

Acoustics | Clocks | Evacuation



Sound!

The planning aid for PA systems



Swiss Made

Often invisible. But always loud and clear. For over 40 years now, the innovative ideas of g+m elektronik ag have been right at the heart of things. Our electro-acoustic developments set standards on the markets time and time again. Well beyond the boundaries of Europe.

Our brand name stands for Swiss values and for Swiss quality. Lasting and forward-looking. We develop, design and produce trend-setting solutions which have made us what we are with the well-founded expertise so typical of our company: They have made us the market leader.

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Acoustics fundamentals

What actually is sound? By «sound», we mean a mechanical oscillation that is propagated in solids, air, water or gas. **Scientifically speaking, the oscillation is referred to as a periodic, high-speed pressure fluctuation caused by a sound source.**

Sound may be transmitted in two ways: naturally or in the form of electrical signals, i.e. energy. The sound waves are propagated in the same direction as they originate in each case and spread unhindered. The sound waves are propagated in longitudinal direction in liquids and gases. Sound is not transmitted in a vacuum owing to the lack of a medium. Such a vacuum is used, for instance, in windows for sound insulation in order to interrupt the sound waves.

The magnitude of the sound wave designates the strength of the pressure fluctuations. It is termed sound pressure and is measured in decibels (dB). The sound pressure may differ extremely – from a rustling leaf to take-off of a jet aircraft. The number of oscillations per second is termed frequency and is measured in Hertz (Hz). At the same time, the frequency determines the pitch. The human ear can hear frequencies from 20 to 20'000 Hz. The lower limit is referred to as auditory threshold and the upper limit is referred to as pain threshold. Sound waves below 16 Hz are referred to as subsonic or infrasound and sound waves over 20'000 Hz are referred to as ultrasound.

Both the auditory threshold and the pain threshold are independent of frequency. A higher acoustic energy must be expended in order to exceed the thresholds in the lower and upper frequency ranges. The energy expenditure is less in the medium frequency range, and so the pain threshold is reached faster.

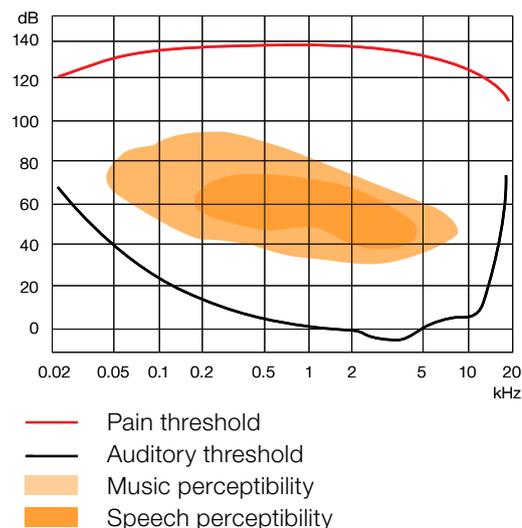
This may be a human voice or a musical instrument.

In this case, we speak of acoustics. If the sound is converted to electrical signals or if electrical signals are converted to sound waves, we speak of electroacoustics.

Definition of electroacoustics

Sound

Auditory sensation area



On the *Auditory sensation area* diagram, the orange-coloured area shows the frequency range in which human speech is perceived intelligibly. If external noise sources, e.g. ambient noise, superimpose this speech information, the volume needs to be increased. Alternatively or in addition, it is possible to reduce the distance between the sound source (e.g. loudspeaker) and the hearer so as to maintain intelligibility of the speech information.

If we double the sound power measured in Watts, it is perceived as a volume difference which is just discernable in the sector of voice or music. Multiplying the sound power by ten is perceived by the human ear as a doubling of the volume.

Room acoustics

Achieving the right sound in a room has a major influence, e.g. on the public in a theatre or concert hall. But it is exactly the same for conversations in a restaurant and announcements in a shopping centre or in a station. We encounter the challenges of sub-optimal room acoustics everywhere in day-to-day life.

Consequently, the room-acoustics conditions play an essential role for an electroacoustic or PA system. The sound is propagated radially starting from a sound source. Part of the sound waves is reflected by the walls in a closed room or area and part is absorbed depending on the fixtures and fittings.

If the reflected sound predominates over the direct sound and does not die away too quickly, this may be perceived as pleasant in the case of musical performances, such as organ recitals. By contrast, in the case of voice transmission, the reflected sound leads to a clear reduction in intelligibility.

Structural conditions in a room can easily become obstacles in the sound field. This relates to columns for instance which substantially disturb sound propagation. The sound is reflected, scattered or deflected by the relevant obstacle.

Echo

Everyone knows the effect from the mountains: our ears perceive a sound twice, with a slight time difference. We speak of an echo. But in fact we have heard the actual sound and the greatly delayed reflection of its sound wave separately. Our ear is able to perceive such an echo if the time between the original sound and the sound reflection is at least 20 milliseconds. So-called early reflections occur within this delay time.

If loudspeakers for instance are installed more than 17 metres apart, it is very probable, at a speed of sound of 330 metres per second, that an echo will be produced. This necessarily has a very disturbing effect on intelligibility.

We speak of a flutter echo if an echo is repeated at time intervals of 50 to 100 milliseconds. It is frequently concave surfaces, for example balconies or galleries in the room, which amplify such an echo.

Reverberation

The most important physical variable for electroacoustics in a room is the reverberation time. It defines the time that passes until the sound level has dropped by 60 dB. If the level of a sound event in a room is 90 dB, this means a remaining sound of 30 dB after a 60 dB drop. This remaining sound corresponds to the normal background noise of a large room.

Of course, the volume, the room occupancy and the sound-absorption capacity of a room determine its reverberation time.

The reverberation time is independent of frequency since different materials absorb the sound to differing extents. The absorption capacity of wall coverings, interior fixtures and fittings is as follows:

- poor: glass surfaces, marble and fair-faced plaster
- good: wood surfaces, rough plaster and parquet flooring
- very good: carpets and acoustic elements

An increased sound-absorption capacity is more advantageous in electroacoustics for transmission of voice signals. It reduces the reverberation time and increases syllable intelligibility. This applies for instance to auditoria, lecture theatres, conference rooms or classrooms. The higher sound absorption can be compensated for easily by a higher acoustic power.

Voice intelligibility

Voice intelligibility is one of the most important criteria when selecting the acoustic properties of a room. An intelligibly transmitted word can save human life in an emergency or assist concentration of those listening at an event of some kind. In electroacoustics, voice intelligibility is dependent on many factors: the frequency response of the transmission path, ambient noise, reverberation time, echo, quality and directional characteristic of the loudspeakers, the volume of the voice signal and the psycho-acoustic masking effects.

An internationally standardised, physical measuring method is used to guarantee the voice intelligibility of electroacoustic and PA systems:

STI (Speech Transmission Index). In this case, a measuring microphone receives a test signal which is analysed by an STI measuring instrument as regards its voice intelligibility.

The minimum value for electroacoustic emergency-warning systems in accordance with the User Standard must be 0.5 or higher on the STI evaluation scale.

STI value

0.00–0.30	poor
0.30–0.45	weak
0.45–0.60	appropriate
0.60–0.75	good
0.75–1.00	excellent



Sound pressure conditions

Ambient noise has a substantial influence on the voice intelligibility: it is referred to as disturbing noise. The User Standards prescribe for instance that the announcement of a voice alerting system must be at least 10 dB above the disturbing noise level.

Doubling the distance from the sound source reduces the noise level by 6 dB.

Dist. from the sound source	Sound pressure	Remarks
1 metre	0 dB	Reference point (90 dB / 1 m)
2 metres	-6 dB	Corresponds to 1/2 of the original sound pressure
4 metres	-12 dB	Corresponds to 1/4 of the original sound pressure

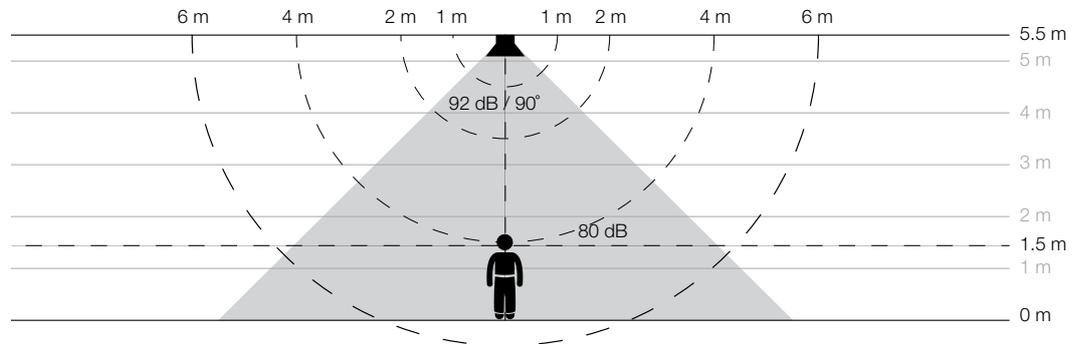
Example sought minimum sound pressure, loudspeakers

To define the sound pressure (dB) of the loudspeaker we require:

- The volume at the listener's location
- The required sound level in the auditory plane

Example: shopping centre with a room height of 5.5 m

Measured sound level, environment 70 dB_{SPL}
 Disturbing noise level, distance +10 dB_{SPL}
Required minimum sound pressure 80 dB_{SPL}



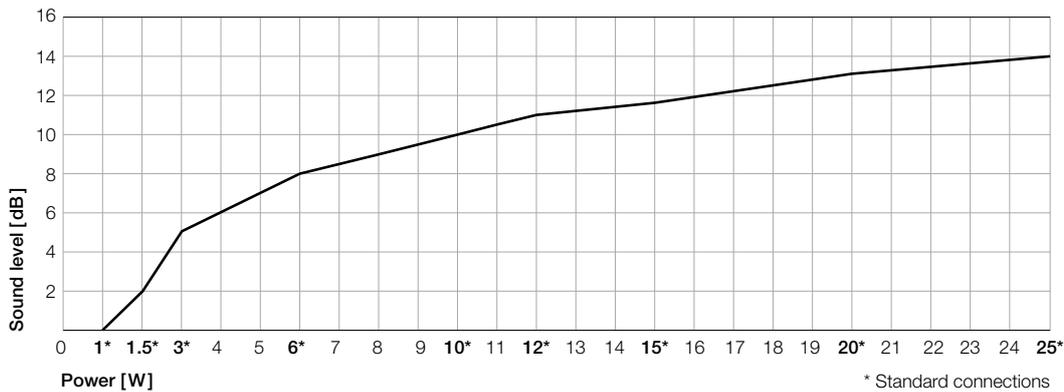
Sought sound pressure dB_{SPL} and power for loudspeaker

Required minimum sound pressure 80 dB_{SPL}
 Sound pressure reduction at 4 m (5.5 - 1.5 m) +12 dB_{SPL}
 Sound pressure for angle reserve + 6 dB_{SPL} (Guideline value)
Required sound pressure for loudspeaker 98 dB_{SPL}

e.g. omnidirectional speaker with nominal sound pressure (1 W / 1 m) 92 dB_{SPL} / 90°
 Required power for sound pressure 98 dB_{SPL} are 5 W (see power calculation curve)

On the selected speaker, the sound pressure must be increased by means of the power.
We choose the 5 W power rating and so we increase the sound pressure by +7 dB.

