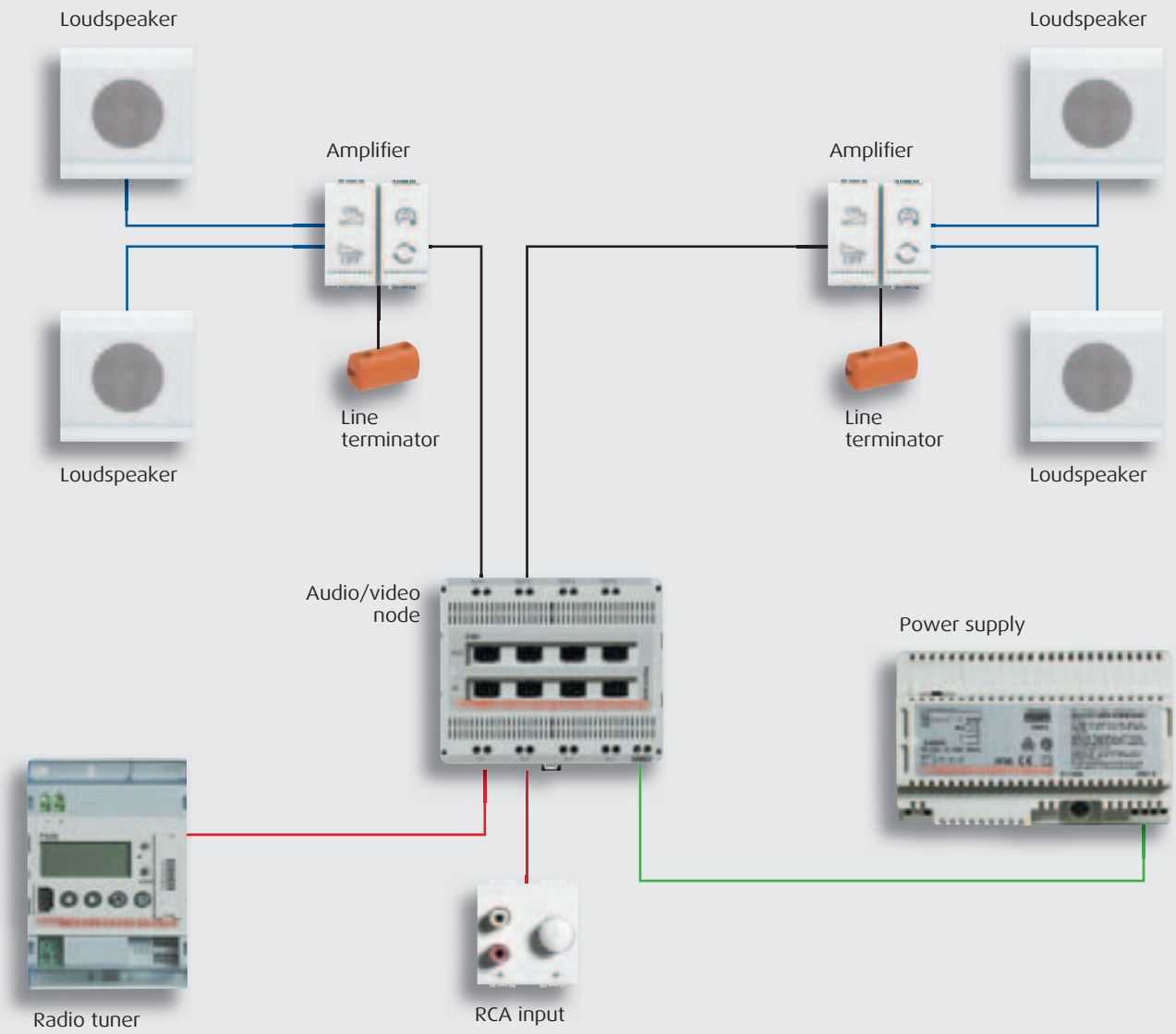
TOUCH SCREEN, the multifunction control for MY HOME



A complete system

The components to make the sound system can be divided into the following families:

- **AUDIO/VIDEO NODE**
- **SOUND SOURCES**
- **CONTROL DEVICES**
- **SOUND AMPLIFIERS**
- **LOUDSPEAKERS**



The sound system components

AUDIO/VIDEO NODE (ITEM F441)

The audio/video node mixes high-frequency stereo signals from several external sources (home stereo, radio tuner ...), towards the amplifiers positioned inside the home.
The device also integrates between the sound system and the two-wire video door entry system without using SCS/SCS interfaces (item F422).

Audio/video node

SOUND SOURCES

The sound sources are devices which generate a stereo audio signal. BTicino proposes a modular radio tuner and interfaces for the connection of external sound sources (e.g. Hi-Fi system).

■ FM RADIO TUNER (ITEM F500)

The BTicino radio tuner is a device to be installed on DIN35 rail to receive FM stereo radio programmes, which can display RDS messages.

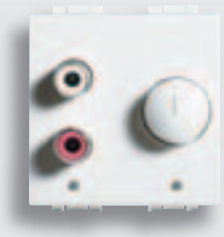
Radio tuner

■ RCA INPUT (ITEM L/N/NT4560)

This device is an interface which can connect an external stereo source (CD reader, DVD...) to the sound system.

■ STEREO CONTROL (ITEM L4561)

It can manage an external stereo source which has infrared remote control. This device saves the commands given by the source remote control to make them available on the amplifiers, special controls and TOUCH SCREEN.



RCA input

Stereo control

CONTROLS

These devices can manage the amplifiers from different rooms.

■ SPECIAL CONTROL (ITEM L4651/2)

Correctly configured it can manage the operation of a single amplifier, several amplifiers, or all the system amplifiers.

■ TOUCH SCREEN (ITEM L/N/NT4683)

A simple touch on the display can control all the functions of the MY HOME system, including the sound system applications.

Special control


TOUCH SCREEN

SOUND AMPLIFIERS

Devices which amplifier the audio signal from the BUS on the loudspeakers in the system.

■ STEREO AMPLIFIER (ITEM L4652)

Switches loudspeakers on/off, manages the volume, cycles the sources available and changes the CD track or selects the favourite radio station from those saved.

■ DIN AMPLIFIER (ITEM F502)

Supplied directly at 230V a.c., allows installations in large systems (up to 80 loudspeakers). Suitable in service rooms such as offices, restaurants, supermarkets...

Flush-mounted amplifier


DIN amplifier

LOUDSPEAKERS

The new sound system can be used with all the loudspeakers from 8Ω to 16Ω normally available on the market. The BTicino loudspeakers are:

■ FLUSH-MOUNTED LOUDSPEAKERS (ITEM L/N/NT4565)

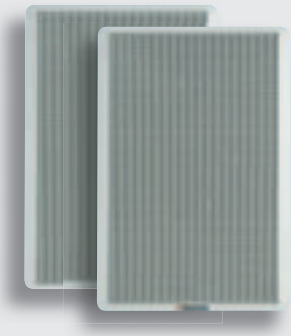
Loudspeakers with 16Ω impedance and 12W power, for installation in flush-mounted boxes item 506E.

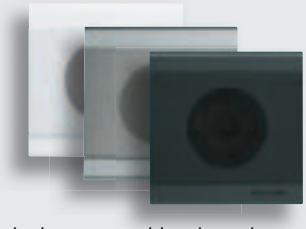
■ WALL-MOUNTED LOUDSPEAKERS (ITEM L4567)

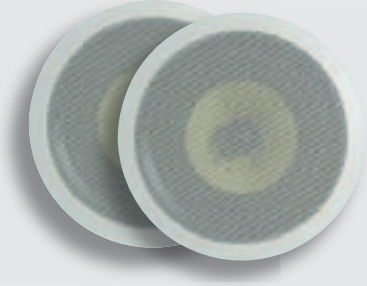
Loudspeakers with 37 mm thickness, 40W power and 8Ω impedance.

■ CEILING-MOUNTED LOUDSPEAKERS (ITEM L4566)

100W loudspeaker with 8Ω impedance, for installation in large rooms.

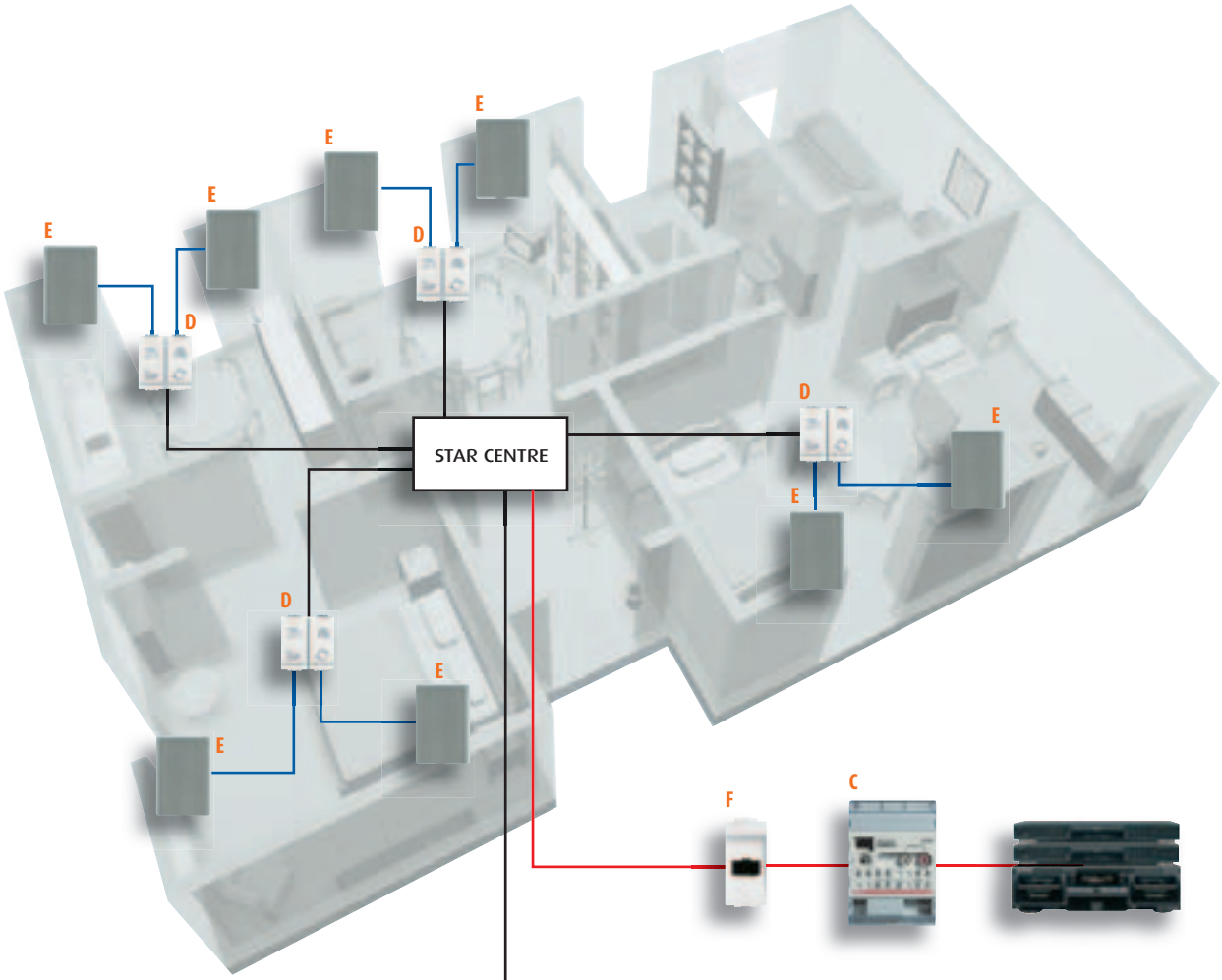

Wall-mounted loudspeakers

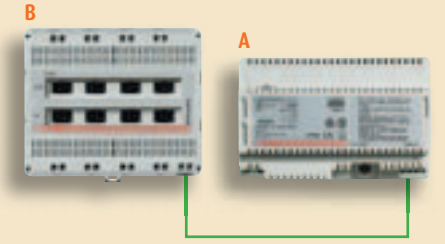

Flush-mounted loudspeakers


Ceiling-mounted loudspeakers

Flat

Below is shown a flat, on a single floor, with four rooms (living room, kitchen and 2 bedrooms). The stereo control can play the music from the Hi-Fi stereo inside the flat. An amplifier with 4 pushbuttons is installed in each room. This amplifier can switch the loudspeakers on and off, adjust the volume, cycle the sound sources available (if there is more than one) and change the CD track or choose the favourite radio station from those saved. Two flush-mounted loudspeakers with 8Ω impedance are connected to the amplifier.





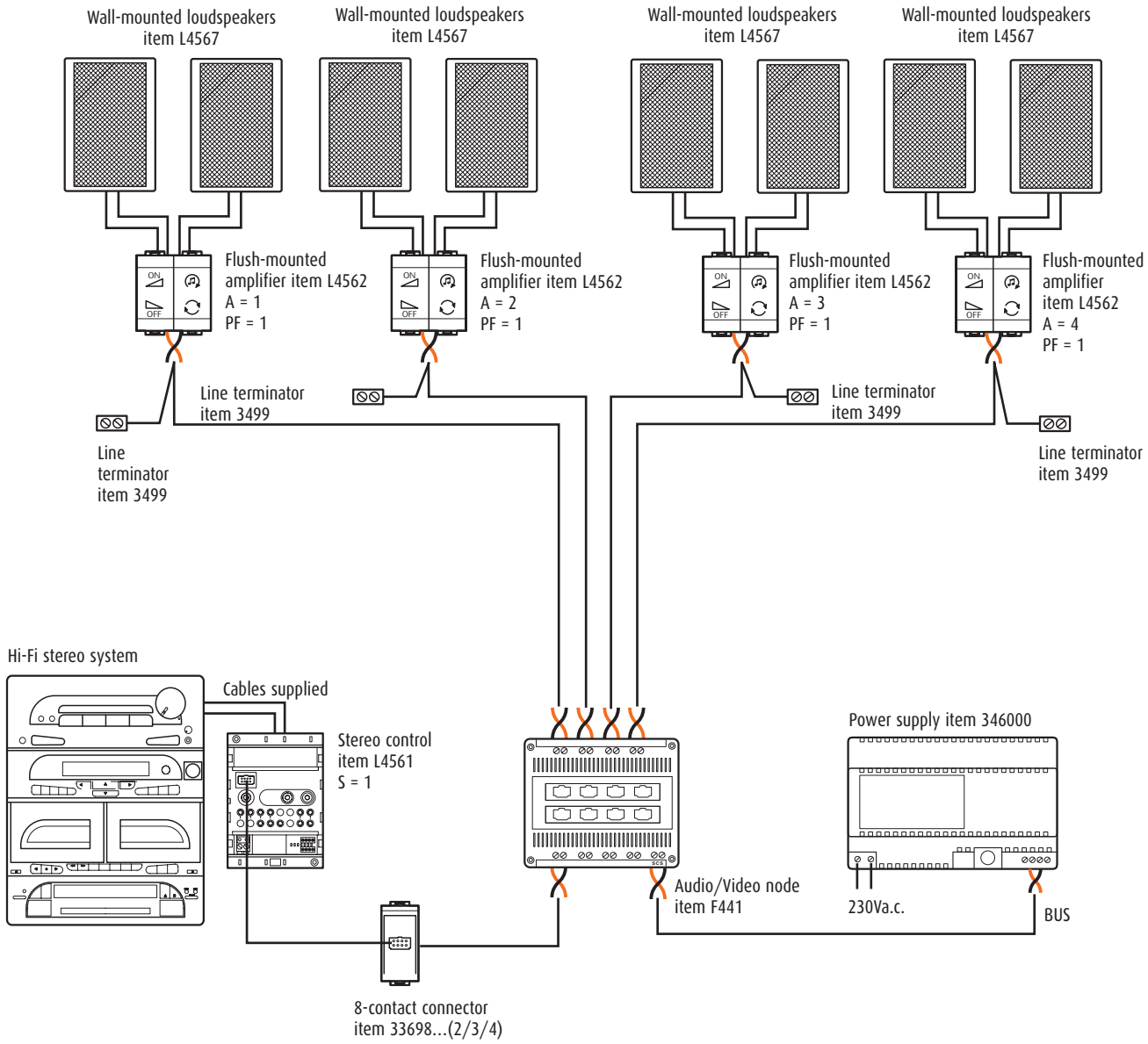
Star centre

List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
L4561	Stereo control	1	C
L4562	Flush-mounted amplifiers	4	D
L4567	Wall-mounted loudspeakers	8	E
L/N/NT4911BF	Right button cover	4	
L/N/NT4911AI	Left button cover	4	
3499	Line terminators	4	
33698...(2/3/4)	8-contact connector	1	F
336904	Twisted cable with 2 conductors	1	

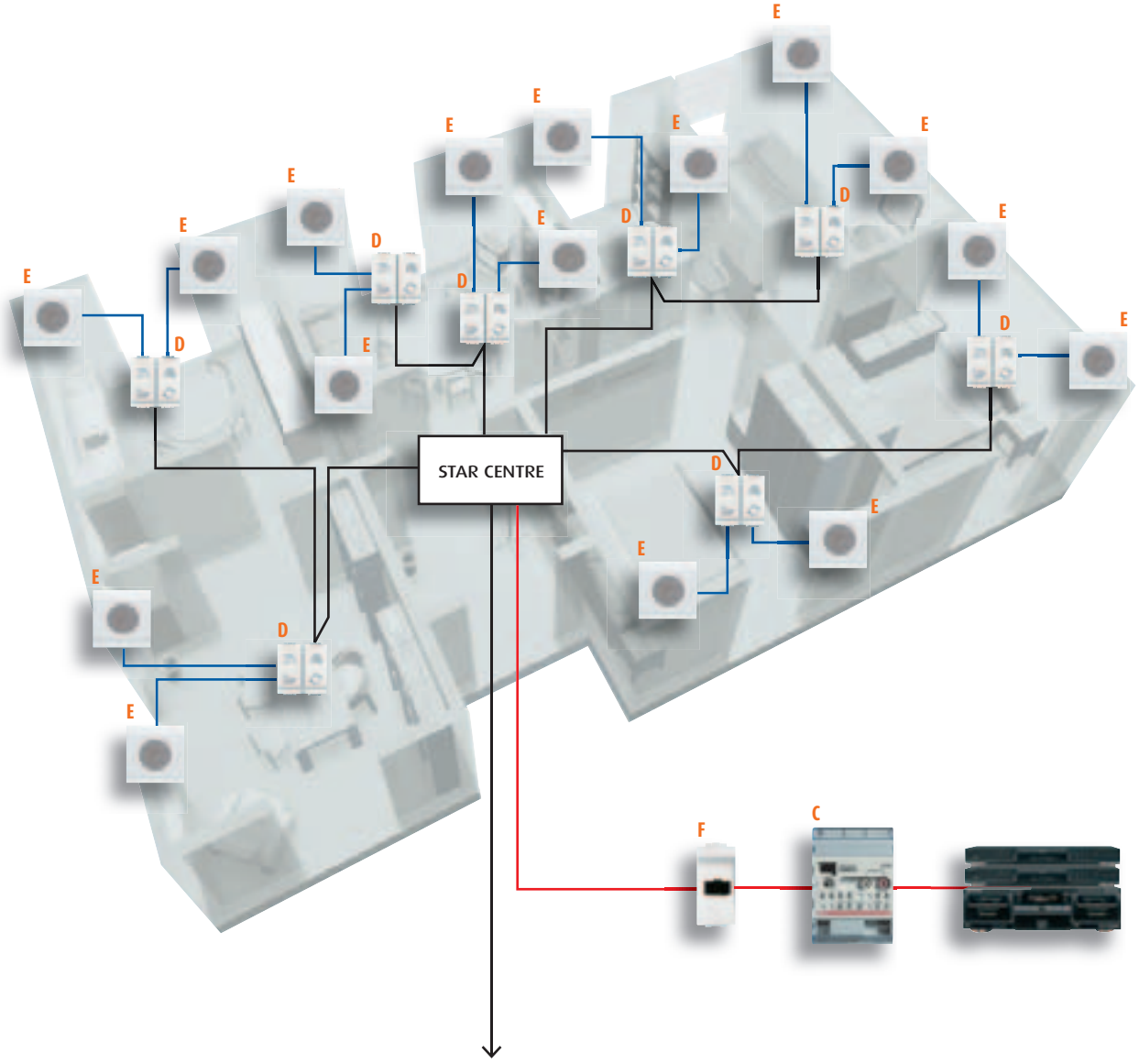
Connection diagram

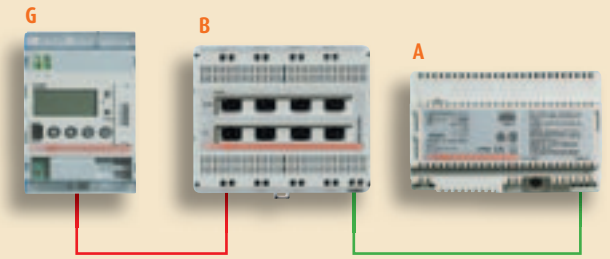
DIAGRAM 1 FLAT – 4 FLUSH-MOUNTED AMPLIFIERS – 8 8 OHM LOUDSPEAKERS



Small house

The following diagram refers to a small house with two sound sources: a stereo control to manage the Hi-Fi system and an FM radio tuner with RDS. In this case 16 flush-mounted loudspeakers are installed to play music in up to 8 rooms. The radio tuner must be installed in a zone with sufficient signal to receive the radio emitters.