**Power calculation,
loudspeakers**



Doubling the power increases the sound level by 3 dB

To determine the number of loudspeakers in a room we require:

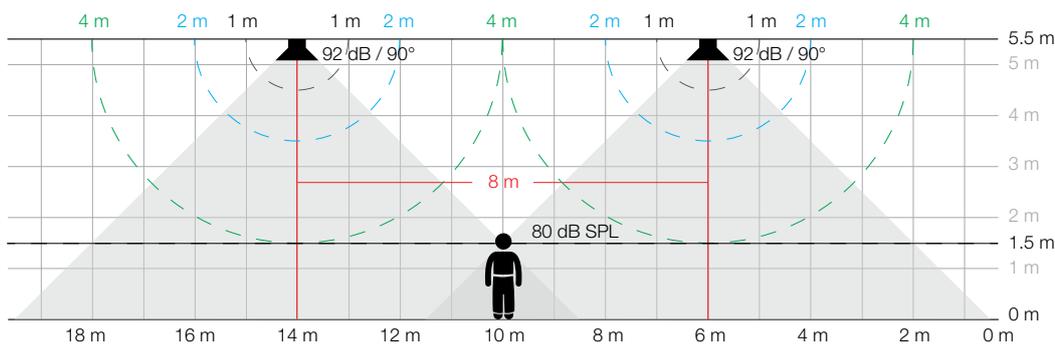
- The room height or ear height
- The radiation angle

**Example calculation
of the number of
loudspeakers**

Example for a shopping centre:

- Room height = 5.5 m, Ear height = 1.5 m
- Radiation angle: $\alpha = 90^\circ$

Calculating the loudspeaker spacing: $2 \times \tan\left(\frac{\alpha}{2}\right) \times 4 \text{ m (Room height - Ear height)} = 8 \text{ m}$



100 V systems

Fundamentals

In the case of signal transmission via a 100 V amplifier, the voltage and impedance are increased – and this greatly reduces the current. This allows the use of relatively small cable cross-sections even over large distances. Not infrequently, large systems consist of well over 100 loudspeakers of greatly varying designs and power ratings.

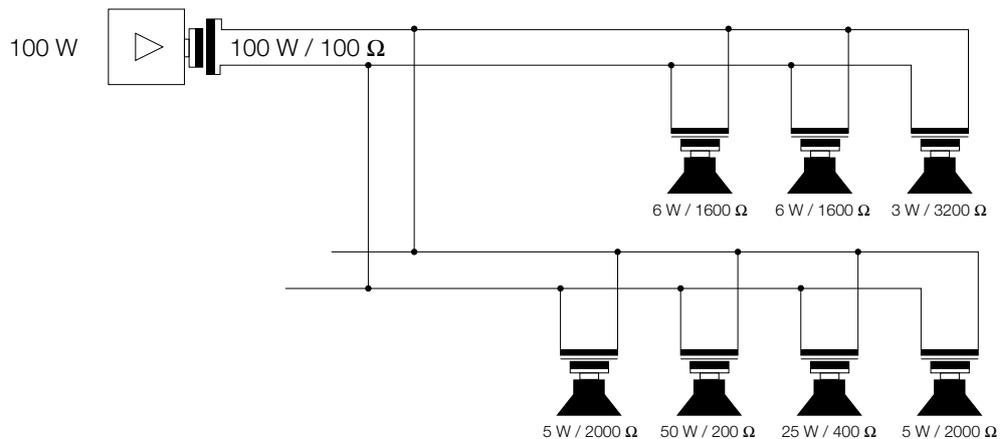
Consequently, 100 V systems offer the following advantages in the case of complex PA systems with a large number of loudspeakers:

- Matching impedance is simplified
- Only individual loudspeakers fail if there is a loudspeaker defect
- The power losses are reduced if cable paths are long

Example circuit

If 100 V loudspeakers are connected in parallel, only the actual loudspeaker in question is affected in the case of a defect – so there is only a minimal impedance shift.

Example circuit



Power at the speaker in Watts with a 100 W / 100 V amplifier

Power losses

Cable length	4 Ω Loudspeaker					8 Ω Loudspeaker					100 V Loudspeaker				
Specifications in metres	Specifications in mm ²					Specifications in mm ²					Specifications in mm ²				
	0.75	1.0	1.5	2.5	4.0	0.75	1.0	1.5	2.5	4.0	0.75	1.0	1.5	2.5	4.0
5	89.1	91.6	94.3	96.5	97.8	94.3	95.7	97.1	98.2	98.9	99.5	99.6	99.8	99.9	99.9
10	79.9	84.3	89.1	93.2	95.7	89.1	91.6	94.3	96.5	97.8	99.1	99.3	99.5	99.7	99.8
15	72.0	77.8	84.3	90.1	93.6	84.3	87.8	91.6	94.9	96.7	98.6	98.9	99.3	99.6	99.7
20	65.2	72.0	79.9	87.1	91.6	79.9	84.3	89.1	93.2	95.7	98.1	98.6	99.1	99.4	99.6
25	59.4	66.8	75.8	84.3	89.7	75.8	80.9	86.6	91.6	94.6	97.7	98.2	98.8	99.3	99.6
30	54.3	62.2	72.0	81.6	87.8	72.0	77.8	84.2	90.1	93.6	97.2	97.9	98.6	99.1	99.5
35	49.8	58.0	68.5	79.0	86.0	68.5	74.8	82.0	88.6	92.8	96.7	97.5	98.4	99.0	99.4
40	45.9	54.3	65.2	76.6	84.3	65.2	72.0	79.9	87.1	91.6	96.3	97.2	98.1	98.9	99.3
45	42.4	50.9	62.2	74.2	82.6	62.2	69.3	77.8	85.7	90.7	95.8	96.9	97.9	98.7	99.2
50	39.3	47.8	59.4	72.0	80.9	59.4	66.8	75.8	84.3	89.7	95.4	96.5	97.7	98.6	99.1
60	34.0	42.4	54.3	67.8	77.8	54.3	62.2	72.0	81.6	87.8	94.5	95.8	97.2	98.3	98.9
70	29.8	37.9	49.8	64.0	74.8	49.8	58.0	68.5	79.0	86.0	93.7	95.2	96.7	98.0	98.8
80	26.2	34.0	45.9	60.5	72.0	45.9	54.3	65.2	76.6	84.3	92.8	94.5	96.3	97.8	98.6
90	23.3	30.7	42.4	57.3	69.3	42.4	50.9	62.2	74.2	82.6	91.9	93.9	95.8	97.5	98.4
100	20.8	27.9	39.3	54.3	66.8	39.3	47.8	59.4	72.0	80.9	91.1	93.2	95.4	97.2	98.2
150	12.9	18.3	27.9	42.4	56.1	27.9	35.9	47.8	62.2	73.4	87.1	90.1	93.2	95.8	97.4
200	8.7	12.9	20.8	34.0	47.8	20.8	27.9	39.3	54.3	66.8	83.4	87.1	91.1	94.5	96.5
250	6.3	9.6	16.2	27.9	41.2	16.2	22.3	32.9	47.8	61.1	79.9	84.3	89.1	93.2	95.7
300	4.8	7.4	12.9	23.3	35.9	12.9	18.3	27.9	42.4	56.1	76.6	81.6	87.1	91.9	94.9
350	3.7	5.9	10.5	19.8	31.5	10.5	15.1	24.0	37.9	51.7	73.5	79.0	85.2	90.7	94.0
400	3.0	4.8	8.7	17.0	27.9	8.7	12.9	20.8	34.0	47.8	70.6	76.6	83.4	89.0	93.2
450	2.5	4.0	7.4	14.7	24.9	7.4	11.0	18.3	30.7	44.3	67.8	74.2	81.6	88.0	92.4
500	2.1	3.3	6.3	12.9	22.3	6.3	9.6	16.2	27.9	41.2	65.2	72.0	79.9	87.1	91.6
1000	0.6	1.0	2.1	4.8	9.6	2.1	3.3	6.3	12.9	22.3	45.9	54.3	65.2	76.6	84.3

The cable length between an amplifier and a 100 W loudspeaker is 100 m.
The cable cross-section is 1.5 mm². What power can the loudspeaker emit?

Example of power losses

4 Ω Loudspeaker = 39.3 W
8 Ω Loudspeaker = 59.4 W
100 V Loudspeaker = 95.4 W



Voice alarm system - safe and secure

IN ACCORDANCE WITH STANDARD EN 54-16

Fast and intelligible information in emergencies is required where there are a lot of people every day. Audible voice alerting systems (VAS) are used in such a danger situation: These are sound amplification and sound distribution sys-

tems for emergencies. They are a part of the fire-alarm systems and comply with the relevant, applicable national or international standards and regulations.

Audible voice alerting allows persons who are located in the danger zone inside or outside a building to be informed and alerted quickly. Pre-recorded or situation-specific texts ensure that the persons in question receive precise announcements, even in more than one language. The foremost aim of the system is to transmit the voice information with perfect intelligibility in

an emergency. Consequently, the endangered persons are able to recognise the situation, take it seriously and take the necessary, targeted action. It has been proven that the spoken word is very important in an emergency: panic reactions or incorrect reactions can be avoided, people escape more calmly and in a more orderly fashion and the escape speed increases.

Aims

Audible voice alerting systems (VAS) are used wherever there are more stringent safety requirements. Generally, this applies to buildings and rooms in which there a lot of persons not familiar with the escape routes on the premises.

This includes shopping centres, hospitals, office buildings, homes for the elderly, production shops, schools, universities, banks, sports facilities, hotel and congress buildings, administration buildings and railway stations.

Use

The audible voice alerting system is an important part of the overall safety and security concept. Consequently, the system must be available and operationally reliable without fail, as prescribed in Standard EN 54-16. Permanent self-monitoring of the sound signal path and the essential peripherals allows the audible voice alerting system to detect safety-relevant defects and to indicate them to the system administrator within 100 seconds.

Specifically, this means that the system monitors itself, from the microphone capsule through the input modules and amplifiers to all loudspeaker cables. This also includes the digital memories of the sound signal sources for alarm texts. The peripherals which are also monitored include the main power supply, the emergency power supply and the battery charge state. The faults are logged reproducibly in the system at all times if faults occur in the monitoring system.

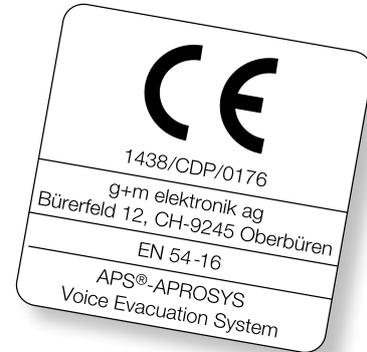
Product Standard EN 54-16

User Standards
VDE 833-4
NEN 2575
BS-5839

...

Planning, installation and operation of audible voice alerting systems in accordance with EN 54-16 are defined in the relevant national standards.

Only voice alerting systems featuring an official EU Certificate of Conformity and a corresponding CE mark may be used since 1 of April 2011 throughout Europe. These certificates may be issued only by testing agencies defined Europe-wide (www.ec.europa.eu).



Planning
Installation

Experienced professionals are needed for planning, installing and commissioning an audible voice alerting system. The systems may be planned, serviced and maintained only by proven specialist companies.

A broad range of services is involved in the process of planning an emergency PA system:

- Advice on room acoustics
- Scope of PA system
- Alerting zones
- Number and location of fire-brigade microphones
- Operator's alarm organisation
- A/B cabling

The loudspeaker cables must comply with the specifications of the system manufacturer and the relevant national fire-protection standard.

The cable cross-section will depend upon the relevant cable length, the voltage and the required power.

It is absolutely essential that the entire emergency system function faultlessly for at least a further 30 minutes in a danger situation, e.g. if a fire breaks out. This functional endurance must be guaranteed for the following connections:

- Loudspeaker riser cables as far as each fire zone
- Lead-throughs through a fire zone
- Connection cables between the voice alerting system and the fire-alarm system
- Cables to the fire-brigade call point

One of 3 security levels (see Page 15) must also be defined on voice alerting systems in accordance with National Standard VDE.

Commissioning
Acceptance testing
Maintenance

The basic functions and the fire-protection concept for the voice alerting system, referred to the installation, are fully tested and logged. This also includes the acoustic parameters of the disturbing sound level, of the wanted sound level and the relevant voice intelligibility, whereby an STI value (Speech Transmission Index) of at least 0.5 should be reached.

Acceptance testing of an electroacoustic emergency system is performed by qualified testing experts. We absolutely recommend that you conclude a maintenance contract with the manufacturer of the overall system in order to guarantee full functionality at all times.

The contract should foresee two to three inspections per year and annual maintenance. This covers all required work including testing the individual items of equipment, operation of them in the entire system, readjustment of the complete system with instructions and the entries in the logbook.

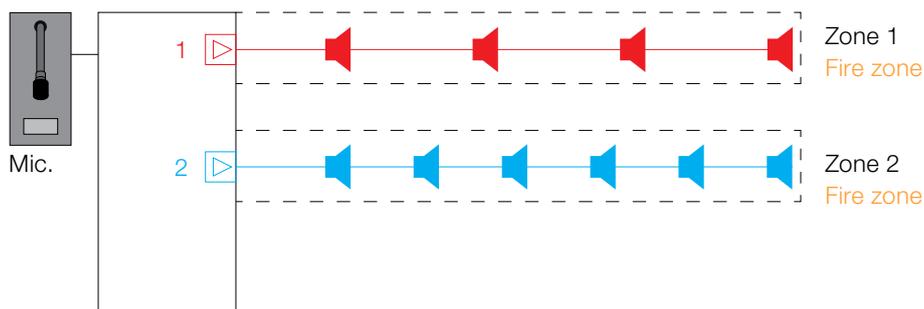
It is also advisable to conclude a servicing contract so as to be able to rectify possible faults within 24 hours. The various intervention times – the length of time between an enquiry and analysis or solution - and the relevant materials needed can be clearly defined in such a contract.

3 defined safety levels in accordance with National Standard VDE

Safety levels Level 1

Safety level 1 is recommended for buildings smaller than 2'000 qm and in which there are normally less than 200 persons.

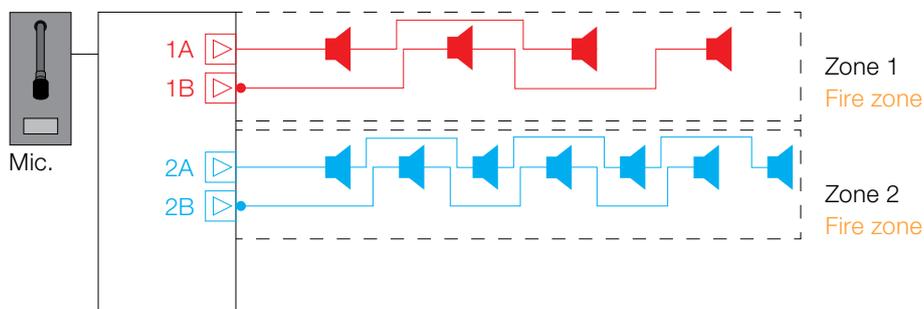
A separate supply cable must be installed for each fire zone. If there is a defect in the transmission path, the PA system may fail only in one fire zone.



Level 2

Safety level 2 (A/B cabling) is recommended for buildings larger than 2'000 qm and in which there are normally more than 200 persons.

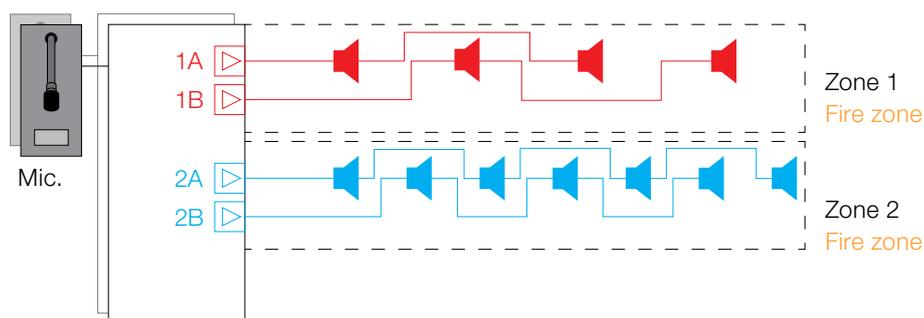
The entire area of action must still receive PA signals in the event of a fault in the transmission path. The voice intelligibility in this case may not drop below 0.45 STI and the value may not drop by more than 3 dB.



Level 3

Safety level 3 is recommended for buildings with maximum safety level.

The entire area of action must still receive PA signals in the event of a fault in the overall system. The voice intelligibility in this case may not drop below 0.45 STI and the value may not drop by more than 3 dB.



No planning or calculation examples guaranteed



Applications

Concepts and sales argument for PA systems,
clock systems and audio-systems.

SHOPPING

CATERING

PUBLIC TRANSPORT

PUBLIC BUILDINGS

SPECIALITIES

COMPANY BUILDINGS

CHURCHES

SCHOOLS & UNIVERSITIES

SPORTS CENTRES & FACILITIES

HOSPITALS

HOMES FOR THE ELDERLY

SHOPPING



Shopping in a relaxed atmosphere – it gets people buying and makes more money for shops. g+m elektronik ag PA systems assist this with pleasant music and playing back recorded advertising announcements. Integrated in the on-site safety and security concept, they ensure that shopping is a real delight.

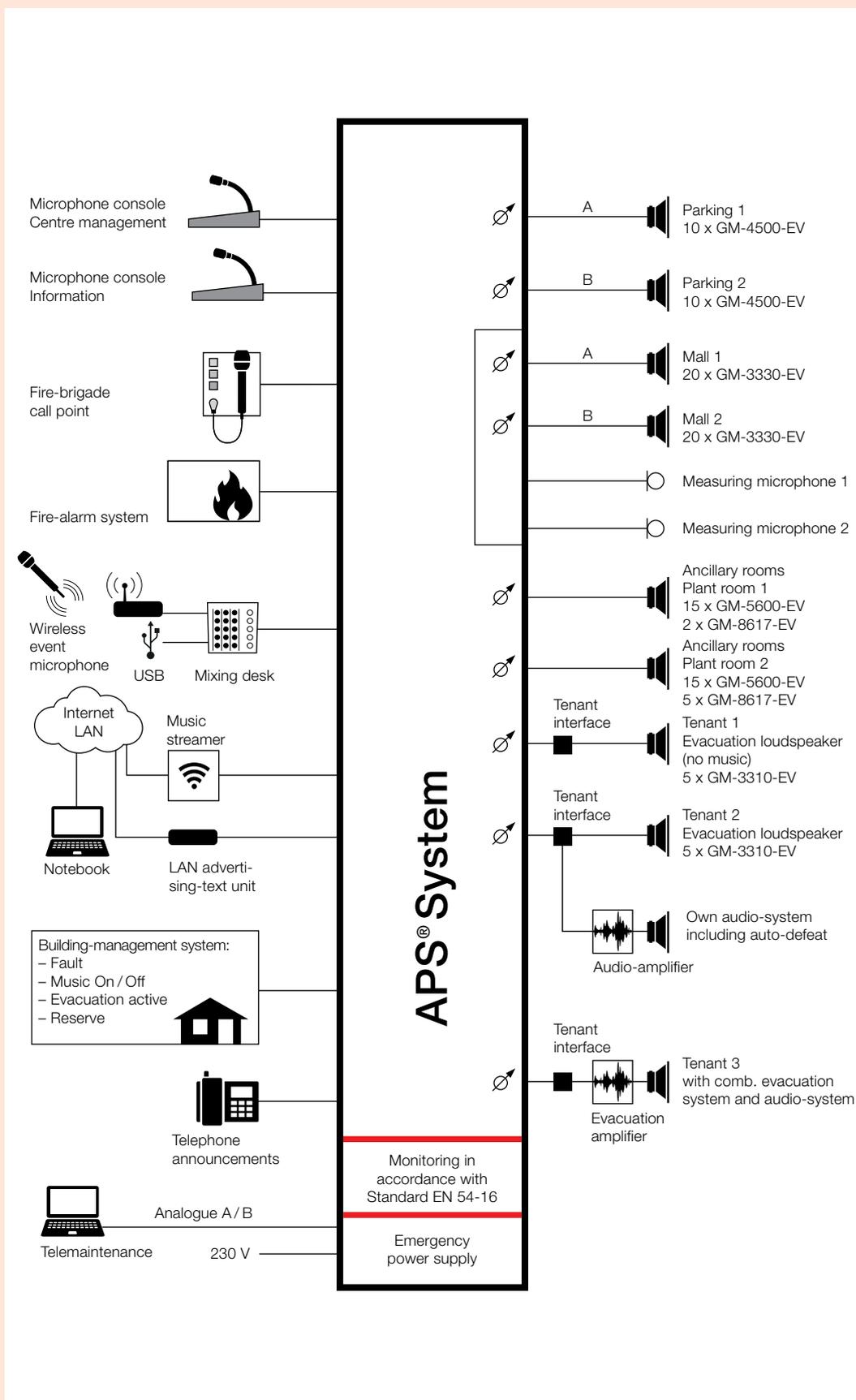
- Background music creates a pleasant atmosphere
- A range of music of various genres without advertising
- Music zones can be set up for presenting individual brand philosophies
- Integration of LAN advertising-text units which can be configured and operated easily on the PC
- Voice recordings for information and advertising texts can be played back in time-controlled manner
- An interface installed in the central control panel allows individual music and texts in shops in a shopping centre
- Automatic adaptation of the volume of music and voice to the background level
- Important paging announcements and other announcements are performed with a microphone or telephone interface
- Wireless microphone systems are available for advertising events and other events
- Direct interface to the fire-alarm system, to the building-management system and to other in-house systems
- Easy integration of the evacuation and PA system in the safety and security concept
- Permanent monitoring of the overall system in accordance with Standard EN 54-16
- Different sound characteristics for voice and music reproduction

Staging brands audibly

For advertising events and other events

Integration in the safety and security concept

Schematic



CATERING



Gentle sounds can whet guests' appetites. Either young and modern or classy to chic, depending on genre. A PA system from g+m elektronik ag ensures that every restaurant and hotel is inviting with the right background music.