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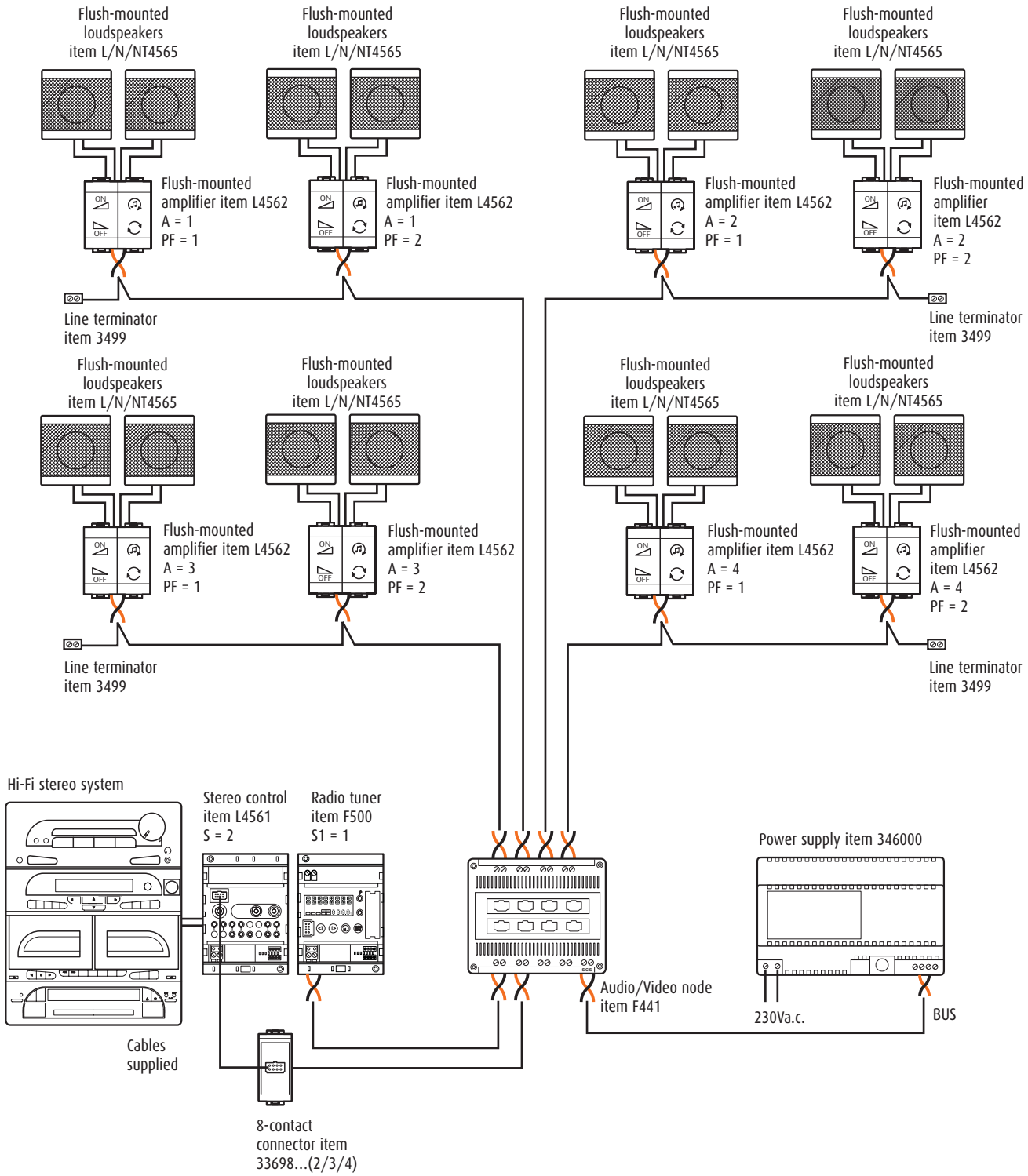
List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
F500	Radio tuner	1	G
L4561	Stereo control	1	C
L4562	Flush-mounted amplifiers	8	D
L/N/NT4565	Wall-mounted loudspeakers	16	E
L/N/NT4911BF	Right button cover	8	
L/N/NT4911AI	Left button cover	8	
3499	Line terminator	4	
33698...(2/3/4)	8-contact connector	1	F
336904	Twisted cable with 2 conductors	1	

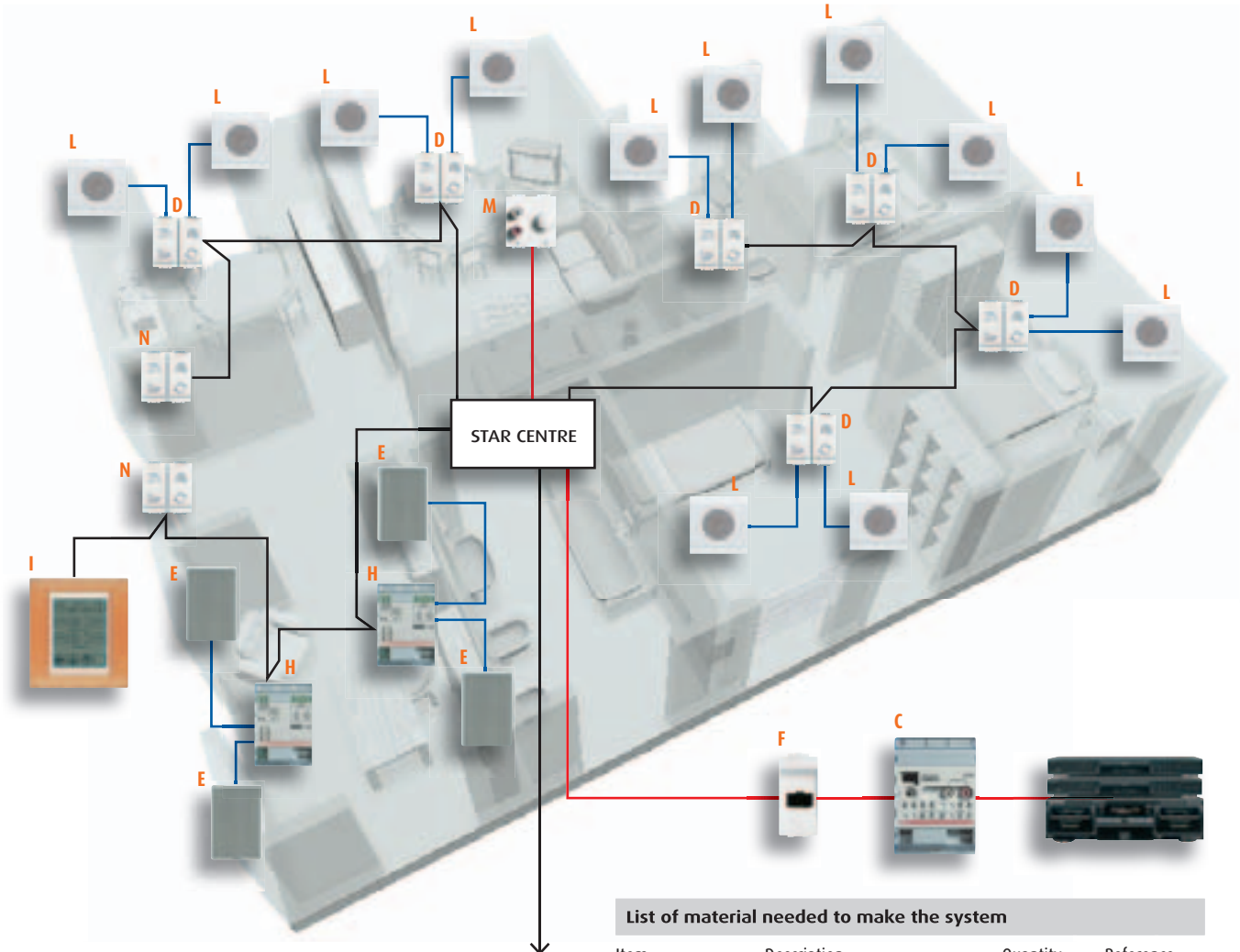
Connection diagram

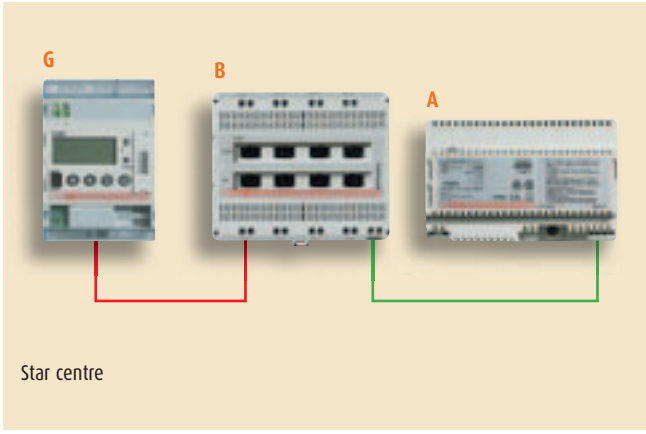
DIAGRAM 2 SMALL HOUSE – 8 FLUSH-MOUNTED AMPLIFIERS – 16 16 OHM LOUDSPEAKERS



Large house

The sound system inside a large house uses 16 loudspeakers and can control up to four external sound sources. Flush-mounted amplifiers and a DIN rail are used to make up the system. The system is managed by a TOUCH SCREEN and two special configured controls: one to activate the complete sound system (main control) and the other to activate all the amplifiers inside a room (room control), such as the amplifiers of the whole living room. Thanks to a TOUCH SCREEN function, the sound system can be used as an alarm clock. In fact, on setting the time on TOUCH SCREEN, the sound source set will switch on at the time set and the loudspeakers will switch on, first at a low sound level and then at a higher level. The alarm clock is switched off by touching the TOUCH SCREEN or the "OFF" pushbutton.





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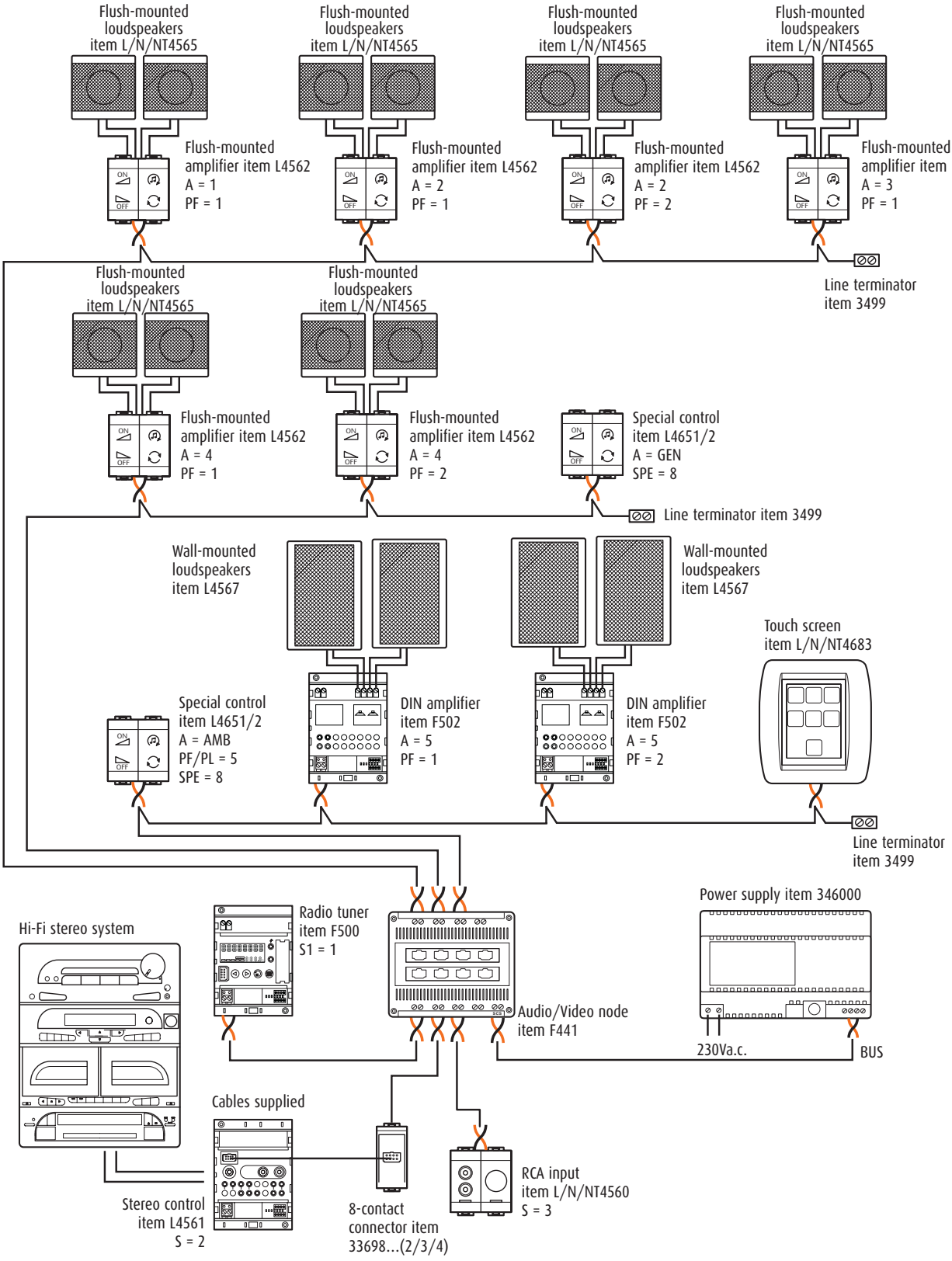
List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
F500	Radio tuner	1	G
L4561	Stereo control	1	C
L/N/NT4560	RCA input	1	M
L4562	Flush-mounted amplifiers	6	D
L4651/2	Special control	2	N
F502	DIN amplifier	2	H
L/N/NT4683	TOUCH SCREEN	1	I
L/N/NT4565	Flush-mounted loudspeakers	12	L
L4567	Wall-mounted loudspeakers	4	E
L/N/NT4911BF	Right button cover	8	
L/N/NT4911AI	Left button cover	8	
3499	Line terminator	3	
33698...(2/3/4)	8-contact connector	1	F
336904	Twisted cable with 2 conductors	1	

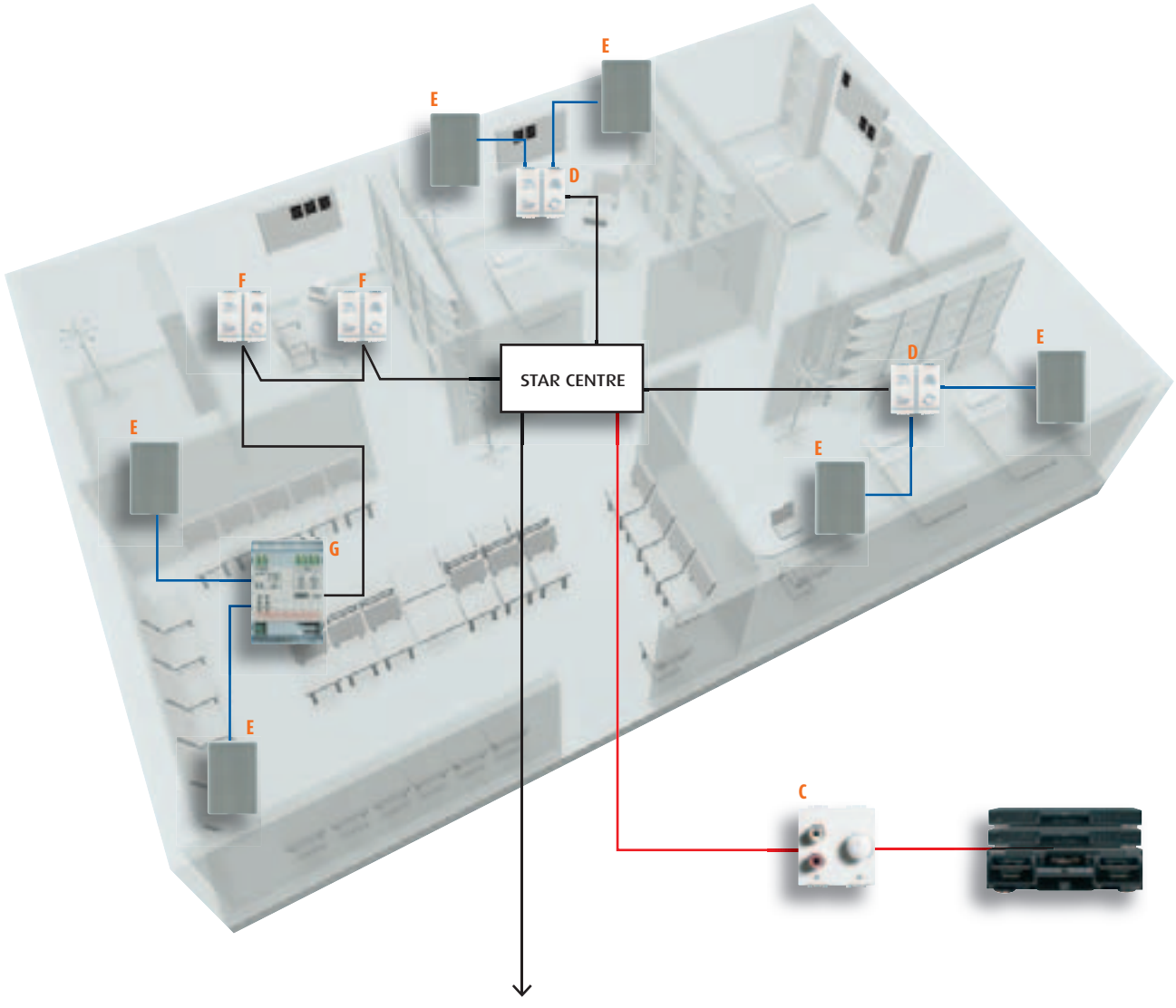
Connection diagram

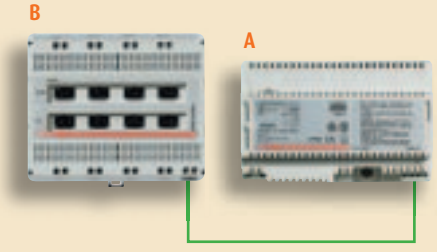
DIAGRAM 3 LARGE HOUSE – 6 FLUSH-MOUNTED AMPLIFIERS AND 2 ON DIN RAIL – 12 16 OHM AND 4 8 OHM LOUDSPEAKERS



Doctor's surgery

This solution is ideal in surroundings where the amplifiers and sound sources should only be controlled by authorised personnel. The example shows a doctor's surgery with a waiting room, the reception and two visiting rooms. An amplifier on DIN rail is used in the waiting room, the Hi-Fi system is positioned in the reception (so that the source is directly controlled by the secretary or doctor) and there are two special controls: one control configured in general mode to activate all the loudspeakers of the doctor's surgery, the other configured to control the loudspeakers in the waiting room. In the visiting rooms there are two flush-mounted amplifiers for local management of the amplifiers.