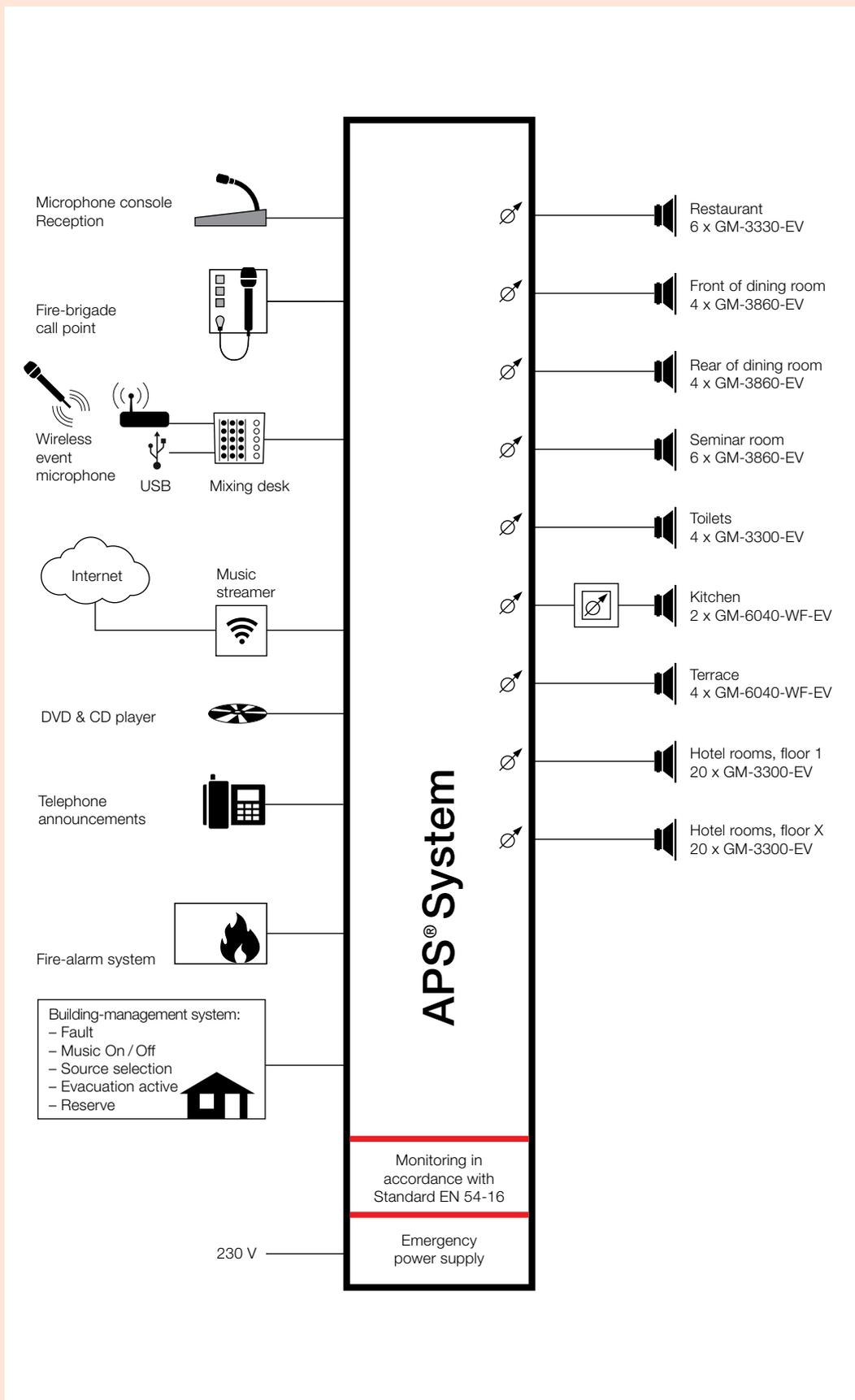
- Background music creates a pleasant atmosphere
- Playing back background music enhances discretion in room acoustics so that conversations at the next table cannot be overheard so easily
- A professionally compiled range of music of various genres ensures an individual atmosphere
- Flexible integration of various music media, e.g. Internet radio, CD and DVD players, iPODs, iPhones, DAB+ or VHF radio
- Important paging announcements and other announcements are made via microphone or telephone interface
- The volume of the music played back can be adjusted individually for every room
- The sound characteristic of the loudspeakers can be matched to needs and requirements on-site
- Direct interface to the fire-alarm system, to the building-management system and to other in-house systems
- Easy integration of the evacuation and PA system in the safety and security concept
- Permanent monitoring of the overall system in accordance with Standard EN 54-16

Guest feel good

For discreet table conversations

Adapted individually

Schematic



PUBLIC TRANSPORT



If you want to stay mobile by bus and train, you will be reliant on precise information. Every minute counts so that you reach your connection on time or are standing at the right platform. g+m elektronik ag wishes you a good trip!

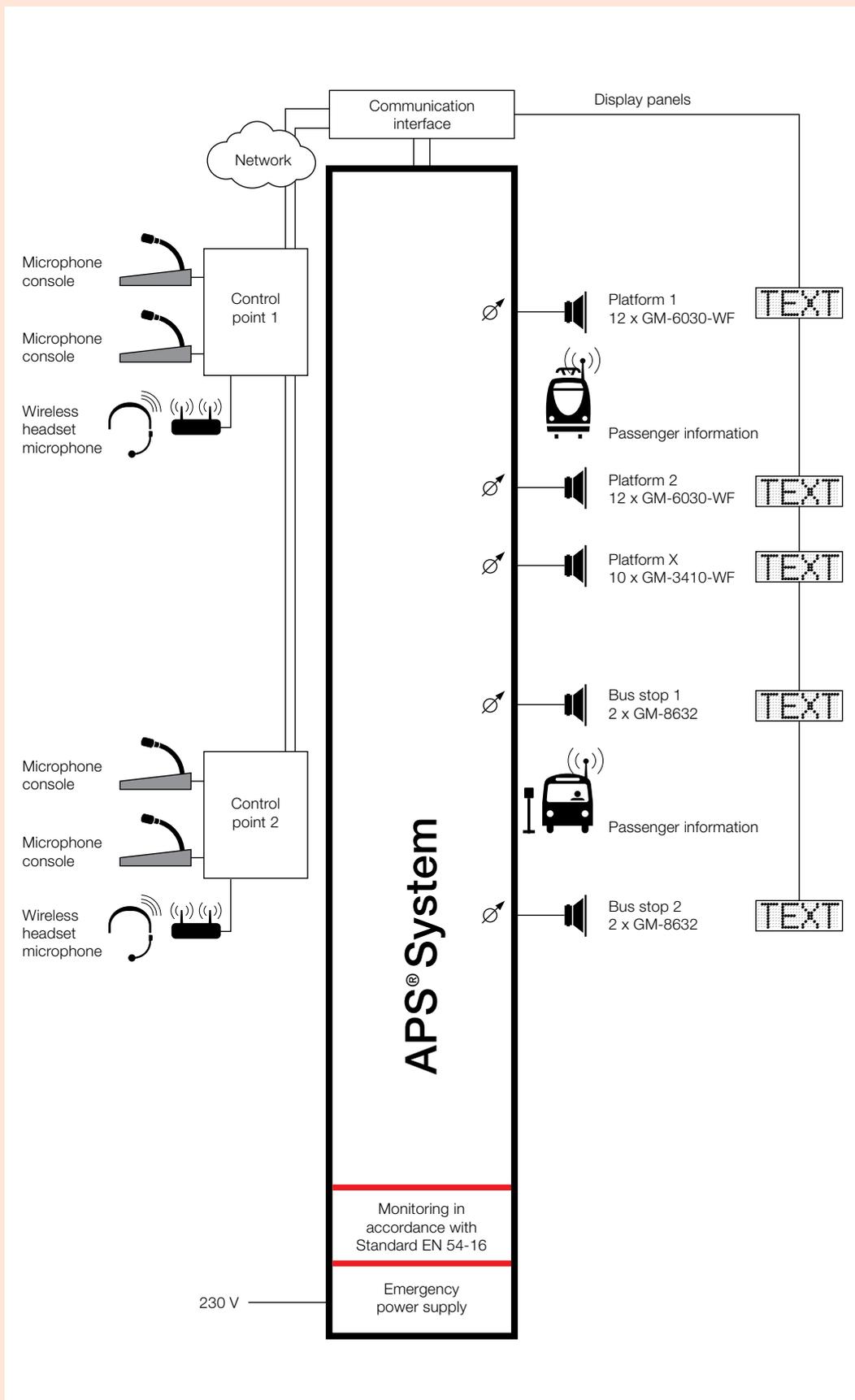
- Announcements inside trains, buses, trams or ships
- Centrally controlled information announcements transmitted at the same time to several stops or platforms
- A selection of loudspeaker models for optimum-intelligibility voice information, even if there are loud noise levels in traffic situations
- Signal transmission and remote control of the local amplifier systems via LAN interface

In means of transport

On platforms and in stations

At exactly the right time and clearly intelligible

Schematic



PUBLIC BUILDINGS



Clearly intelligible information is needed in museums, in theatres, in multi-purpose halls and in official buildings – wherever where a lot of people go in and out every day. In addition, music recordings enhance trust and comfort in public areas.

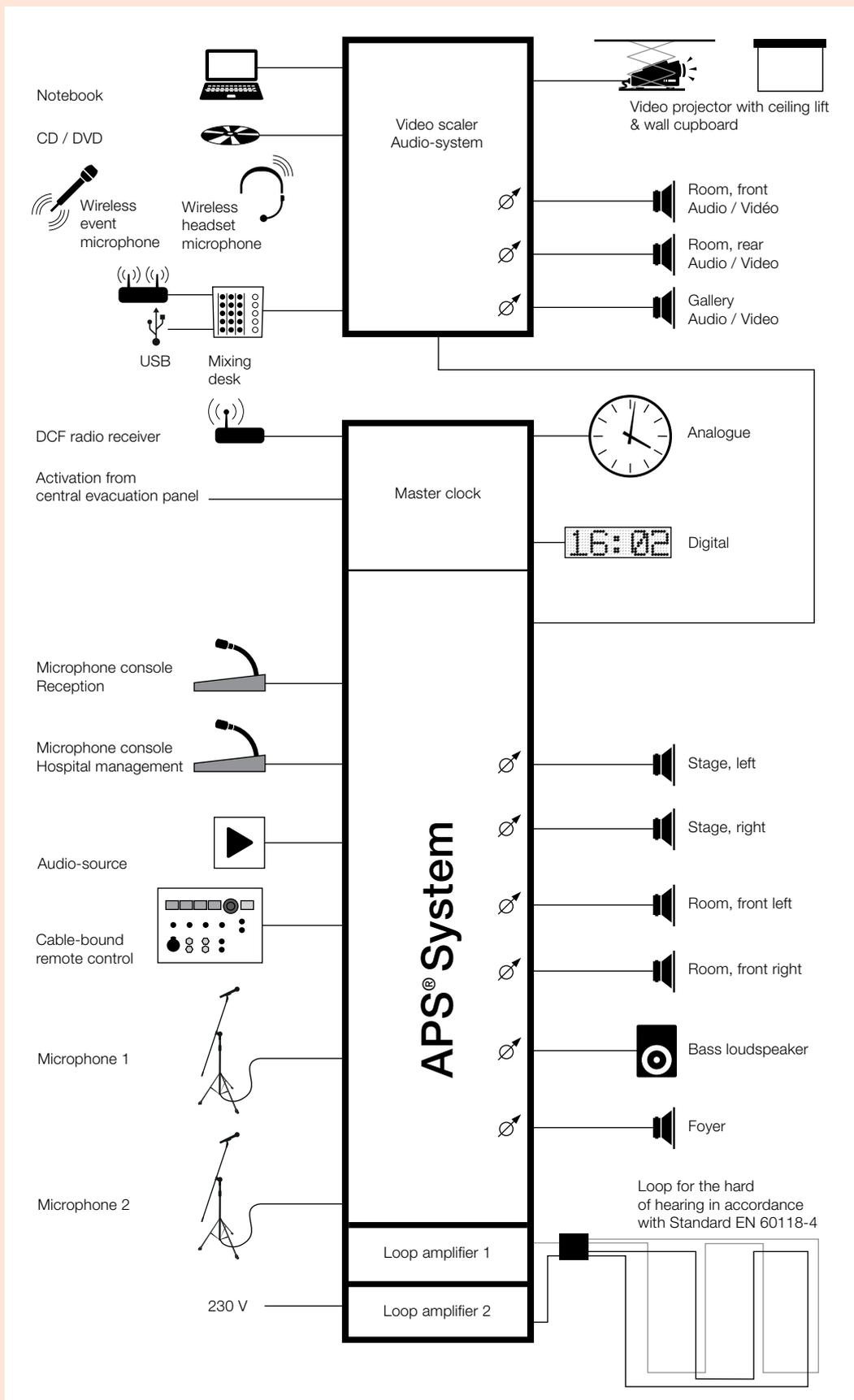
- Music and voice are transmitted to all areas in top quality
- Optimum matching and optimum intelligibility thanks to state-of-the-art DSP technology
- Flexible integration of various music media, e.g. Internet radio, CD and DVD players, iPODs, iPhones, DAB+ or VHF radio
- Simple to complex audio-mixing desks can be integrated, suitable for all occasions
- Bright projection systems for professional presentations
- Transmission of digital video signals by means of transmitter/receiver in high resolution regardless of cable length
- State-of-the-art video scalers units ensure the right picture format in optimum resolution
- Planning and implementation of induction loops for the hard of hearing in accordance with Standard EN 60118-4
- All media devices can be integrated in presentation furniture or invisibly in cubicles and cabinets
- Analogue or digital slave clocks are panel-mounted or surface-mounted
- Loudspeaker systems allow information announcements, paging or emergency announcements
- Direct interface to the fire-alarm system, to the building-management system and to other in-house systems
- Easy integration of the evacuation and PA system in the safety and security concept
- Permanent monitoring of the overall system in accordance with Standard EN 54-16

Versatile in use

Monitored in accordance with EN Standards

Innovation: Digital Signal Processor (DSP)

Schematic



SPECIALITIES



Every room has acoustics quite of its own. Sometimes, professional technology is needed to reach business objectives or guarantee public safety. Sometimes, there is a private fondness for perfect sound. g+m elektronik ag always offers an individual solution.

Top presentation systems

Meeting and conference room

- The audio-video or multimedia system is matched perfectly to the room
- Screen, video-projector lift and loudspeakers can be integrated flush with the ceiling
- Maximum operating convenience thanks to simple wall remote controls or mobile touch-panels
- Integrated control of all room functions such as lighting, blinds, audio and video
- Pre-programmed scenes, basic values and control combinations can be called up
- Optimum matching and optimum intelligibility thanks to state-of-the art DSP technology
- Transmission of digital video signals by means of transmitter/receiver in high resolution
- State-of-the-art video scalers units ensure the right image format in optimum resolution
- Planning and implementation of induction loops for the hard of hearing in accordance with Standard EN 60118-4
- All media devices can be integrated in presentation furniture or invisibly in cubicles and cabinets

Home entertainment deluxe

Detached house/owner-occupied flat

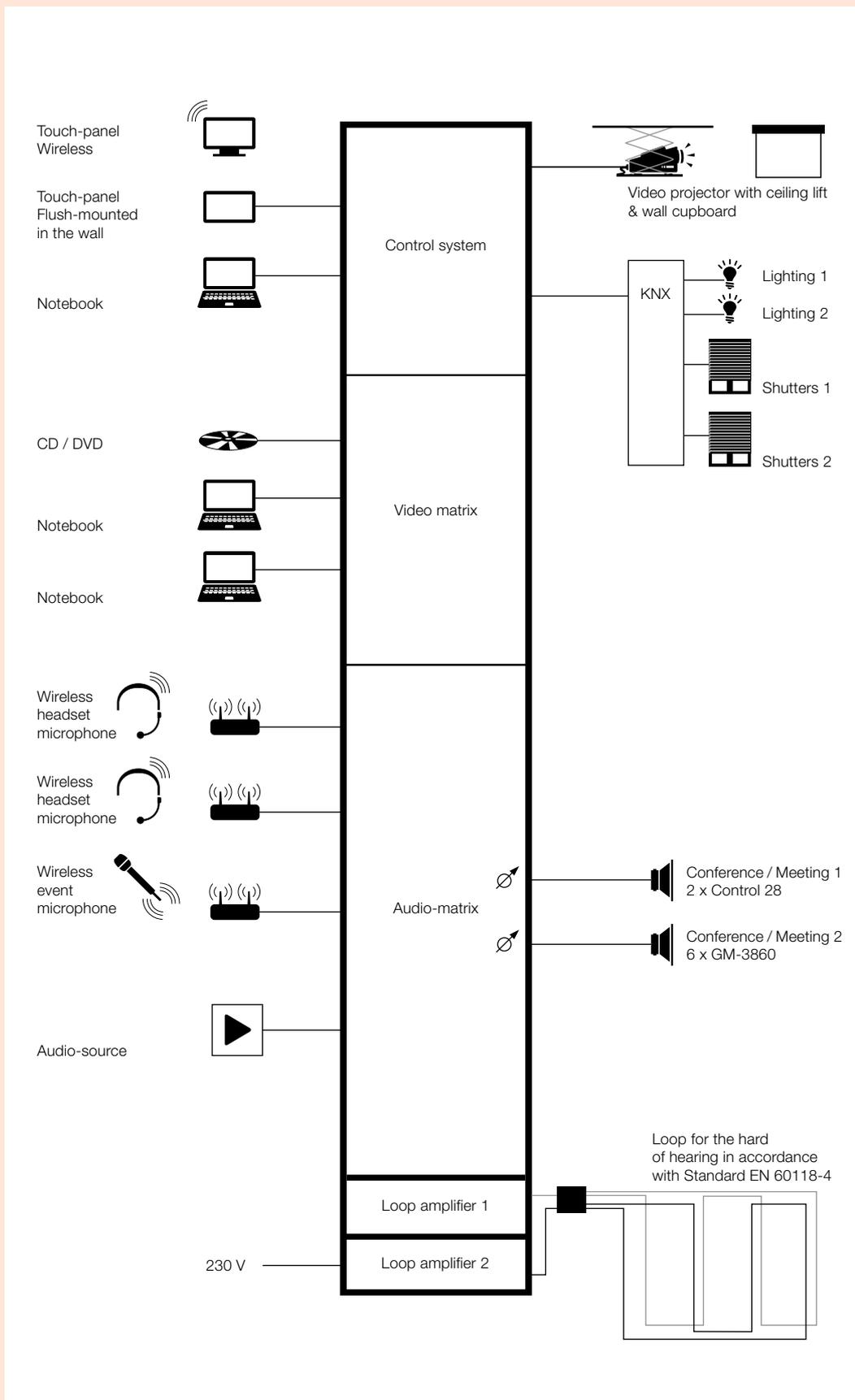
- A multi-room system ensures individual public address in all rooms of the building
- With a broad selection of matching active loudspeakers
- Up to 9 music sources for up to 40 rooms can be freely selected and regulated
- Design if required by integration in EDIZIO or standard cover panels

Protection in every situation

Tunnel PA systems

- Optimum intelligibility of information and alarm signals transmitted in order to quickly evacuate the premises through escape routes in an emergency
- Direct interfaces to the fire-alarm system, to the building-management system and to other in-house systems
- Easy integration of the evacuation and PA system in the safety and security concept
- Permanent monitoring of the overall system in accordance with Standard EN 54-16

Schematic



COMPANY BUILDINGS



Success sounds good. In particular wherever maximum performance is achieved by motivated staff. Be it in production or in the office, g+m elektronik ag PA systems can help to save time, effort and costs, ensure safety – and enhance fun at work with important information.