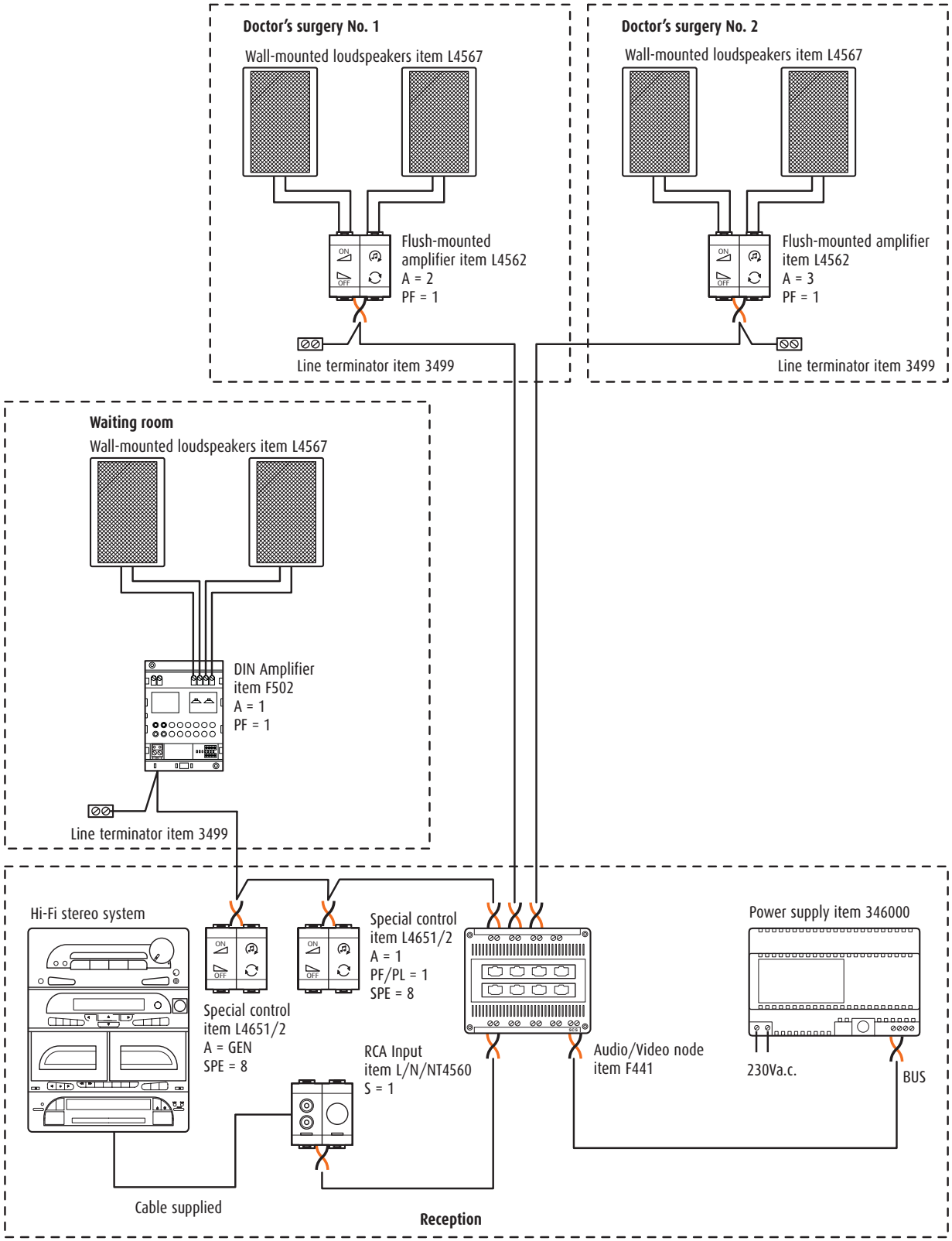
Star centre

List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
L/N/NT4560	RCA input	1	C
L4562	Flush-mounted amplifiers	2	D
F502	Amplifier for the service sector	1	G
L4651/2	Special control	2	F
L4567	Wall-mounted loudspeakers	6	E
L/N/NT4911BF	Right button cover	3	
L/N/NT4911AI	Left button cover	3	
3499	Line terminator	4	
336904	Twisted cable with 2 conductors	1	

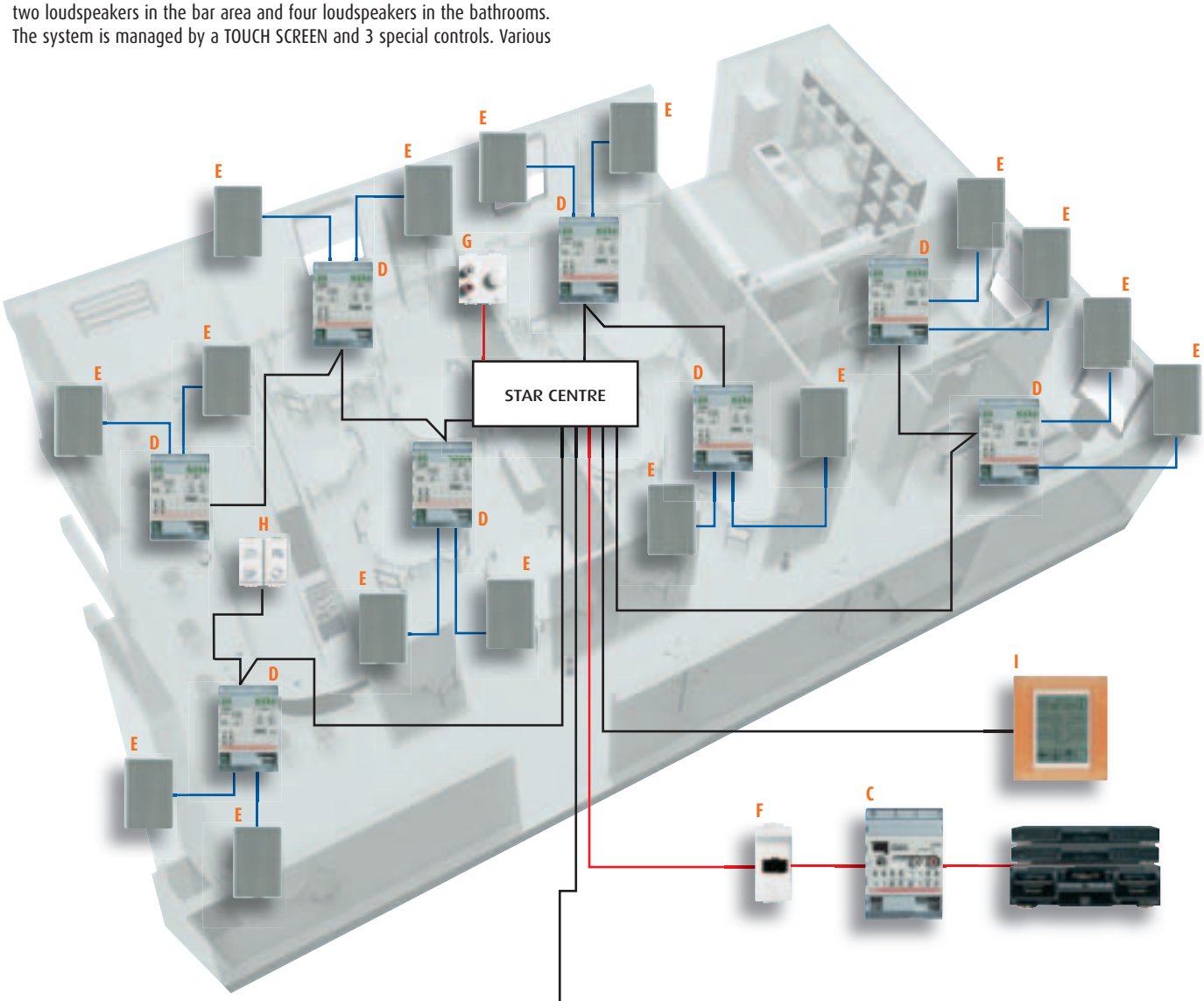
Connection diagram

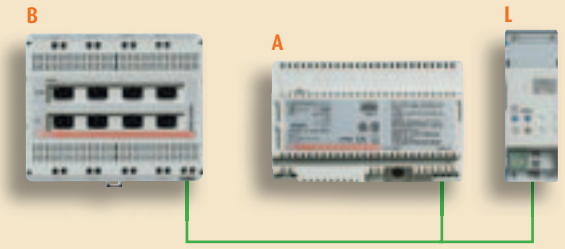
DIAGRAM 4 DOCTOR'S SURGERY – 2 FLUSH-MOUNTED AMPLIFIERS – 1 DIN AMPLIFIER – 3 ROOMS



Restaurant

The example has two rooms, a bar area and bathrooms for men and women. A sound system can be constructed inside a restaurant by installing wall-mounted loudspeakers for each room (connected to DIN amplifiers), two loudspeakers in the bar area and four loudspeakers in the bathrooms. The system is managed by a TOUCH SCREEN and 3 special controls. Various scenarios can be saved using a scenario module (programmed by the TOUCH SCREEN): for example the loudspeakers can be switched on in the rooms with different sound levels.





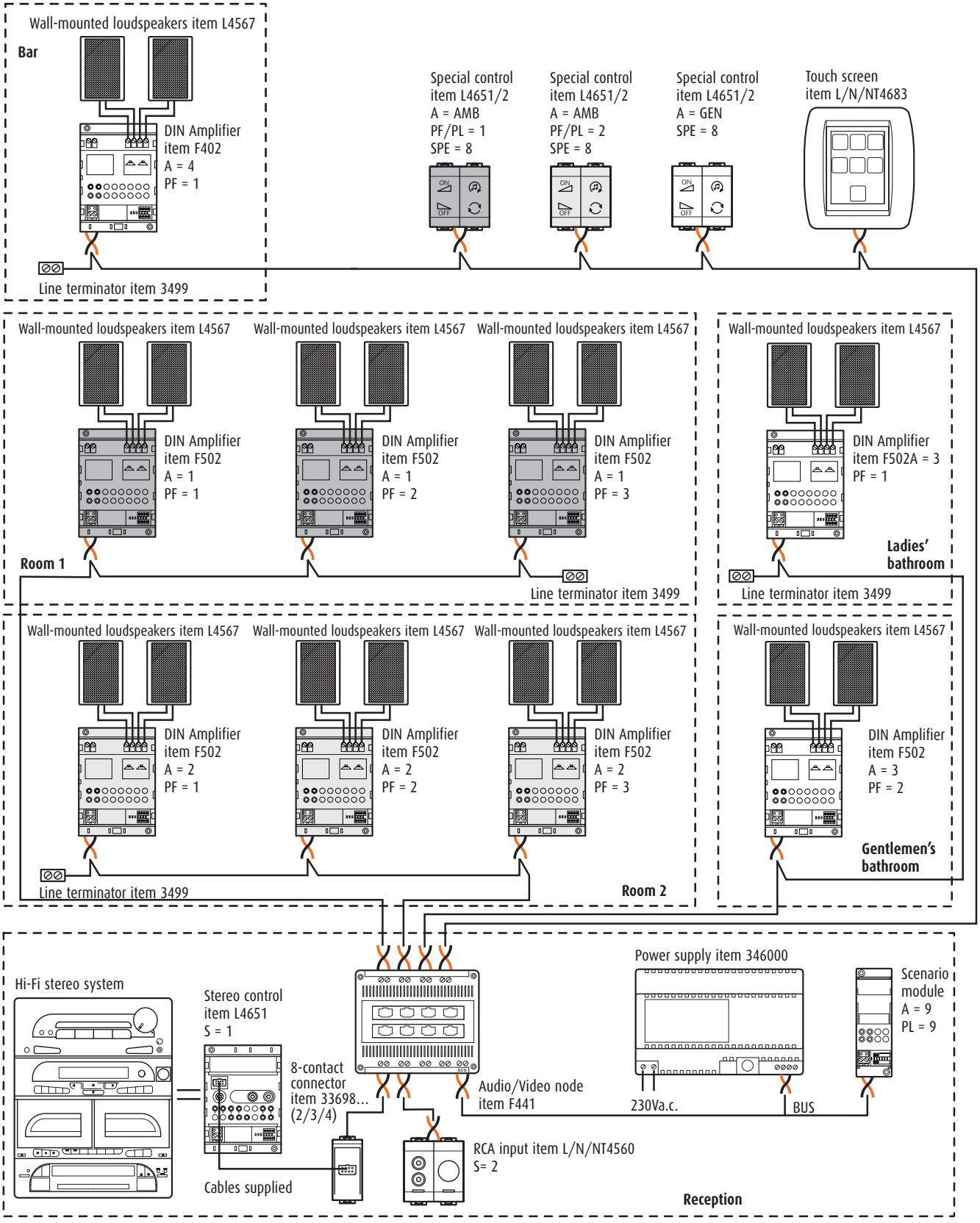
Star centre

List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
L/N/NT4560	RCA input	1	G
L4561	Stereo control	1	C
F502	Amplifier for the service sector	9	D
L4567	Wall-mounted loudspeakers	18	E
L4651/2	Special control	3	H
L/N/NT4683	TOUCH SCREEN	1	I
F420	Scenario modules	1	L
L/N/NT4911BF	Right button cover	3	
L/N/NT4911AI	Left button cover	3	
3499	Line terminator	3	
33698...(2/3/4)	8-contact connector	1	F
336904	Twisted cable with 2 conductors	1	

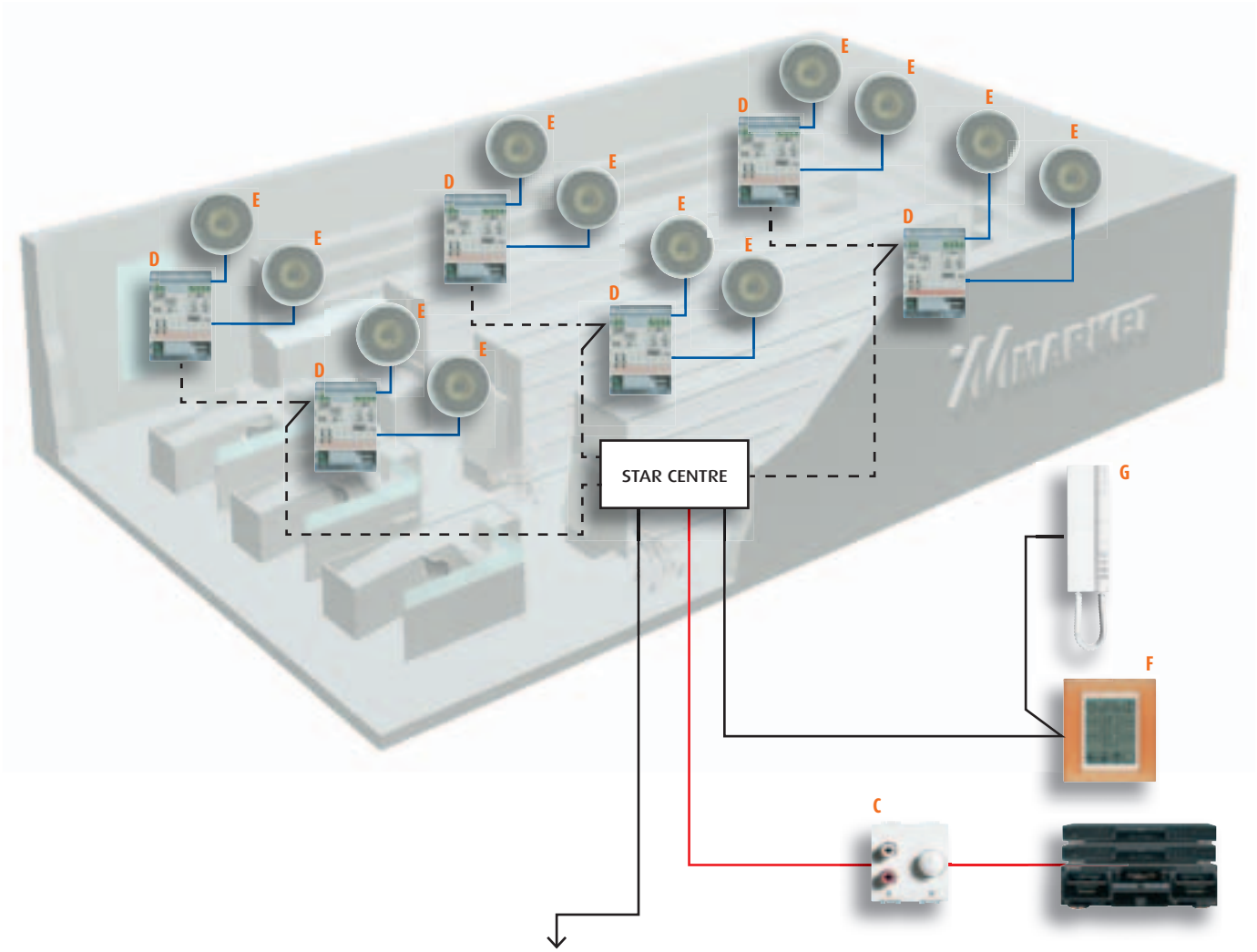
Connection diagram

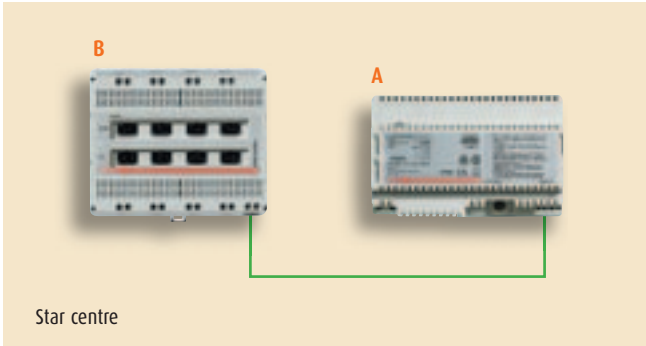
DIAGRAM 5 RESTAURANT – AMPLIFIER ON DIN RAIL



Supermarket

The sound system inside a supermarket (large area) can be made using a maximum of 40 ceiling-mounted loudspeakers managed by amplifiers on a DIN rail connected in mono. The mono system is configured by inserting configurator 3 into socket M3 of the amplifier. The solution presented is made by installing a TOUCH SCREEN to manage all the amplifiers, an RCA input to play the audio signal from a Hi-Fi system and one or more PIVOT internal units (using key 4 of the internal unit) to call personnel by means of the loudspeakers inside the supermarket or installed near the cash desks.





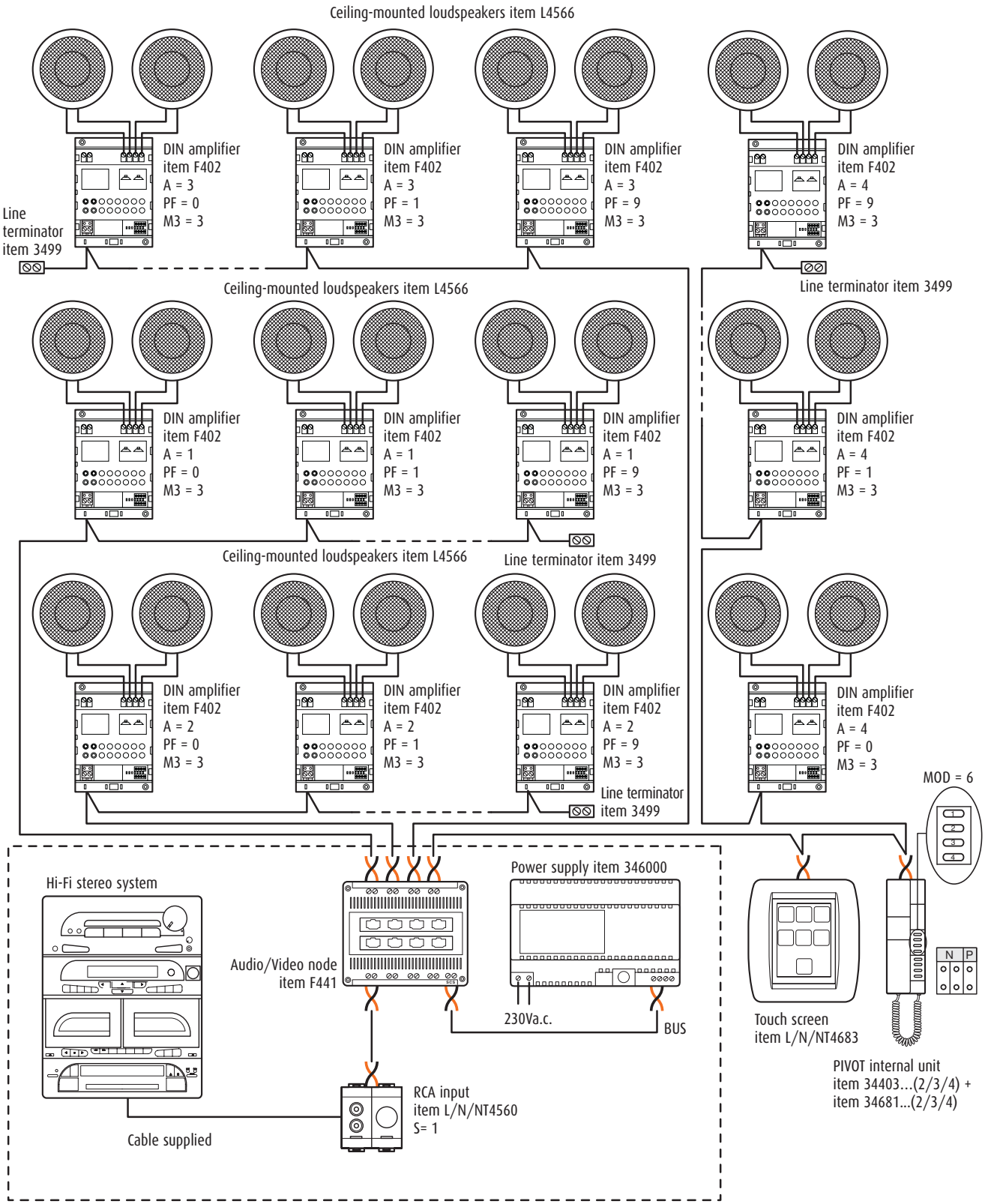
Star centre

List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
L/N/NT4560	RCA input	1	C
F502	Amplifier for the service sector	Max 40	D
L4566	Ceiling-mounted loudspeakers	Max 80	E
L/N/NT4683	TOUCH SCREEN	1	F
34403...(2/3/4)	PIVOT internal unit	1	G
34681...(2/3/4)	4-pushbutton block	1	
3499	Line terminator	4	
336904	Twisted cable with 2 conductors	1	

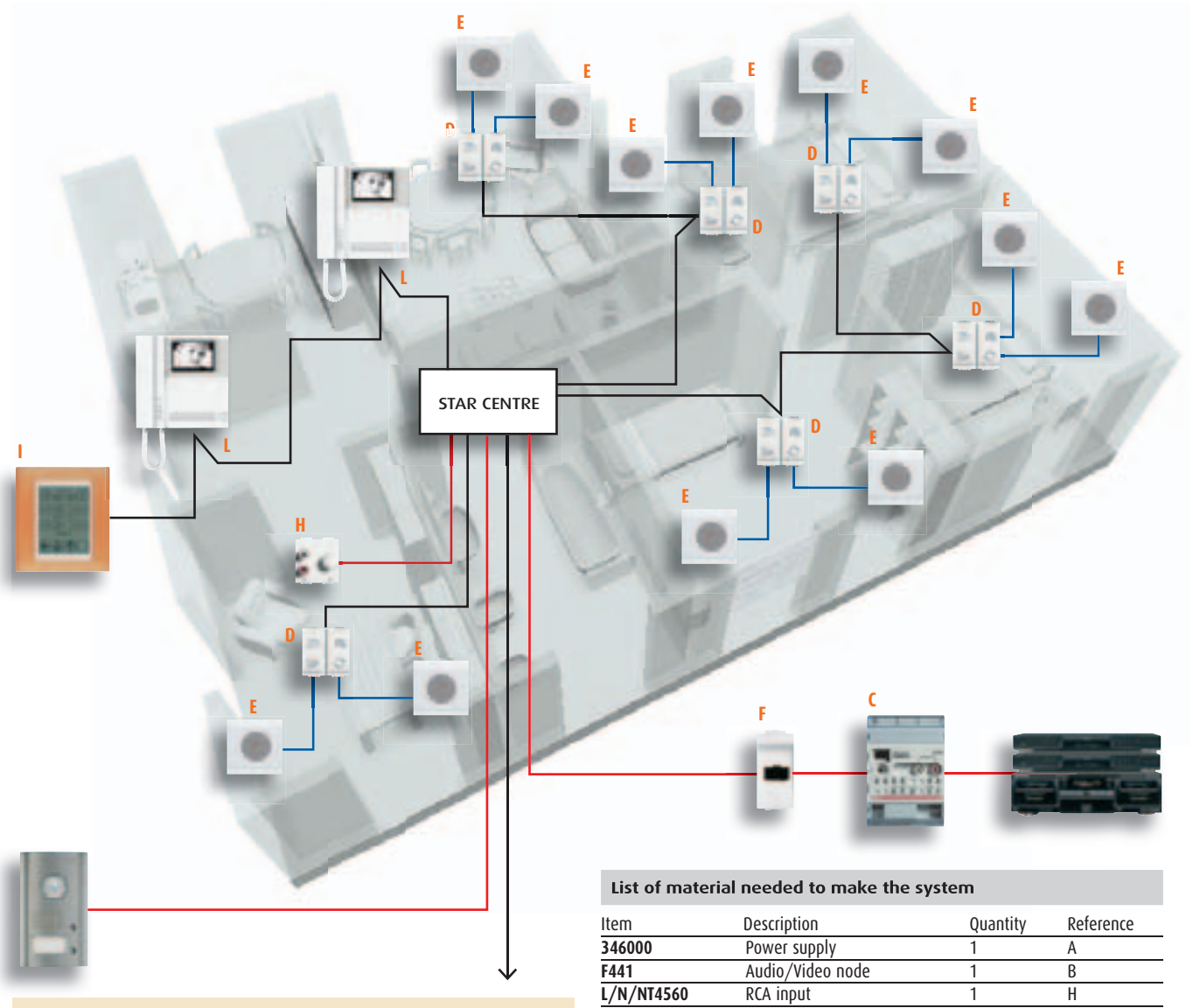
Connection diagram

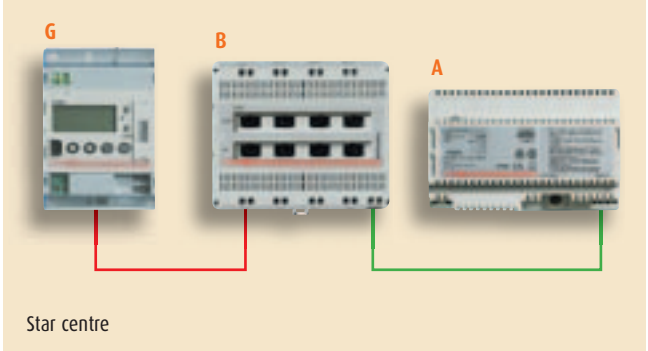
DIAGRAM 6 SUPERMARKET – MAX 40 AMPLIFIERS ON DIN RAIL – MONO PLAY



Large house with 2-wire video door entry system

The two-wire sound system can be combined with the two-wire video door entry system. A TOUCH SCREEN and flush-mounted amplifiers, 1 entrance panel and 2 PIVOT internal units are installed in the system. When the entrance panel is activated, the sound system reduces the volume of the stereo sources so that the sound of the bell can be heard. The audio will return to its original volume when the internal unit handset is replaced. Using the 4-button block installed in the video door entry units the loudspeakers in the home can be used to page people.





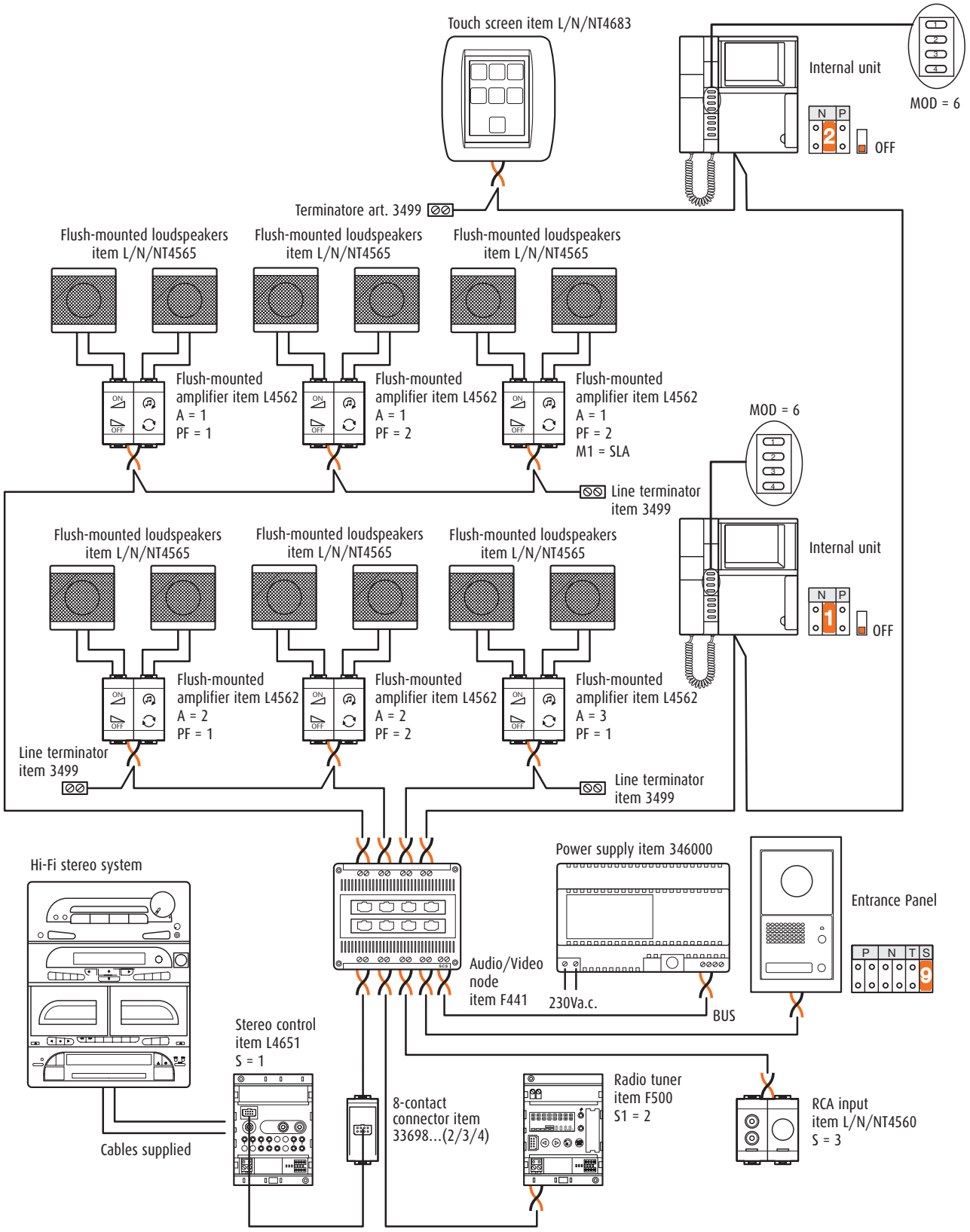
Star centre

List of material needed to make the system

Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
L/N/NT4560	RCA input	1	H
L4561	Stereo control	1	C
F500	Radio tuner	1	G
L4562	Flush-mounted amplifier	6	D
L/N/NT4565	Flush-mounted loudspeakers	12	E
L/N/NT4683	TOUCH SCREEN	1	I
344032	PIVOT internal unit	2	
344102	PIVOT video internal unit	2	L
34681...(2/3/4)	4-pushbutton block	2	
342510	Entrance panel camera	1	
342170	One-family speaker unit	1	
3499	Line terminator	4	
33698...(2/3/4)	8-contact connector	4	F
336904	Twisted cable with 2 conductors	1	

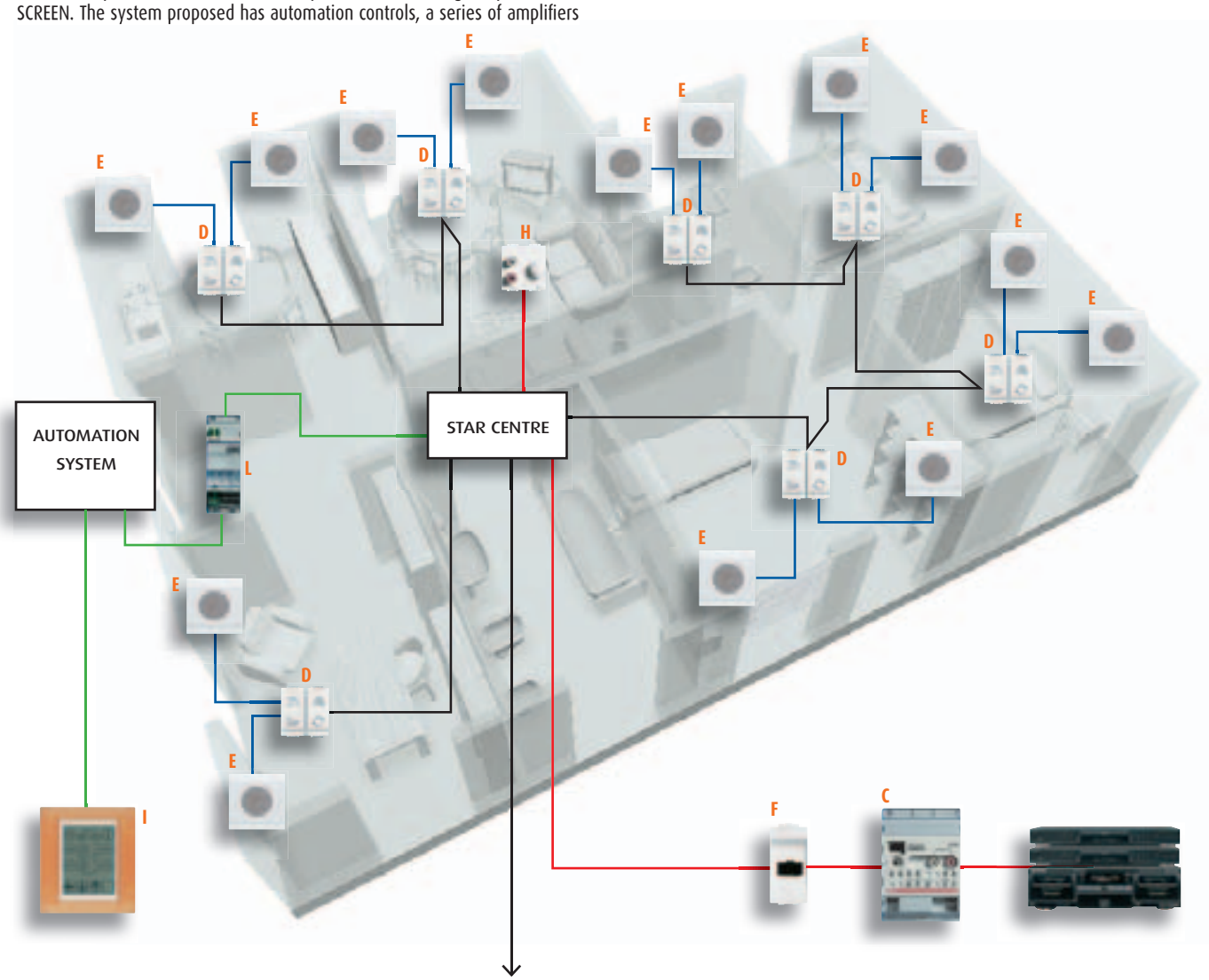
Connection diagram

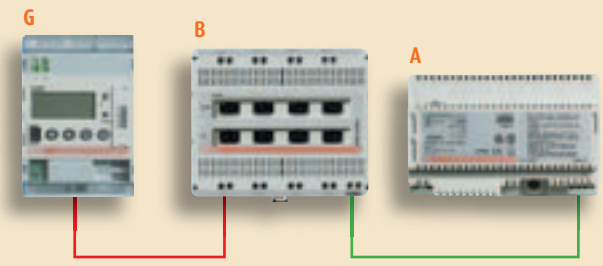
DIAGRAM 7 LARGE HOUSE – SOUND SYSTEM COMBINED WITH 2-WIRE VIDEO DOOR ENTRY SYSTEM AND TOUCH SCREEN



Large house with automation system

The two-wire sound system can also be used with MY HOME automation. This is brought about by using an SCS/SCS interface item F422, where the sound system BUS is connected in output (OUT) and the automation BUS is connected in input (IN) (the interface does not require configurations). Both the sound system and the automation system can be managed by a TOUCH SCREEN. The system proposed has automation controls, a series of amplifiers and loudspeakers, a stereo control to control a Hi-Fi system, a radio tuner and an RCA input. Using a scenario module you can: save the switching on of the sound system, switch on the lights and raise the rolling shutters with just one pushbutton.