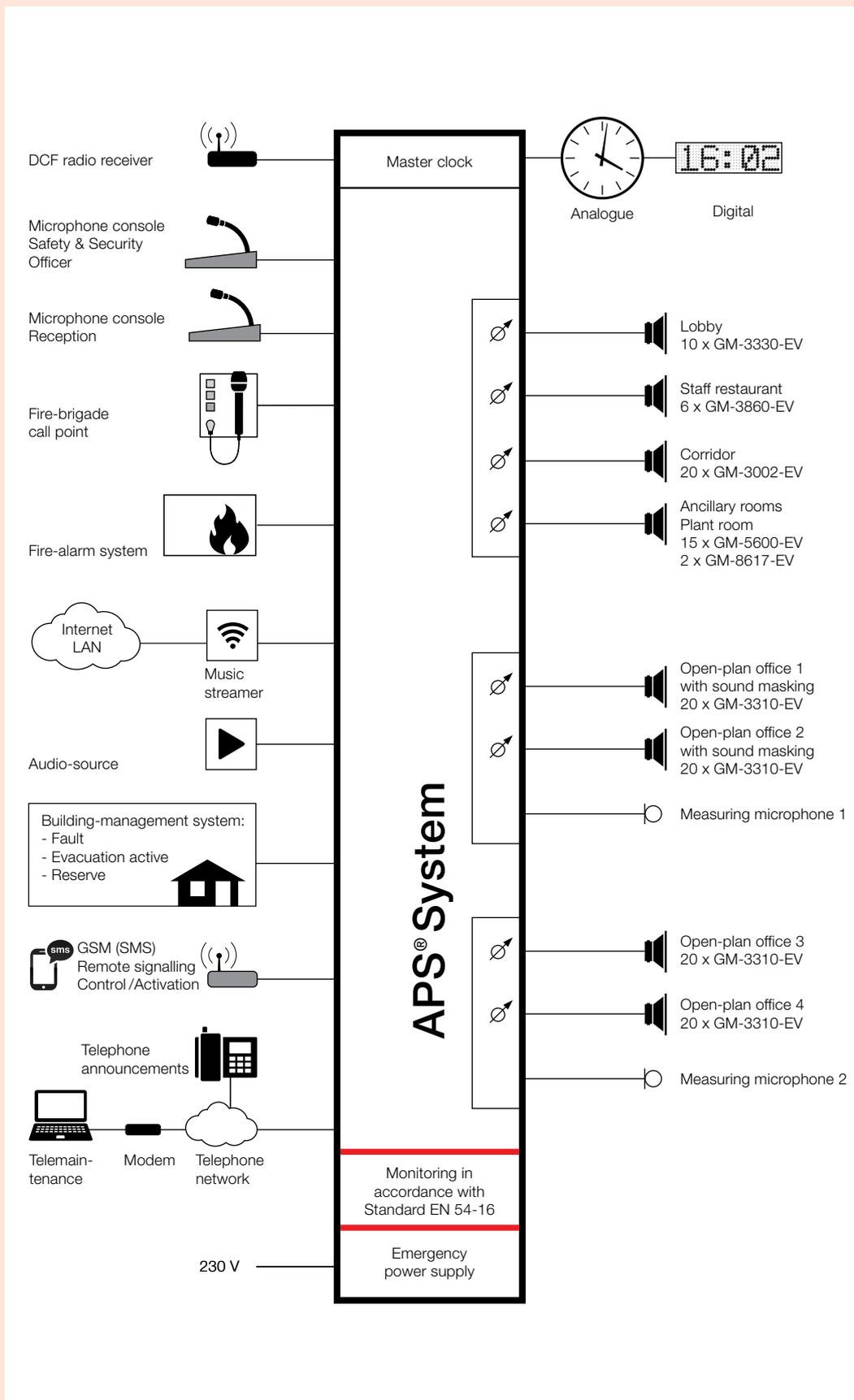
- In open-plan offices, sound-masking systems create a concentrated and discreet working atmosphere
- Background music creates a pleasant atmosphere
- Flexible integration of various music media, e.g. Internet radio, CD and DVD players, iPods, iPhones, DAB+ or VHF radio
- Important information and announcements are made from a microphone console or from the fire-brigade call point
- Direct interfaces to the fire-alarm system, to the building-management system and to other in-house systems
- Easy integration of the evacuation and PA system in the safety and security concept
- Permanent monitoring of the overall system in accordance with Standard EN 54-16

Enhances motivation

Assists productivity

Perfect system integration

Schematic



CHURCHES



Room to contemplate, room to pause and room to be solemn. Church interiors radiate a quite special atmosphere. A PA system from g+m elektronik ag meets the most stringent requirements in order to do justice to the sacred character in all situations.

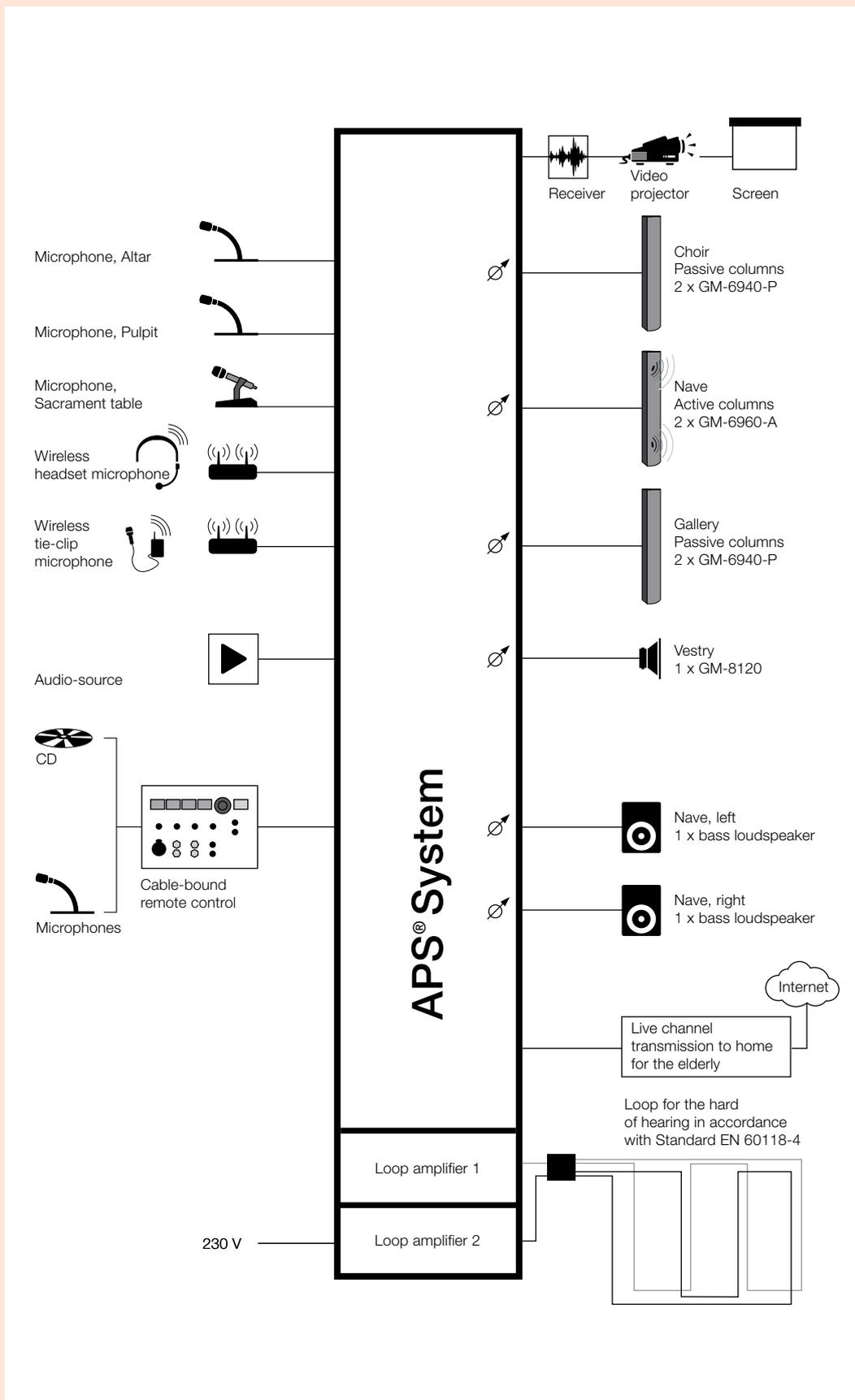
- Music and voice signals can be heard optimally in the entire interior thanks to balanced sound transmission
- First-rate audio-quality and natural sound reproduction thanks to innovative DSP technology
- Use of active and passive sound columns with outstanding acoustic properties
- The radiation angle of active sound columns can be regulated electronically with no inclination of the sounding bodies
- The clearly defined sound alignment optimises intelligibility and directly addresses the listeners in the entire church interior
- Optimum matching to room acoustics prevents feedback and undesirable reflections
- Full sound impression of the bass loudspeakers, in particular for low-frequency music
- Planning and implementation of induction loops for the hard of hearing in accordance with Standard EN 60118-4

For complex acoustics

Can also be used in chapels of rest and cemeteries

High level of operating convenience

Schematic



SCHOOLS & UNIVERSITIES



«Learning» PA systems from g-m elektronik ag are also needed wherever people jointly learn new material. They can be used flexibly, can be integrated in line with individual requirements and pass every test when it comes to safety and security on-site.

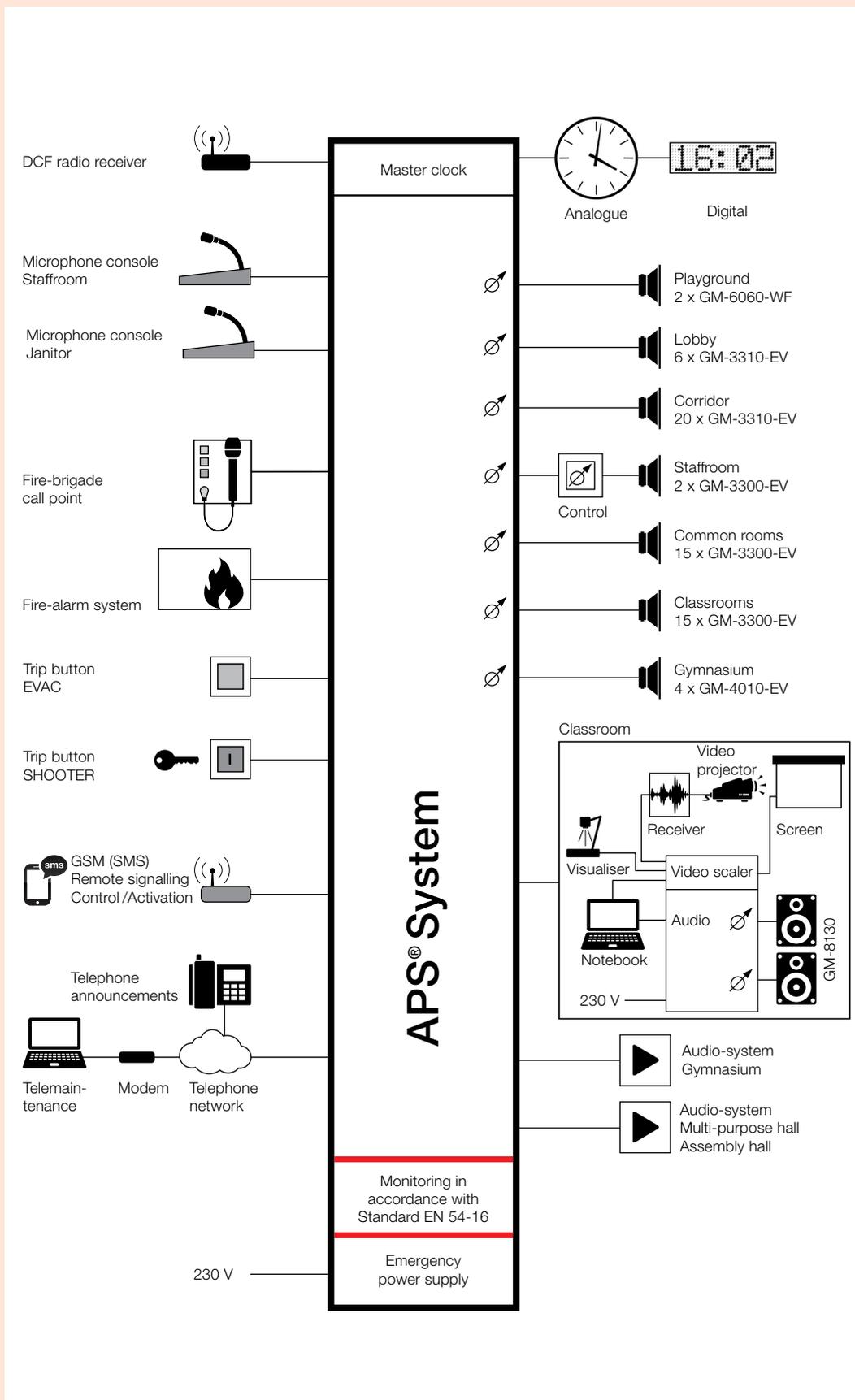
- Analogue or digital break-time bell and clock systems can be integrated in the APS® system and ensure orderly operation of the school or university
- Emergency situations, evacuations or shooting-spree dangers are each allowed for in the safety and security concept
- Important messages and announcements are made via microphone or telephone interfaces
- Perfect matching and integration of an audio-video system in every classroom or seminar room
- Transmission of digital video signals by means of transmitter/receiver in high resolution
- State-of-the-art video scalers units ensure the right image format in optimum resolution
- Mobile audio-systems can be used flexibly in music rooms or halls

Starting punctually

Learning safely

Presenting multi-media

Schematic



SPORTS CENTRES & FACILITIES



Acoustics is always very important when it comes to valuable points, deciding seconds or a great goal kick. It can motivate the sportsmen/sportswomen or inspire the crowd. g+m elektronik ag PA systems take up any sporting challenge.

**Robust in
all weathers**

- Music and voice can be heard optimally throughout the entire hall thanks to balanced acoustics
- Perfect matching and optimum intelligibility thanks to state-of-the-art DSP technology
- You have the option between announcements, paging or emergency announcements

**For professional
sports competitions**

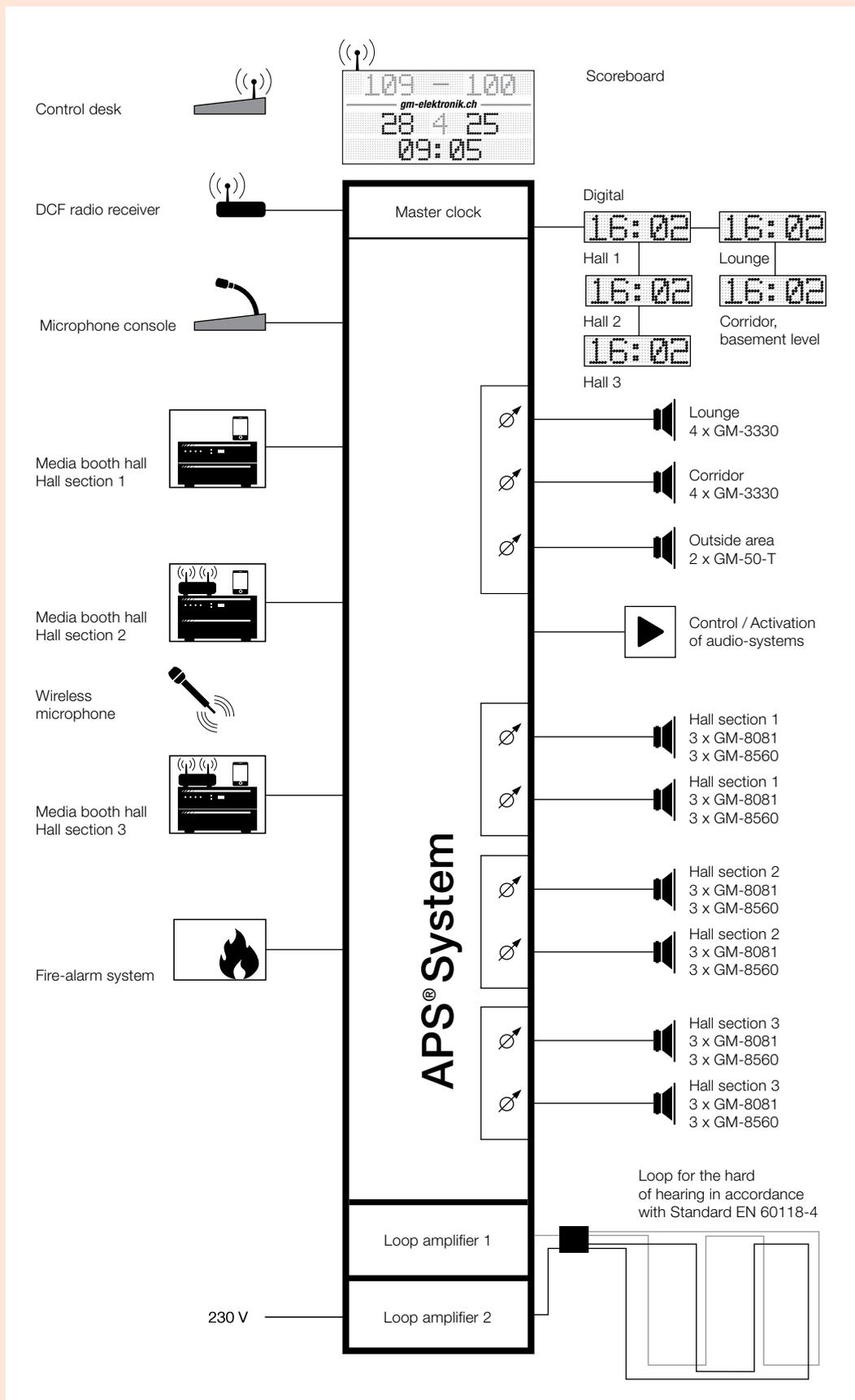
- Use of weatherproof, mechanically robust components
- Broad selection of remote-control panels and consoles/desks to meet any requirement
- Music sources can be selected to match the current sports activity
- Wireless microphone systems are suitable for gymnastics or special events
- The g+m elektronik ag sports scoreboard informs you precisely of results, wins or the current time
- Analogue and digital slave clocks can be panel-mounted or surface-mounted
- Planning and implementation of induction loops for the hard of hearing in accordance with Standard EN 60118-4
- High-performance speakers for long distances

**Top performance
for all requirements**

Indoor swimming pools/Open-air swimming pools

- Panel-mounted loudspeakers and speaker cabinets meet the special requirements for outdoor areas and indoor swimming pools
- Lifeguard alarm which can be triggered discreetly with various emergency buttons throughout the entire pool area
- Information texts which can be called up, e.g. information on end of bathing time or catering offerings
- The audio-system can be extended with high-performance compact speaker cabinets, e.g. for events, aqua aerobics or professional swimming competitions
- Mobile audio-racks with professional music sources and wireless microphones
- Background music in changing rooms, toilets and ancillary rooms creates a pleasant atmosphere

Schematic



HOSPITALS



First aid is also a matter of clearly understandable information. g+m elektronik ag PA systems are used with great success between maternity ward and operating theatre, wherever health is of supreme importance. They give a feeling of safety and help the hospital team in their day-to-day work.