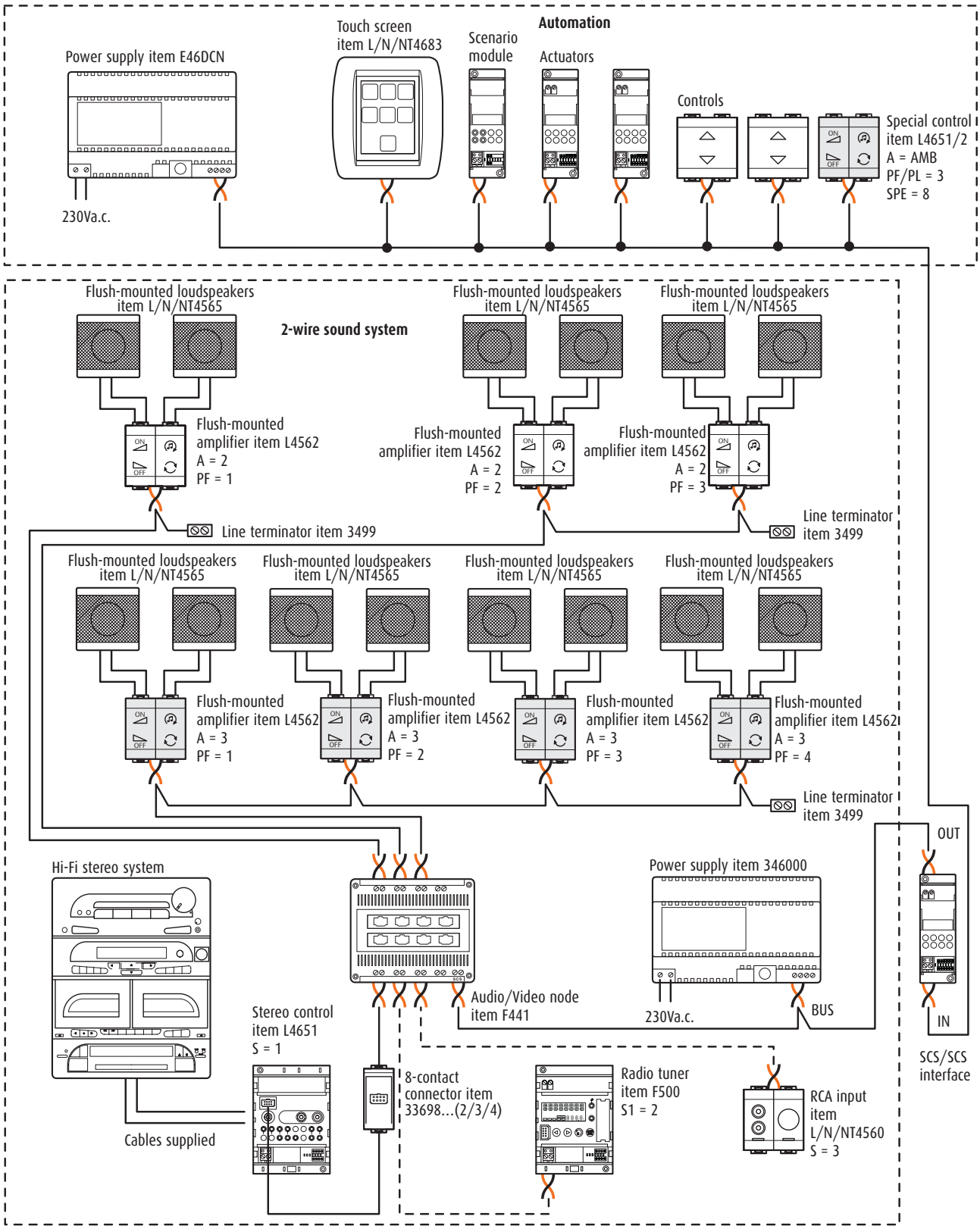
Star centre

List of material needed to make the system

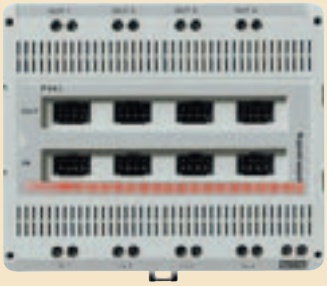
Item	Description	Quantity	Reference
346000	Power supply	1	A
F441	Audio/Video node	1	B
L/N/NT4560	RCA input	1	H
L4561	Stereo control	1	C
F500	Radio tuner	1	G
L4562	Flush-mounted amplifier	7	D
L/N/NT4565	Flush-mounted loudspeakers	14	E
L/N/NT4683	TOUCH SCREEN	1	I
F422	SCS/SCS interface	1	L
3499	Line terminator	3	
33698...(2/3/4)	8-contact connector	1	F
336904	Twisted cable with 2 conductors	1	

Connection diagram

DIAGRAM 8 LARGE HOUSE – SOUND SYSTEM COMBINED WITH 2-WIRE AUTOMATION SYSTEM



Audio/video node, sound sources



F441

AUDIO/VIDEO NODE

Item	Description
F441	Audio/Video node to mix audio signals (Max 4 sources) towards 4 outputs – 6 DIN modules – complete with depth compensator for DIN rail

F500

SOUND SOURCES

Item	Description
F500	RDS stereo radio tuner – 4 DIN modules – complete with depth compensator for DIN rail
L4560	Flush-mounted RCA input – two LIVING INTERNATIONAL modules to control a stereo source
N4560	Flush-mounted RCA input – two LIGHT modules to control a stereo source
NT4560	Flush-mounted RCA input – two LIGHT TECH modules to control a stereo source
L4561	Device to control stereo sources with infrared remote control – the source can be managed by the amplifiers or the special controls – 4 DIN modules – complete with RCA/RCA cable and cable with jack to connect the IR transmitter

L4560

N4560

NT4560

L4561

Amplifiers, commands, loudspeakers

F502

L4562

AMPLIFIERS

Item	Description
F502	4 DIN module amplifier to be installed in units
L4562	Flush-mounted amplifier – two modules – to be completed with LIVING INTERNATIONAL, LIGHT or LIGHT TECH button covers

L4683
N4683
NT4683

L4651/2

CONTROLS

Item	Description
L4683	TOUCH SCREEN LIVING INTERNATIONAL
N4683	TOUCH SCREEN LIGHT
NT4683	TOUCH SCREEN LIGHT TECH
L4651/2	Special control to manage amplifiers to be completed with LIVING INTERNATIONAL, LIGHT or LIGHT TECH button covers to switch on/off, control volume, change source and change programmed radio stations – two modules

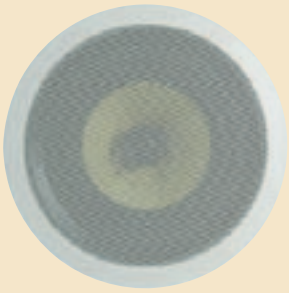
L4565

N4565

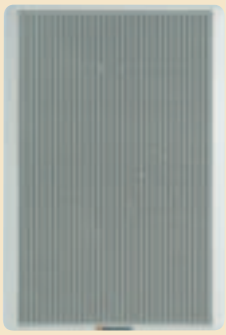
NT4565

LOUDSPEAKERS

Item	Description
L4565	Flush-mounted loudspeaker for box 506E LIVING INTERNATIONAL 16Ω series
N4565	Flush-mounted loudspeaker for box 506E LIGHT 16Ω series
NT4565	Flush-mounted loudspeaker for box 506E LIGHT TECH 16Ω series
L4566	Ceiling-mounted loudspeaker 8Ω
L4567	Wall-mounted loudspeaker 8Ω



L4566



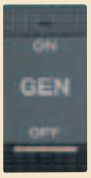
L4567

Button covers, connectors, configurators


L4911BF


N4911BF


NT4911BF



L4911AF
N4911AF
NT4911AF

L4911AI
N4911AI
NT4911AI


L4911BE
N4911BE
NT4911BE


336983


336982


336984

LIGHTABLE BUTTON COVERS

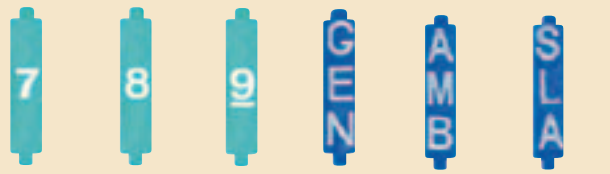
With silk-screen printing – 2 functions – 1 module

Item			Silk-screen description
LIVING INTERNATIONAL	LIGHT	LIGHT TECH	
L4911BF	**N4911BF**	**NT4911BF**	sound system functions
L4911AF	**N4911AF**	**NT4911AF**	ON-OFF-GEN
L4911AI	**N4911AI**	**NT4911AI**	ON-OFF-adjustment
L4911BE	**N4911BE**	**NT4911BE**	treble clef symbol

CONNECTORS FOR STEREO CONTROL BUS CABLE INTERFACE

Item	Description
336983	LIVING INTERNATIONAL 8-contact connector to connect interface item L4685 to the BUS
336982	as above – LIGHT series
336984	as above – LIGHT TECH series

3501/1 3501/2 3501/3 3501/4 3501/5 3501/6



3501/7 3501/8 3501/9 3501/GEN 3501/AMB 3501/SLA

CONFIGURATORS – ONE-TYPE PACKAGE OF 10 PIECES

Item	Description
3501/0	configurator 0
3501/1	configurator 1
3501/2	configurator 2
3501/3	configurator 3
3501/4	configurator 4
3501/5	configurator 5
3501/6	configurator 6
3501/7	configurator 7
3501/8	configurator 8
3501/9	configurator 9
3501/GEN	configurator GEN
3501/AMB	configurator AMB
3501/SLA	configurator SLA

CONFIGURATOR KIT

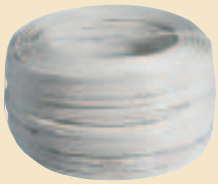
Item	Description
346900	Kit of configurators from 0 to 9
3501K/1	Kit of AUX, GEN, GR, AMB,ON, OFF, O/I, PUL, SLA, CEN, ↑↓ , ↑↓ M configurators


346900

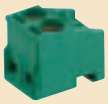

3501K/1

Various accessories

346000



336904



3515

3499

335919

POWER SUPPLY

Item	Description
346000	power supply for sound system – input 230Va.c. output 27Vd.c. – maximum current supplied 1200 mA – fastening on DIN rail with size 8 modules

CABLE FOR SYSTEMS

Item	Description
336904	twisted 2-conductor cable which can be buried in piping – corresponds to standards IEC 20-13 and IEC 20-14 – coil length 200 m

LINE TERMINATOR

Item	Description
3499	line terminator – to be installed on the used outputs of the audio/video node

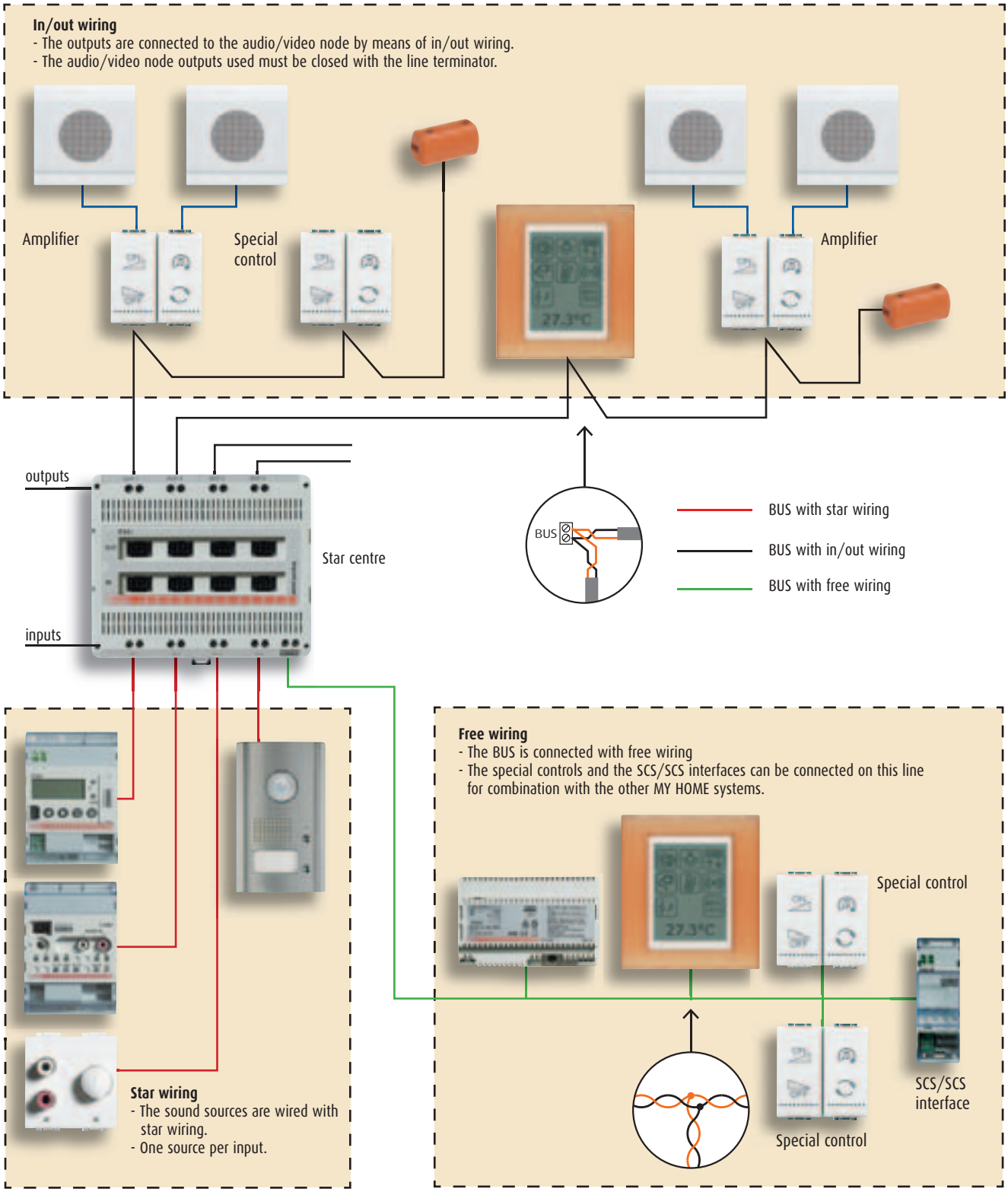
VARIOUS ACCESSORIES

Item	Description
3515	spare pull-out terminal
335919	cable to connect the TOUCH SCREEN to the PC to program the device

Sound system wiring

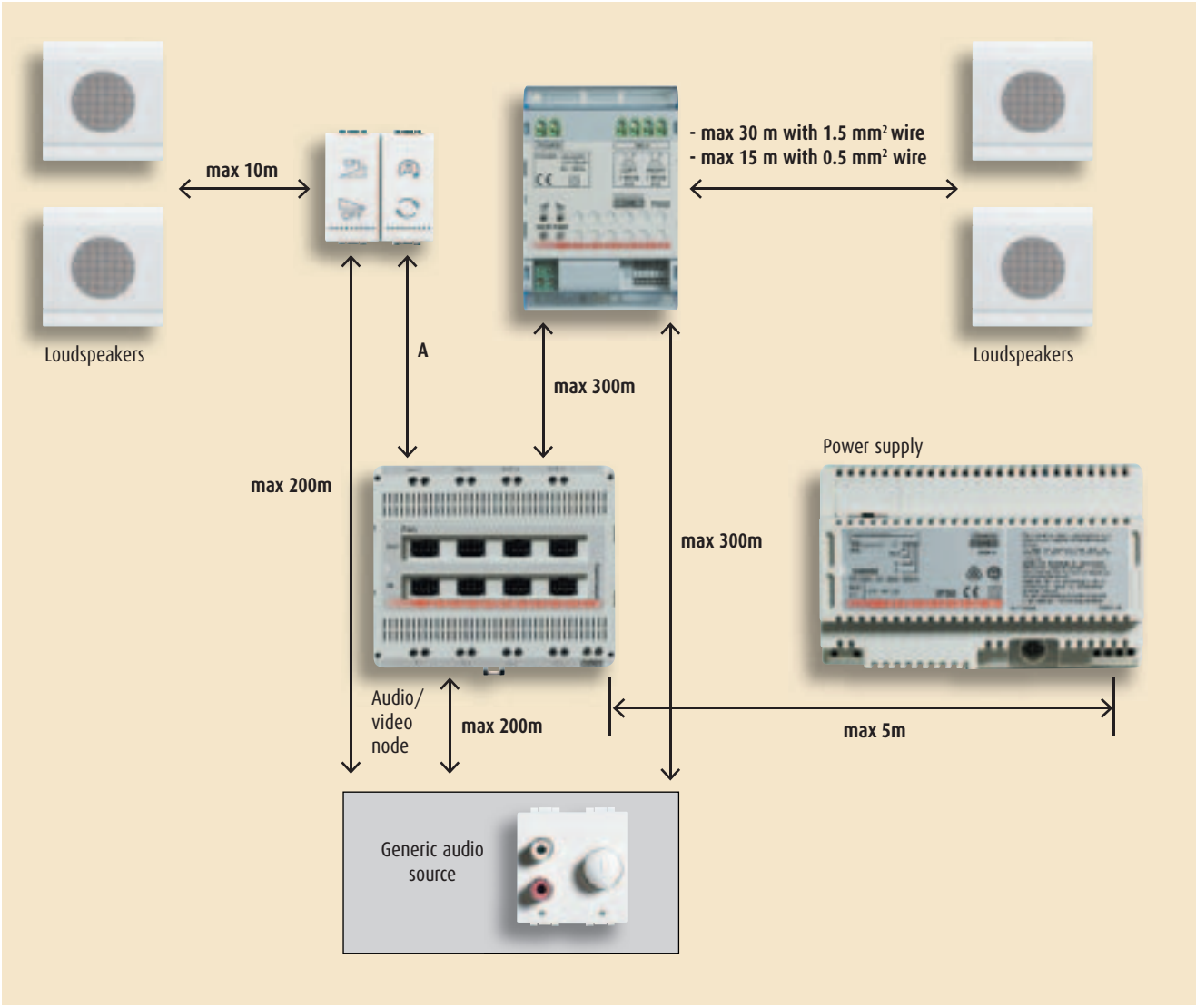
When wiring the sound system some general installation rules must be followed: the distribution system is made using star wiring, where the signals from the external stereo sources and the wiring from the control devices and amplifiers converge.

The following diagram shows the type of wiring necessary to make up a sound system.



Maximum cable distances and cable features

In sizing the system the following system limits are considered. They depend on the type of amplifier installed and the impedance characteristics of the loudspeaker used.
To keep the fidelity of the audio signal reproduced unaltered, lay the 2-wire Sound/Video door entry BUS wiring and the accessory wiring (cables for loudspeakers etc.) in separate piping from the power cables (230V line). The above wires can only share inside junction boxes using cables with correct insulation (E.g. Item 336904).
Failure to respect the above rules may affect the quality of the audio signal reproduced.



Maximum distances between the sources (A)

Maximum length of the cable depending on the number of amplifiers item L4562 installed along an output of the audio/video Node

	Loudspeaker impedance	With 1 amplifier	With 2 amplifiers	With 3 amplifiers	With 4 amplifiers
Using cable item 336904	8Ω	160m	60m	-	-
	16Ω	200m	160m	100m	60m
Using UTP cable cat 5E	8Ω	80m	30m	-	-
	16Ω	160m	80m	50m	30m

NOTE: - using DIN amplifiers item F502, a maximum of 10 amplifiers can be wired for each output of the audio/video node
- for the lengths of the video door entry system wiring, refer to the Communication Technical Newsletter
- total extent of cable max 800m.

Calculating the current absorption

The system absorption should always be calculated when deviating from the diagrams proposed in the guide.
When calculating the current absorbed by the components, remember that the maximum current which the power supply can furnish (1200mA) must not be exceeded.
To calculate the current absorbed by the sources, consider that with greatest absorption in "ON" and all the others in "stand-by".
While for the flush-mounted amplifiers L4562 consider the ON absorption for the type of load connected (loudspeaker impedance and number of outputs connected to the loudspeakers).

There should be at most 100 SCS devices.
There should be at most 8 L4562 amplifiers.
There should be at most 40 F502 amplifiers (maximum 10 per output of node F441).
The maximum current of each output of audio/video Node F441 must be less than 600 mA continuous, a limit which translates into a maximum of 2 flush-mounted amplifiers L4562 with 8 ohm loudspeakers or 4 flush-mounted amplifiers L4562 with 16 ohm loudspeakers.

Table of absorptions

Description	Item	Stand-By	ON
Power supply:	**346000**		1200mA (maximum current which can be supplied)
Audio/Video node:	**F441**	-	20mA
RCA Input Source	**L/N/NT4560**	12mA	30mA
Radio Tuner:	**F500**	12mA	50mA
Stereo Control Source :	**L4561**	12mA	40mA
Flush-mounted stereo amplifier:	**L4562**	6mA	250mA with 8ohm loudspeakers on 2 L-R outputs 130mA with one 8ohm loudspeaker on 1 L-R output 130mA with one 16ohm loudspeakers on 2 L-R outputs 90mA with one 16ohm loudspeaker on 1 L-R output 40mA (MUTE)
Service amplifier:	**F502**	-	5mA (from BUS)
Special control:	**L4651/2**	-	7.5mA
TOUCH SCREEN:	**L/N/NT4683**	-	20mA
Scenario modules:	**F420**	-	20mA
SCS/SCS interfaces (on OUT):	**F422**	-	3mA
Sfera 2-wire B/W camera	**342510**	12mA	250mA
Sfera 2-wire Speaker unit	**342170**	25mA	75mA
PIVOT 2-wire video internal unit	**344102**	5mA	505mA

EXAMPLE 1

A calculation example is given below, considering the **Small house** diagram.

List of material	Quantity	Absorption (mA)
F500 Tuner	1	1 x 50
L4561 Stereo control	1	1 x 12
L4562 Flush-mounted amplifiers	8 (loaded with 2 diffusers, 16ohm each)	8 x 130
F441 A/V node	1	1 x 20
TOTAL		**1122**

EXAMPLE 2

A calculation example is given below, considering the Large house with 2-wire video door entry system diagram. When calculating the current absorbed during the video door entry call, consider the MUTE absorption of the flush-mounted amplifiers.

List of material	Quantity	Absorption with sound system	Absorption in video door entry call
F441 A/V node	1	1 x 20mA	1 x 20mA
F500 Tuner	1	1 x 50mA	1 x 50mA
L4561 Stereo control	1	1 x 12mA	1 x 12mA
L/N/NT4560 RCA input	1	1 x 12mA	1 x 12mA
L4562 Flush-mounted amplifiers	6 (with 2 16ohm diffusers)	6 x 130mA	6 x 40mA
L/N/NT4683 TOUCH-SCREEN	1	1 x 20mA	1 x 20mA
32510 Sfera 2-wire B/W camera	1	1 x 2mA	1 x 250mA
342170 Sfera 2-wire Speaker unit	1	1 x 25mA	1 x 75mA
344102 PIVOT 2-wire video internal unit	2	2 x 5mA	1 x 505mA
TOTAL		**941mA**	**1184mA**

To calculate the current margin consider the highest absorption, i.e. 1200 – 1184 = 16mA.

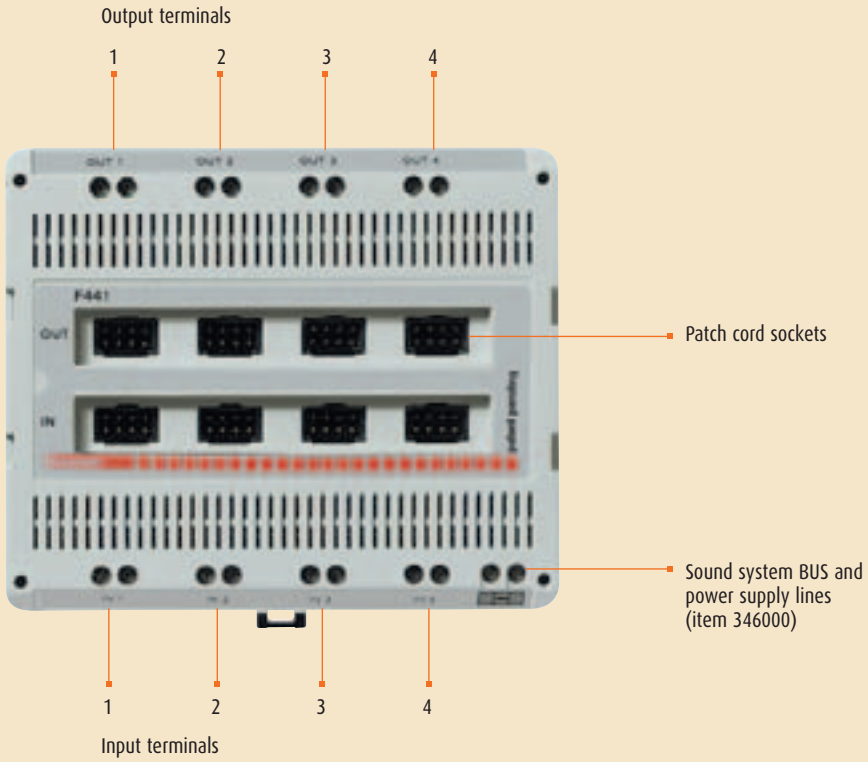
Audio/video node

AUDIO/VIDEO NODE ITEM F441

The audio/video node is a mixer which can distribute up to 4 sound sources. A series of terminals or patch cords item 4668/BUS... on the front part of the device can be used to wire the sound systems at the input of the sound sources and the amplifiers and controls at the output to the audio/video node.
The simultaneous use of connection terminals and the BUS connectors is not allowed.

Technical data

Supply voltage: 18 to 27 Vd.c.
Size: 6 DIN modules
Absorption: 20mA
No. of inputs available: 4
No. of outputs available: 4
Dissipated power: 0.5W
Operating temperature: 5°C to 45°C



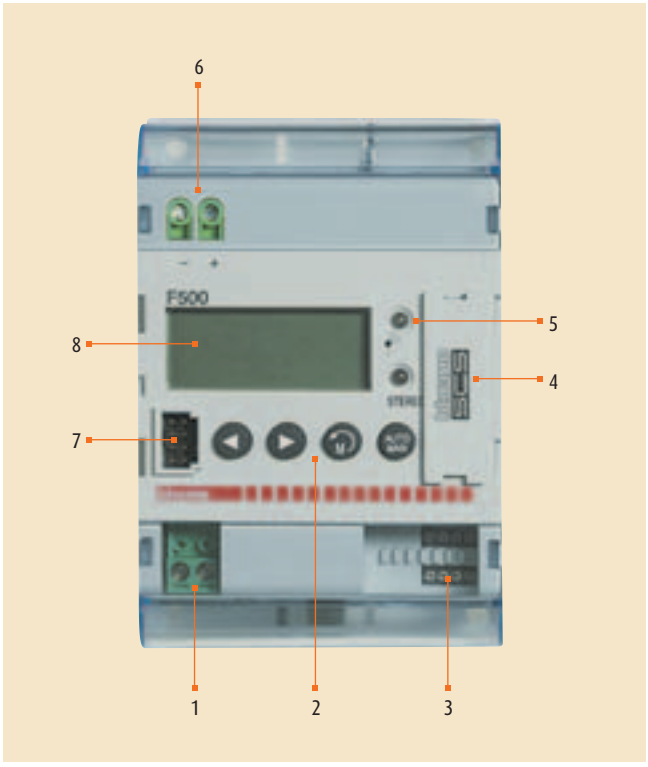
Sound sources

FM RADIO TUNER ITEM F500

The radio tuner can receive FM radio emissions. The front pushbuttons and the backlit display adjust the device locally, save 5 radio stations and display RDS messages and the tuned frequency.
The device can perform two types of search: manual or automatic.
The device can be managed (switch on/off, change frequency etc.) by flush-mounted amplifiers L4562 or by using correctly configured control devices item L4651/2 and/or TOUCH SCREEN item L/N/NT4683.
The tuner must be installed in a zone with sufficient signal to receive the radio emitters.

Technical data

Supply voltage from BUS: 18 to 27 Vd.c.
Extra supply voltage: 18 to 30 Vd.c.
Size: 4 DIN modules
Range: 87.5MHz to 108MHz
Dissipated power: 1W
Absorption:
• In stand-by: 12mA
• When working: 50mA (with extra 3mA power supply)
Operating temperature: 5°C to 45°C



Legend

1. pull-out terminal for connection to the BUS
2. radio tuner programming and radio programme scanning buttons
3. configurator sockets
4. housing for future expansions
5. radiophonic signal indication LED
6. terminal for extra power supply
7. terminal for connection to the BUS via patch cord
8. backlit display to show the frequency, RDS messages and saved stations

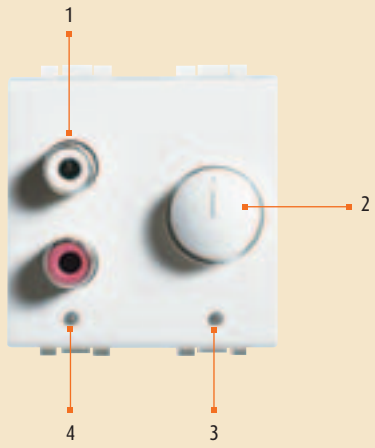
Configuration

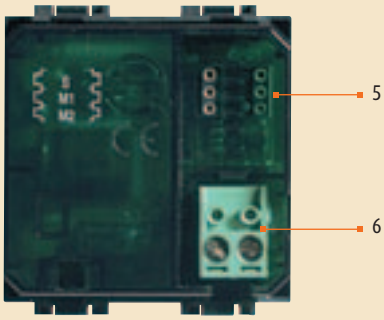
S1= 1-4 local address of the radio tuner source
S2= free socket for future expansions
M= free socket for future expansions

Sound sources

RCA INPUT ITEM L/N/NT4560

The device allows the interfacing and adaptation of the signal level of an external stereo audio source. It is connected with the audio signal by means of two RCA female connectors (red = right channel; white = left channel) on the front of the device. There is also a knob to adjust the input signal sensitivity and two LED to indicate the device state (ON/STANDBY) and the correct adjustment.
The device must only be connected to class II external sound sources (IEC EN 60065). These sources are identified by the double insulation symbol ⧈. Preamplified outputs should be used because their level is independent of the volume set on the external sound source amplifier. The earphone outputs should thus not be used.





Technical data

Supply voltage from BUS: 18 to 27 Vd.c.
Size: 2 modules
Absorption:
- In stand-by: 12mA max
- When working: 30mA

Operating temperature: 5°C to 45°C

Stereo audio features
- RCA input impedance: 14KΩ
- Input sensitivity: 100mVrms to 1Vrms
- TYP channel balancing: ± 0.5dB
- MIN channel balancing: ± 1.5dB
- Frequency range @ -3dB: 20Hz to 20Khz

Legend

1. RCA female connectors for stereo audio input
2. adjustment knob
3. LED for audio adjustment on the BUS of the sound system:
   - off: no audio signal
   - green: signal with minimum level
   - flashing orange: best adjustment
   - steady orange: signal too high
4. state indication LED
   - green: standby
   - orange: device ON
5. configurator socket
6. pull-out terminal for connection to the BUS

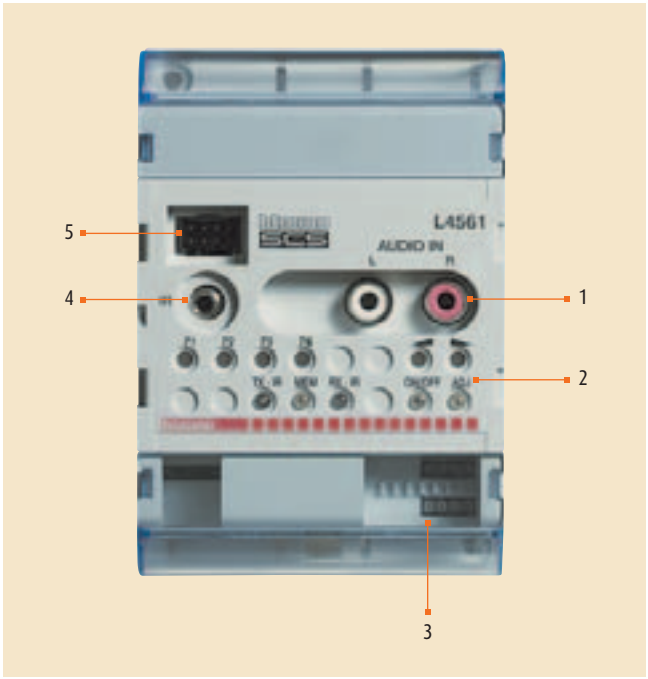
Configuration

S1= 1-4 local address of the sound source
M1= free socket for future expansions
M2= free socket for future expansions

Sound sources

STEREO CONTROL ITEM L4561

The device manages and interfaces an external stereo audio source (e.g. Hi-Fi system) with infrared remote control. The device can save and reproduce the commands given by the stereo source remote control. The commands saved by the stereo control are sent to the external stereo control through a cord with infrared transmitter (supplied). In this way one can, by means of the various control devices (special controls and TOUCH SCREEN) and the amplifiers, manage the switching on and control of the source (e.g. activation of the radio and scanning of the saved stations or activation of a CD reader and changing the CD track).
It is connected to the stereo source by means of two RCA/RCA connectors (white = left channel; red = right channel) on the front of the device (the RCA/RCA cable is supplied). As well as the RCA connectors on the front of the stereo control there are pushbuttons which, with the aid of an indication LED, adjust the audio signal entering the device. There are also 4 pushbuttons which are used to programme the stereo control and an infrared receiver which is used to save the signals from the source remote control.
During normal operation of the stereo control, when the device activates the Hi-Fi system, the loudspeakers directly connected to the system switch on as well. When the last amplifier switches off, giving an OFF command, the loudspeakers switch off but the Hi-Fi system remains active for one minute.
The device must only be connected to class II external sound sources (IEC EN 60065). These sources are identified by the double insulation symbol ⧈.
Preamplified outputs should be used because their level is independent of the volume set on the external sound source amplifier. The earphone outputs should thus not be used.



Technical data

Supply voltage from BUS: 18 to 27 Vd.c.
Size: 4 DIN modules
Absorption:
• In stand-by: 12mA
• When working: 40mA
Operating temperature: 5°C to 45°C

Stereo audio features
• RCA input impedance: 14KΩ
• Input sensitivity: 200mVrms to 1Vrms
• TYP channel balancing: ± 0.5dB
• MIN channel balancing: ± 1.5dB
• Frequency range @ -3dB: 20Hz to 20Khz

Legend

1. RCA female connectors for stereo audio input
2. buttons, LED and sensors to programme the stereo control and adjust the output audio on the BUS
3. configurator socket
4. jack input for connection of cable with IR sensor (supplied)
5. terminal for connection to the BUS by patch cord

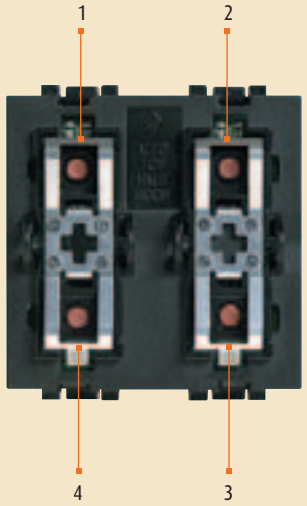
Configuration

S1= 1-4 local address of the stereo control source
M1= 1-4 configuration of however many devices must be controlled in the same device, max 4 (example Hi-Fi stereo with radio, CD reader etc....)
M2= 1-6 time which elapses between one command and the next during the switching on sequence (see instruction sheet)

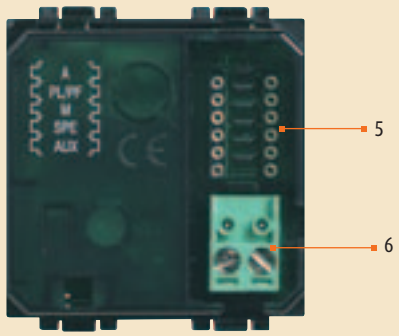
Control devices

SPECIAL CONTROL ITEM L4651/2

This device, correctly configured (SPE = 8), is used to send commands to manage the various devices such as amplifiers, FM tuners, external sound sources etc. on the BUS. In point to point or room configuration the special control can switch one or more amplifiers ON/OFF, manage the volume, change the source and cycle the saved stations (for the radio) or change the CD track. In general control configuration, the special control performs the commands just mentioned apart from managing the volume. The device is completed with 1 module button covers item L/N/NT4911...



Front view



Rear view

Technical data

Supply voltage from BUS: 18 to 27 Vd.c.
Size: 2 modules
Absorption: stand-by: 7.5 max
Operating temperature: 5°C to 45°C

Legend

1. control to switch on amplifier(s) (simple touch) and increase the volume (long press)
2. control to cycle and activate the available stereo sources
3. control to scan the emitters saved (for the radio) or the CD tracks
4. control to switch off amplifier(s) (simple touch) and decrease the volume (long press)
5. configurator socket
6. pull-out terminal for connection to the BUS

Configuration

A = 1-9 address of the amplifier room to be controlled
PL/PF = 0-9 address of the amplifier to be controlled
SPE = 8 sound playing mode

or

A = AMB room configuration
PL/PF = 1-9 address of the amplifier to be controlled (in this case all the amplifiers of the same room are controlled)
SPE = 8 sound playing mode

or

A = GEN this command activates all the amplifiers in the home
PL/PF = /
SPE = 8 sound playing mode

The single black control buttons inside the package are used for the sound playing mode.

Control devices

TOUCH SCREEN ITEM L/N/NT4683

This device can centralise and control all the functions of the MY HOME system (Sound System, Automation, Burglar-Alarm, etc.) at the touch of a finger. By interacting with various icons on the backlit display, previously configured with the Tidisplay software, you can select and activate the various sound sources, adjust the volume, select the radio stations to be listened to and read the RDS messages. A TOUCH SCREEN function allows using the Sound System as an alarm clock. After setting the time on the TOUCH SCREEN, the sound source set will switch on at the time set and the loudspeakers will switch on, first at a low sound level (20%) and then reaching a higher level (80%) after 2 minutes (automatic switching off). The alarm clock is switched off by touching the TOUCH SCREEN or the "OFF" pushbutton of an amplifier. The TOUCH SCREEN is easily installed on the wall using box item 506E and is completed with cover plates item L/N/NT4826...

Technical data

Supply voltage from BUS: 18 to 27 Vd.c. (from the BUS)
Size: installation on box 506E
Absorption: 20 mA
Operating temperature: 0°C to 40°C

Legend

1. terminal to connect the cable to the PC which is used to program the device
2. pull-out terminal for connection to the BUS

Front view

Rear view

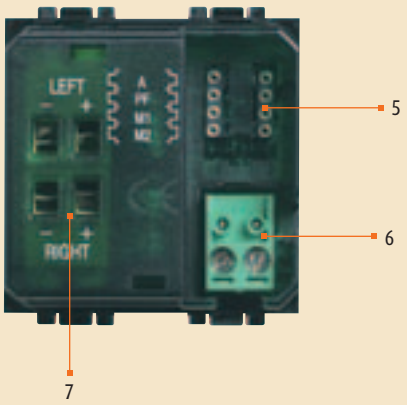
Amplifiers

STEREO AMPLIFIER ITEM L4562

This device amplifies the stereo signal on the BUS and controls up to two loudspeakers with impedance between 8Ω and 16Ω. On the front the amplifier has two pushbuttons which can: switch the loudspeakers ON/OFF, adjust the volume in output, change the audio source and cycle the saved stations (for the radio) or save the CD tracks.
Correctly configured the amplifier can have two modes:
- "FOLLOW ME" mode: function which allows the same music in another room after the amplifier of the room previously occupied has been switched off and switching on the amplifier on the room you are now in.
- "NO FOLLOW ME" mode: when another amplifier is switched on, on changing room, the source configured the same as the configurator (inserted on M2) inserted on the amplifier switches ON, not necessarily the source which was being listened to before.

The device is completed with 1-module button covers item L/N/NT4911...

Front view



Rear view

Technical data

Supply voltage from BUS: 18 to 27 Vd.c.
Size: 2 modules
Absorption:
• In stand-by: 6mA max
• When working: see table in the absorption calculation section
Operating temperature: 5°C to 45°C

Stereo audio features:
• Power (on 8Ω): 2Wrms (1Wrms + 1Wrms)
16Wpmpo (8Wpmpo + 8Wpmpo)
• TYP channel balancing: ± 0.5dB
• MIN channel balancing: ± 1.5dB
Frequency range @ -3dB: 20Hz to 20Khz
TYPS distortion: 0.1%
Noise signal ratio: 68dB

Legend

1. control to switch on the amplifier (simple touch) and increase the volume (long press)
2. control to cycle and activate the available stereo sources
3. control to scan the emitters saved (for the radio) or the CD tracks
4. control to switch off the amplifier (simple touch) and decrease the volume (long press)
5. configurator socket
6. pull-out terminal for connection to the BUS
7. screw terminals for connection of the loudspeakers

Configuration

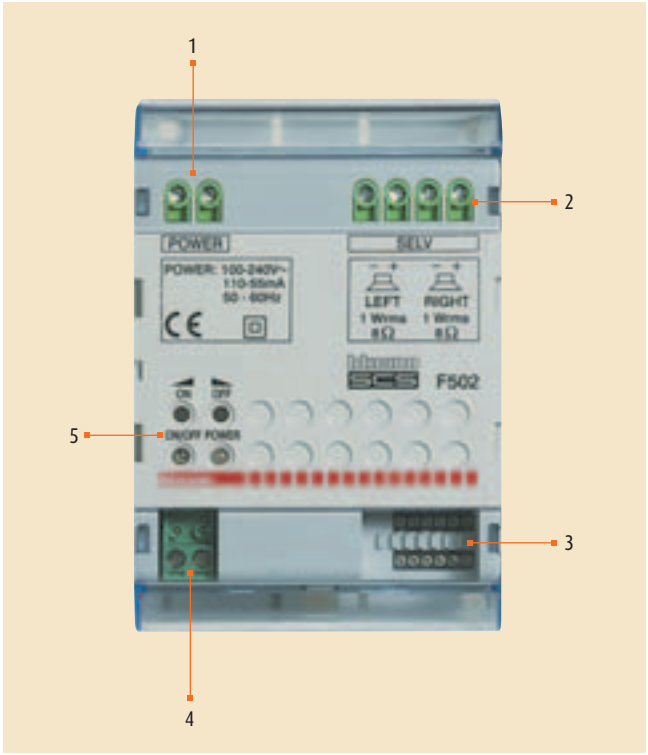
A = 1-9 address of the amplifier room to be controlled
PL = 0-9 address of the amplifier to be controlled
M1 = free socket for future expansions
M2 = - (no configurator) when the amplifier is switched on, the last source which was ON will switch on, "FOLLOW ME" mode
= **1-4** when the amplifier is switched on, the source with the same configuration as that set on the device itself (example amplifier with M2 = 2, in this case the source with S=2 switches on), "NO FOLLOW ME" mode.

Amplifiers

AMPLIFIER FOR DIN RAIL ITEM F502

This device, with hook for installation on DIN rail, allows installations mainly in rooms of the service sector. Supplied directly at 230Va.c. it allows multiple installations (maximum 40 amplifiers and 80 loudspeakers), thanks to the low current absorption on the BUS (5mA).
Correctly configured you can have both a stereo and a mono signal in output from the device to the loudspeakers. This type of amplifier can be connected to 8Ω and 16Ω loudspeakers.
The amplifier can have two modes:
- "FOLLOW ME" mode: function which allows the same music in another room after the amplifier of the room previously occupied has been switched off and switching on the amplifier on the room you are now in.
- "NO FOLLOW ME" mode: when another amplifier is switched on, on changing room, the source configured the same as the configurator (inserted on M2) inserted on the amplifier switches ON, not necessarily the source which was being listened to before.

The device can be controlled either directly by means of the buttons on the front, or by the TOUCH SCREEN or by special controls item L4651/2.



Technical data

BUS voltage: 18 to 27Vd.c.
Supply voltage: 110 to 230Va.c. (50-60Hz)
Size: 4 DIN modules
Absorption:
• On the Power terminal: 110mA (a 110Va.c.) - 56mA (at 230Va.c.)
• On the BUS: 5mA
Operating temperature: 5 to 45° C

Stereo audio features:
• Power (on 8Ω) = 2Wrms (1Wrms + 1Wrms)
16Wpmpo (8Wpmpo + 8Wpmpo)
• TYP channel balancing: ± 0.5dB
• MIN channel balancing: ± 1.5dB
• Frequency range @ -3dB: 20Hz to 20Khz (on 8Ω)
Dissipated power: 2W

Legend

1. terminal for connection of the power supply
2. terminals for connection of the loudspeakers
3. configurator socket
4. pull-out terminal for connection to the BUS
5. The pushbuttons under "ON" and "OFF" are used:
   - the "ON" pushbutton to switch on the amplifier (simple touch) and to increase the volume (long press)
   - the "OFF" pushbutton to switch off the amplifier (simple touch) and to decrease the volume (long press). The LED positioned under the pushbuttons indicate:
   - the LED under "ON/OFF" indicates the amplifier state: if it is OFF there is no BUS, if it is GREEN the device is in Stand-By, if it is ORANGE the amplifier is ON
   - the LED under "POWER" indicates: if it is OFF there is no voltage on the POWER terminal, if it is RED the amplifier is switched on.

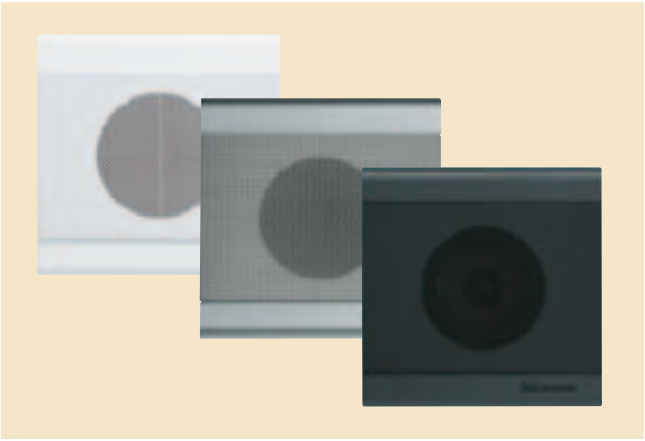
Configuration

A = 1-9 address of the amplifier room
PL = 0-9 address of the amplifier
M1* = - (no configurator) supplies 20% of the maximum volume
= 2 supplies 50% of the maximum volume
= 4 supplies 100% of the maximum volume
M2 = - (no configurator) when the amplifier is switched on, the last source which was ON will switch on, "FOLLOW ME" mode
= 1-4 when the amplifier is switched on, the source with the same configuration as that set on the device itself (example amplifier with M2 = 2, in this case the source with S=2 switches on), "NO FOLLOW ME" mode.
M3 =1 both outputs play the signal received on the LEFT channel
=2 both outputs play the signal received on the RIGHT channel
=3 the amplifier plays a mono signal received on both loudspeaker outputs

* Configure M1 only if the sound system is integrated with the video door entry system.

Loudspeakers

FLUSH-MOUNTED LOUDSPEAKERS ITEM L/N/NT4565



Technical data

Type: broadband
Power: 6Wrms/12W musical
Impedance: 16Ω
Frequency range: 160 to 16kHz
Sensitivity: 80dB (1W/1m)
Feature: loudspeaker to be installed in flush-mounted boxes item 506E

WALL-MOUNTED LOUDSPEAKERS ITEM L4567

Technical data

Type: 2 way
Power: 20Wrms/40W musical
Impedance: 8Ω
Frequency range: 75 to 20kHz
Sensitivity: 88dB (1W/1m)
Weight: 1 Kg
Feature: shallow loudspeaker to be installed on the wall (complete with fastening screw and 4 m of cable)
Dimensions: 271 x 184 x 37 mm

CEILING-MOUNTED LOUDSPEAKERS ITEM L4566

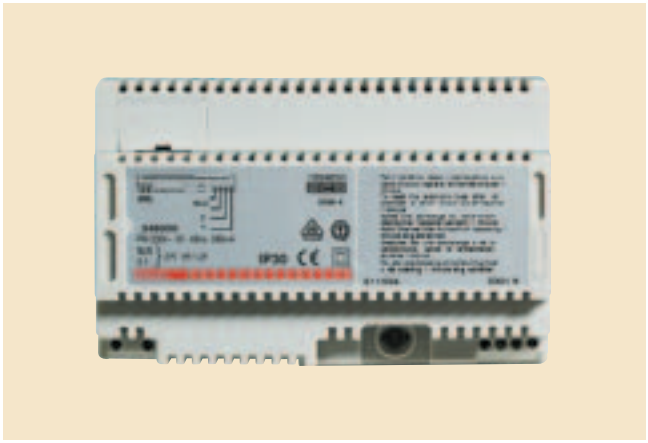
Technical data

Type: 2 way coaxial
Power: 50Wrms/100W musical
Impedance: 8Ω
Frequency range: 50 to 20kHz
Sensitivity: 88dB (1W/1m)
Weight: 1.7Kg
Feature: loudspeaker to be installed on the ceiling
Diameter mounting hole: 210 mm
External diameter: 240 mm
Depth: 140 mm

Power supplies

POWER SUPPLY ITEM 346000

Power supply for the video door entry system and the sound system components: audio/video node, flush-mounted amplifier, special controls, radio tuner and interfaces for external stereo sources.

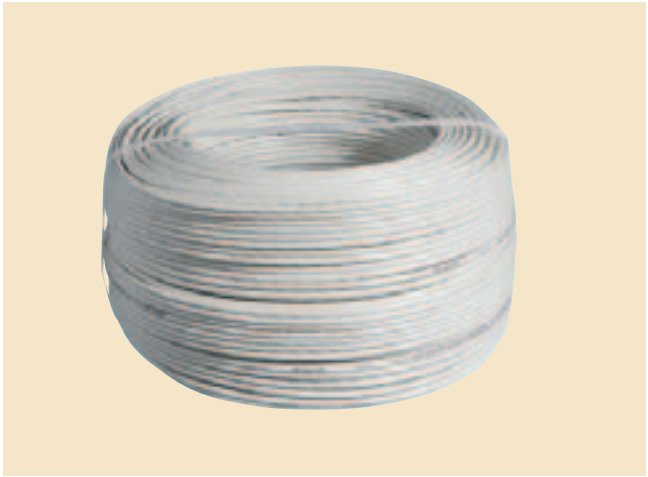


Technical data

Device with double insulation ⧈
Maximum current which can be supplied: 1200mA
Size: 8 DIN modules
Input voltage: 230Va.c. 50Hz
Output voltage:
• BUS terminal: 27 V
• Terminals 1 and 2: 27 Vd.c.
Dissipated power: 9W

CABLE ITEM 336904

Cable with 2 twisted conductors which can be buried in piping – corresponds to the standards (IEC 20-13 and IEC 20-14), 200 metre coil.

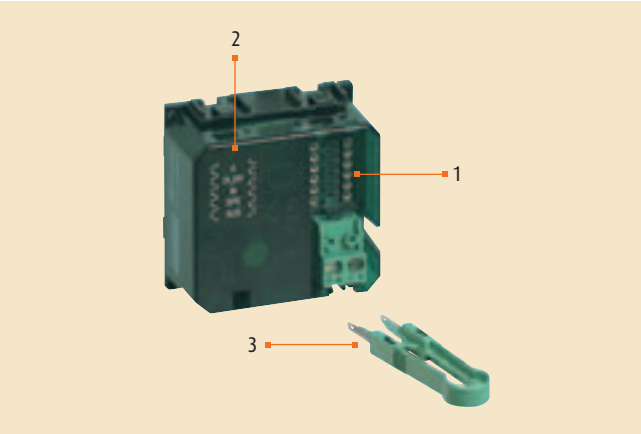


Technical data

Outer sheath:
- white RAL 9010
- external diameter max 5 mm
- on the sheath there is a measurement indicator with metric progression as well as the indication of the year of production
Cross-section of the single conductors: 0.50 mm^2
Electrical resistance: < 45Ω / km a 20° C
Operating temperature: -15°C to +70°C

Device configuration

So that each Sound System device can perform its function correctly, it must be correctly configured to define:
- the device address in the system (what it is);
- its mode of operation (what it must do).
This operation is performed by inserting configurators differentiated by number and letter in the device sockets.



Legend

1. configurator socket
2. description of the configurator sockets
3. tool to insert the configurator

ADDRESSING THE DEVICES

To understand the device addressing logic some terms which will occur frequently in this guide should be defined.

Address of the local amplifiers (item L4562)

- **(A) = Room**
set of amplifiers belonging to a logical zone (in a home, for example, the living room, bedroom, etc...)
- **(PF) Sound point**
number identification (1 – 9) of each amplifier inside the Room (A)
- **(M1 e M2) = mode**
sockets for special configurations

Amplifier addressing mode

Type of command	Amplifiers	
	Configurator socket	Configurator value
Point – point	A	1 - 9
	PL	1 - 9
Room	A	1 - 9
	PL	1 - 9
General	A	1 - 9
	PL	1 - 9

Address of the special controls (item L4651/2)

- **(A) = Room**
if correctly configured can control either a single amplifier (configurator 1 – 9) or a set of amplifiers (AMB configurator) or become a general switching on point (GEN configurator) of all the amplifiers, even configured with different rooms.
- **(PF/PL) = Sound point/light point**
number identification (1 – 9) of each amplifier inside the Room (A) or if configured differently can manage the switching on of the all amplifiers on a whole room (the room concerns the number from 1 – 9 inserted in socket "A" of the amplifier).
- **(SPE)**
for operation in the Sound System must be configured with the number "8".

Special control addressing mode

Type of command	Special control	
	Configurator socket	Configurator value
Point - point	A	1 - 9
	PL/PF	1 - 9
Room	A	AMB
	PL/PF	1 - 9
General	A	GEN
	PL/PF	

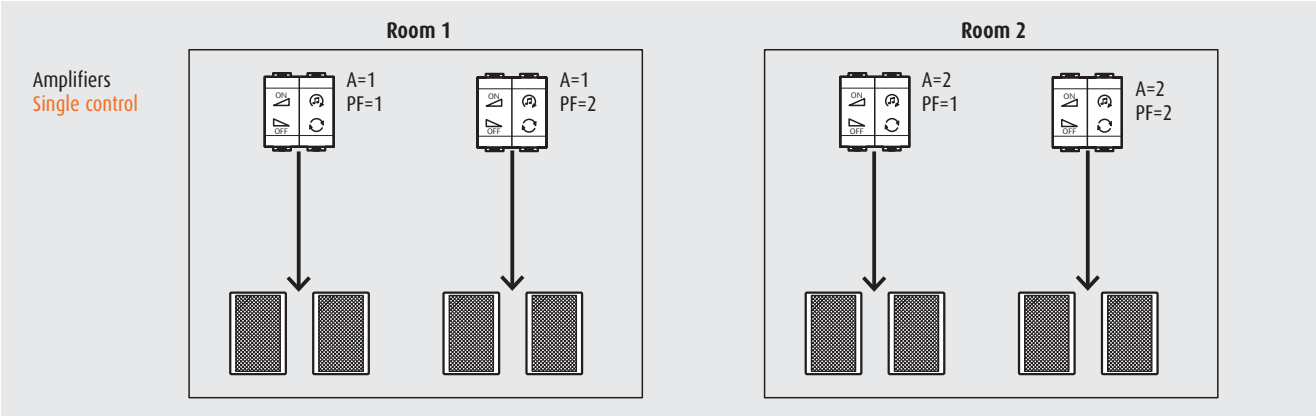
Address of the sound sources

- **(S) = Source**
Number identification (1 – 4) of the single sound source in the Sound System.

Configuring the devices

SINGLE CONFIGURATION

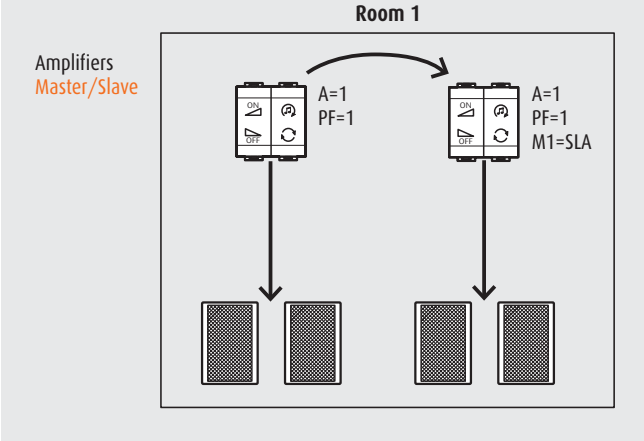
Using only the amplifiers, without them being controlled by special controls or TOUCH SCREEN, the devices are configured on sockets **A** and **PF**.



MASTER/SLAVE CONFIGURATION

Using 2 amplifiers configured with:
- 1st amplifier: **A=1, PF=1**
- 2nd amplifier: **A=1, PF=1, M1=SLA**

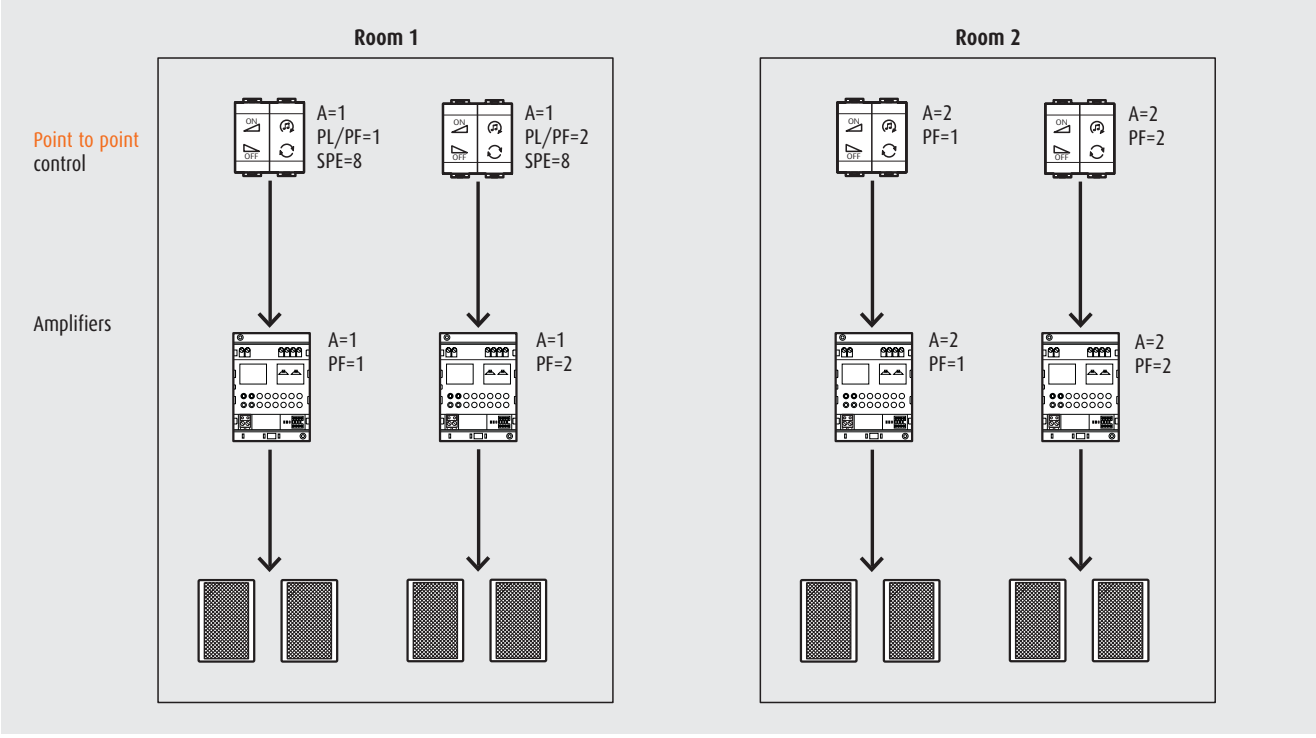
If the volume is adjusted on one amplifier, it is automatically adjusted on the other amplifier as well. Any command performed on one amplifier takes place on the other amplifier.



POINT TO POINT CONFIGURATION

This configuration uses the special controls or a TOUCH SCREEN to control the amplifiers remotely.
Configuring the special control:
- **A=1**
- **PL/PF=1**
- **SPE=8** (sound system mode)

on pressing the special control buttons, the device sends its command to the configured amplifier.
- **A=1**
- **PF=1**



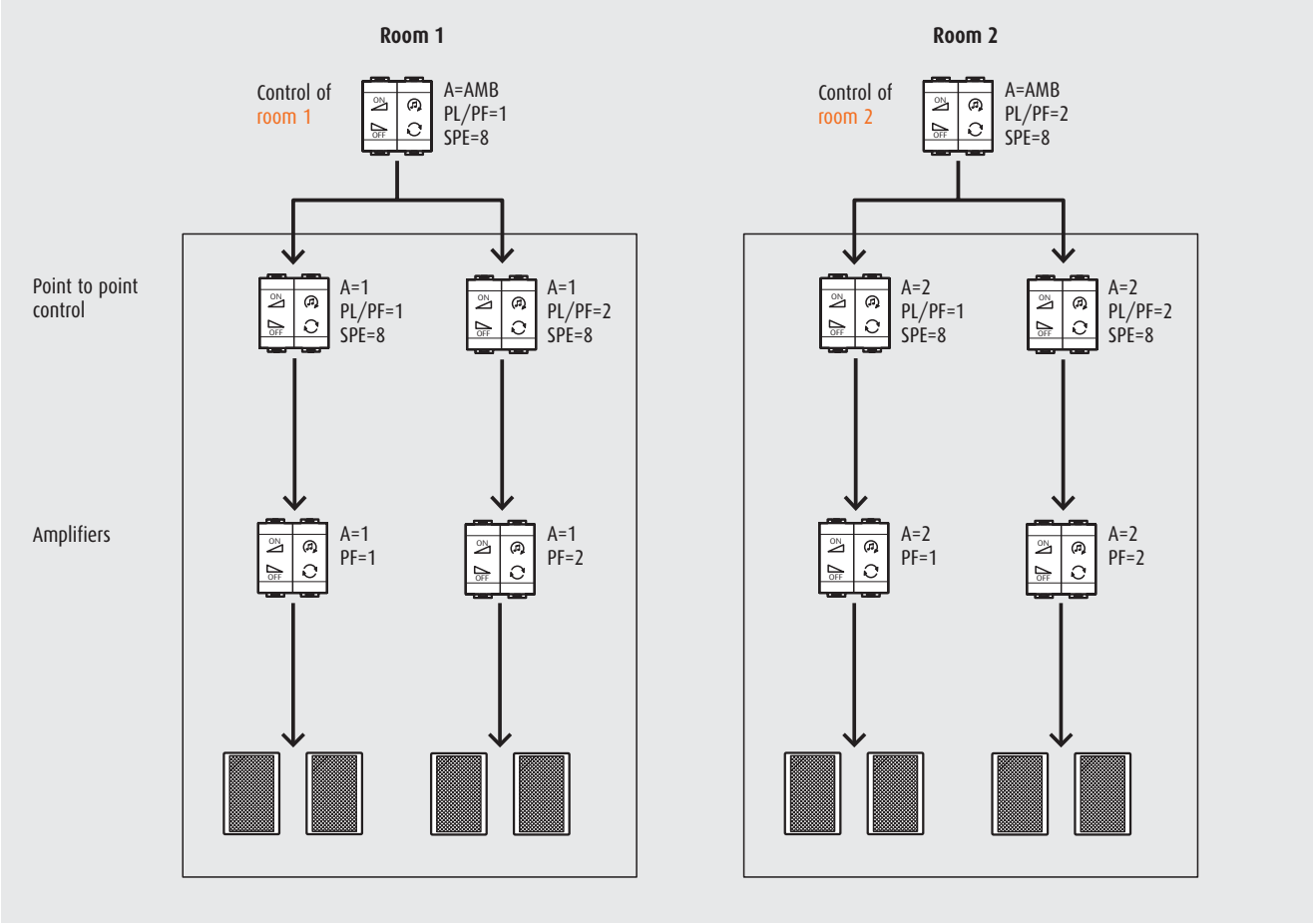
Configuring the devices

CONFIGURATION FOR ROOM CONTROL

A configuration which is only performed on the special controls or when programming the TOUCH SCREEN. All the management commands on amplifier item L4562 can be performed. Configuring the device:

- **A=AMB**
- **PL/PF=1**
- **SPE=8**

Pressing the device buttons affects all the amplifiers configured with **"A"**, the same as the configurator positioned on the device **"PL/PF"** (in this case all the amplifiers with A = 1).



CONFIGURATION FOR GENERAL COMMAND

A configuration which is only performed on the special controls or when programming the TOUCH SCREEN. All the management commands can be performed as in the room control configuration apart from adjusting the volume.
Configuring the device:

- **A=GEN**
- **PL/PF=** (in this situation the PL/PF is not configured)
- **SPE=8**

This configuration lets the device act on the operation of all the amplifiers inside the room independent of the type of amplifier configuration.

Positioning the loudspeakers

When designing the Sound System the correct positioning of the listening points must be identified.
A precise layout of the loudspeakers in fact guarantees better sound quality and balance in the whole room.
Rules to be applied to identify the number of loudspeakers to install are given below.

ROOM IN THE HOME AND SMALL SERVICE SECTOR

The distances to adopt to position loudspeakers and the areas which BTicino loudspeakers cover are given below, as a function of the sound quality for a room in the home. For rooms in the small service sector, the sound level required is on average lower than in the home. In this case it is assumed that a loudspeaker covers double the area.

Positioning the loudspeakers

Description	Distance (m)
Distance between loudspeakers (A)	2-4
Distance from the floor (B)	1-2.5
Distance between loudspeaker and listener (C)	2-4

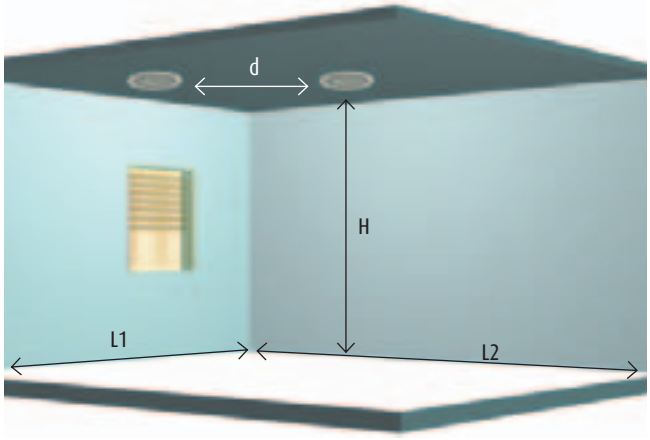
Loudspeaker coverage

Type of loudspeaker	Area covered by the loudspeakers			
	In the home		In the small service sector	
	GOOD	SUFFICIENT	GOOD	SUFFICIENT
L4565 (flush-mounted box item 506E)	3m²	7m²	-	-
L4567 (wall-mounted)	5m²	12m²	10m²	24m²
L4566 (ceiling-mounted)	6m²	15m²	12m²	30m²

ROOM IN THE SMALL SERVICE SECTOR

If a Sound System is to be installed in a room of the small service sector, the type of room where the system is to be installed must be identified. When positioning playing points remember:
- The height from the playing point (H)
- The area to be covered (S)
- The distance between the playing points (d)
- The distance between the listener and the playing point (D)

Identifying the room and calculating the playing points

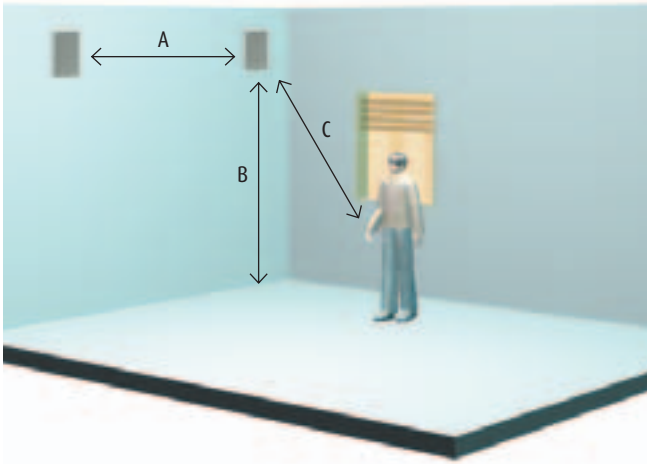


The table gives the recommended distances between the ceiling-mounted loudspeakers referring to the room height.

Location of the loudspeakers item 4566

H (m)	2.5	3	3.5	4	4.5
d (m)	3	4	5	6	7

The loudspeakers should be at a height of 1m near to listening points where people are seated. Instead use a height of 2.5m near to listening points where people are standing (e.g. waiting room.).



Level of room sound coverage

Type of room	Sound coverage value (dBA)	Type of surroundings (dBA)	Sound coverage value
Mechanical industry	80	Shopping centre	60
Mechanical workshop	75	Café	60
Gymnasium	70	Shop	60
Conference room	70	Restaurant	55
Electronics industry	70	Meeting room	55
Supermarket	65	Hotel corridors	55
Fast-food outlets	65	Offices	55
Warehouses	65	Museums	50
Places of prayer	65	Hotel rooms	40

The formula to apply to obtain the number of loudspeakers to be installed in a room on the basis of its total area is given below.

$$N = \frac{L_1 \times L_2 - [(L_1 \times d) + (L_2 - d) \times d]}{d^2}$$

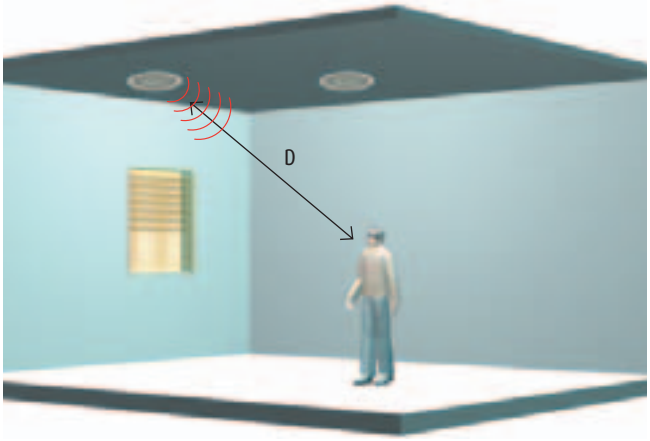
Legend:
N: playing points
L1 e L2: length of the sides of the room to be covered
d: distance between the loudspeakers referring to the room height (see table above)

Example: $N = \frac{20 \times 40 - [(20 \times 7) + (40-7) \times 7]}{7^2} = 8.8$ I consider **N=10**

Legend: **L1:** 20m² - **L2:** 40m² - **H:** 4.5m from the table one obtains **d:** 7

Positioning the loudspeakers

Calculating the attenuation and checking the sound level
Another feature to be considered to cover a room correctly is the sound level. In fact the sound level of a loudspeaker decreases as the distance between loudspeaker and listener increases. When calculating the attenuation leave a margin of 10dB with respect to the values indicated above (e.g. electronic industry 80dB + 10dB).
If distance **D** is known the attenuation can be obtained:



Attenuation

D (m)	Attenuation (dB)
1	0
2	-4
4	-8
8	-12
16	-16

Checking the sound level

LSA + 10dB > S + A

Legend:

LSA = room sound level (see "sound coverage level" table)
10dB = margin to be added
S = sensitivity of the loudspeakers (dB)
A= attenuation as a function of the distance between the loudspeaker and the listener (see "attenuation" table)

N.B. When there are metal iodide lamps or sodium vapour lamps at high and low pressure (loads A) lay the wiring respecting the following rules:
1. to supply Loads A use power cables with minimum insulation 300/500V;
2. provide a dedicated power line for amplifiers F502;
3. keep "power line Loads A" and "BUS line or power line F502" separate by at least 1 m;
4. wire the loudspeakers with twisted cables (e.g. Item 336904);
5. keep the wiring to the loudspeakers as short as possible positioning the F502 amplifiers near the loudspeakers.

Failure to respect the above rules may affect correct operation of the devices.

EXAMPLE OF THE SOUND LEVEL CALCULATION

Some examples for identifying the sound level are given below.
If when calculating the sound level the value obtained is greater by a small margin (2 – 4dB) we have sufficient sound coverage for the room. If it is smaller the possibilities are as follows:

1. put two loudspeakers close together at each playing point (this gives an equivalent loudspeaker with sensitivity +6dB greater than that of the single loudspeaker);
2. put four loudspeakers close together at each playing point (this gives an equivalent loudspeaker with sensitivity +12dB greater than that of the single loudspeaker).

1st example

The first example refers to a shop showroom with the following features:

H = 3,5m thus d = 5m
L1 = 10m^2
L2 = 20m^2
shop showroom = 60dBA + 10dB = 70dBA

From the data one obtains:
N = 3
d = 5
locating 3 loudspeakers one obtains D = 12

Attenuation (D = 12m) = -14dB
Loudspeaker sensitivity = 88dB
Sound level required = 74dBA (perfect sound coverage)

2nd example

The second example refers to a electronics industrial site with the following features:

H = 4,5m thus d = 7m
L1 = 20m^2
L2 = 40m^2
electronics industry = 70dBA + 10dB = 80dBA

From the data one obtains:
N = 10
d = 7
locating 10 loudspeakers one obtains D = 6

Attenuation (D = 6m) = -10dB
Loudspeaker sensitivity = 88dB
Sound level required = 78dBA (insufficient sound coverage)

As the sound level calculated is insufficient, just put two loudspeakers close together at each playing point (giving an equivalent loudspeaker with sensitivity +6dB greater than that of the single loudspeaker) and the sound coverage is found to be sufficient.

Attenuation (D = 6) = -10dB
Loudspeaker sensitivity = 88dB + 6dB
Sound level required = 78dBA (perfect sound coverage)

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