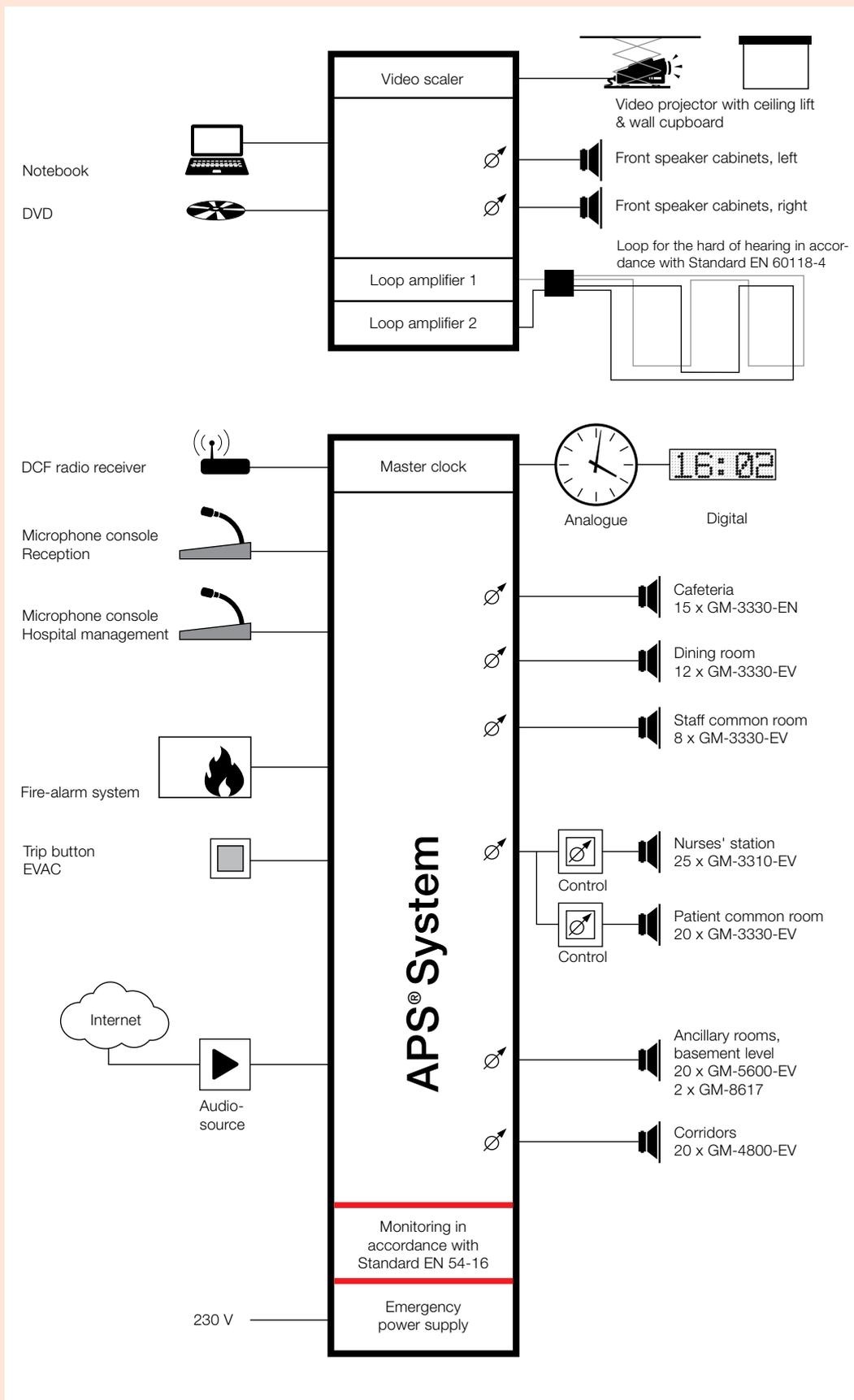
- Background music creates a pleasant atmosphere in public zones
- Music of various genres with no advertising
- Audio-video systems provide information and training content for staff
- Planning and implementation of induction loops for the hard of hearing in accordance with Standard EN 60118-4
- Analogue and digital slave clocks available as panel-mounted or surface-mounted models
- Easy integration of the evacuation and PA system in the safety and security concept
- Permanent monitoring of the overall system in accordance with Standard EN 54-16

Creating a positive atmosphere

Optionally for the hard of hearing

Monitored in accordance with EN Standards

Schematic



HOMES FOR THE ELDERLY



Reports and music worth listening to keep you young. Be it for therapy, for events or for information – g+m elektronik ag PA systems in homes for the elderly prove that they meet your listening needs at every age.

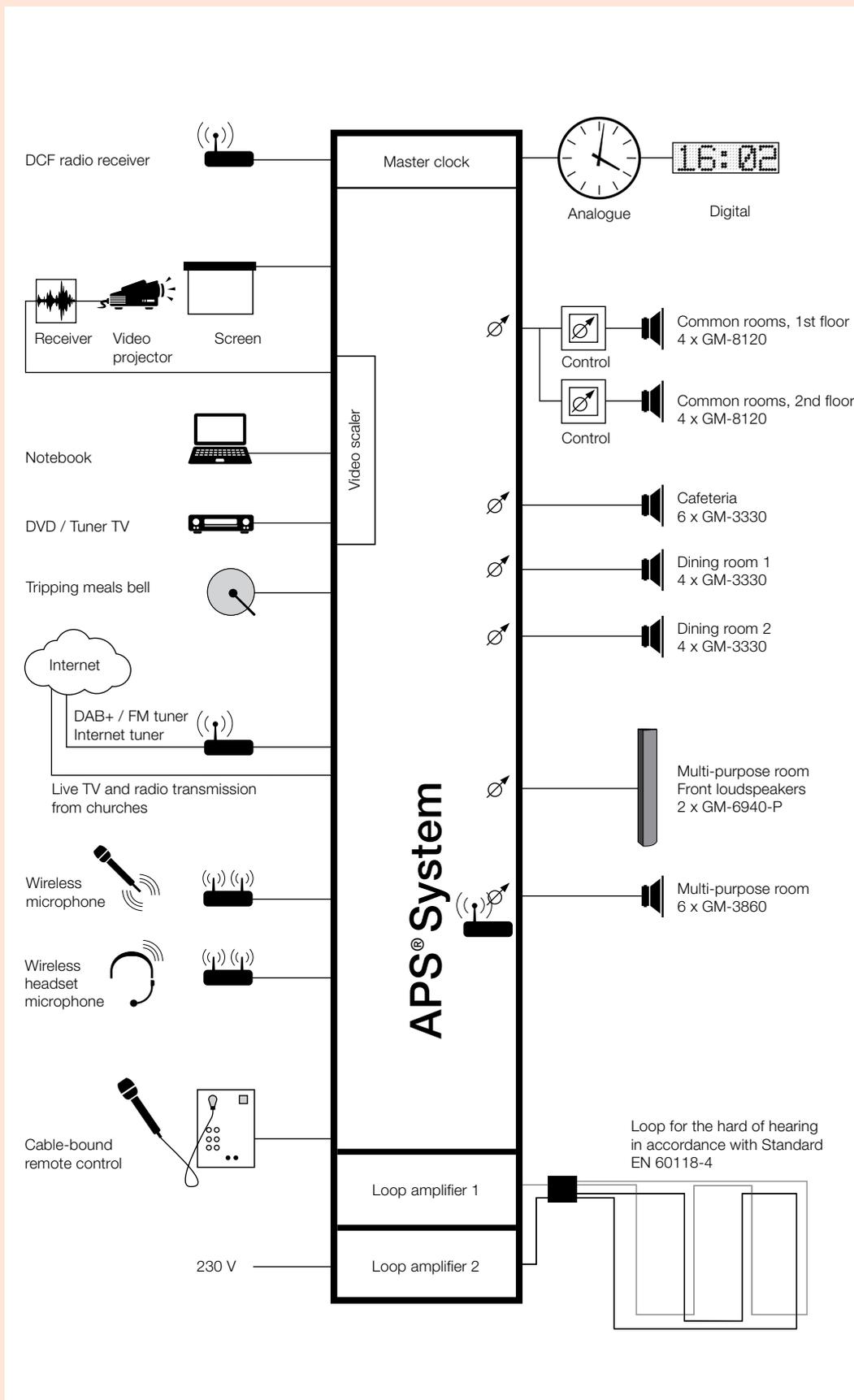
- Background music creates a pleasant atmosphere in the building
- Audio-systems can be equipped with high-quality sound columns and compact speaker cabinets for speeches and announcements
- Flexible integration of various music media, e.g. Internet radio, CD and DVD players, iPODs, iPhones, DAB+ or VHF radio
- Announcements or sermons can be transmitted via the Internet directly to multi-purpose rooms
- Audio-video systems are the right choice for lectures, TV transmissions or internal staff training
- Image transmissions feature optimum resolution and brightness
- Planning and implementation of induction loops for the hard of hearing in accordance with Standard EN 60118-4
- Analogue and digital slave clocks can be panel-mounted or surface-mounted

For providing reminders and for amplification

Reaching all residents

Optimum audibility and visibility

Schematic



APS® system

VOICE EVACUATION SYSTEM

- Extremely easy system planning
- User friendly
- Digital amplifiers 100 V
- LAN networking
- Digital signal processing
- Open system architecture
- Officially EN 54-16 certified
- Fully modular
- Loudspeaker loop monitoring



APS® technology

Thanks to its open system architecture, our APS® technology features a large number of different interfaces, thus resulting in high flexibility in interworking with third-party systems. Automatic and permanent monitoring of these interfaces guarantee 100% system availability in emergency situations at all times, as prescribed by Standard EN 54-16.

Each individual module has its own intelligence and permanently communicates with the central processor module APS-990 via the digital bus. The most important advantages of our APS® technology are obvious:

- Any number of modules (depending on customer configuration) can be combined and extended at any time with additional units very easily and at low cost
- Minimum wiring complexity, thus reducing costs substantially
- Can be programmed individually and customer-specifically
- Very efficient diagnostic options

The programmable, digital microphone consoles with bus system or LAN interworking, building-management systems or touch-screen terminals ensure maximum convenience and maximum safety and reliability thanks to monitored, redundant cable routing (EN 54-16).

Networking with standard LAN allows an optimum spatial distribution of various sub-systems so as to noticeably cut wiring costs. The permanently monitored networks also allow interworking with redundant fibre-optic cables and thus minimise the risk of overall system failure.

APS® has its own software tools for monitoring and telemaintenance thus allowing a system to be analysed and reprogrammed if required within a very short time.

The Class-D amplifier technology and Digital Signal Processing (DSP) allow optimum system matching to the given room acoustics.

APS® technology



APS COMPONENTS (EXCERPT)

Music and signal sources, programmable

APS-19.2	MP3 chime and siren module, 30 melodies
APS-24.1-LAN	LAN text unit for recording and playback of an unrestricted number of texts of unrestricted length – configuration by means of Web browser
APS-25.2	Digital VHF tuner, 50 stations, channel search
APS-26	USB media player module
GM-1524	Music unit, VHF tuner, CD, MP3, USB, 19"

Function/ control modules, programmable

APS 46.1	4-channel DSP module, with equaliser, delay, volume control, dynamic and remote control
APS-50.1	Universal switching and control module with 8 illuminated pushbuttons
APS-52	Control module for 8 functions from external buttons, contacts
APS-53	Switching and control module, for 4 control circuits from external voltages (12/24/48 V)
APS-54.1	Switching and control module with 4 illuminated pushbuttons, for special functions, with remote activation
APS-56-NL	Control module with 8 monitored inputs
APS-57	Time switch with 2 circuits
APS-58	Communication module for RS 232 interface, 8 conditions, 8 outputs
APS-59.1-LAN	Data and LF interface module for multiple systems, LAN configuration type
APS-60	Control loudspeaker with amplifier, selector switch LF bus 1-4

Power supply modules

APS-90.2	Power module 230 V AC/48 V DC, 3 A
APS-151	Emergency power supply 48 V DC, 24 Ah, 3 units height, 19"

Output modules, programmable

APS-31.1	LF output module with additional Open Collector, VU meter and volume control
APS-33-4	4-channel DSP output module with delay, equaliser, compressor/limiter, volume control
APS-64.1	Module with 4 controllable and switchable loudspeaker lines 100 V, including int./ext. control bypass, 250 W
APS-74.1	Module for switching 4 groups 100 V, including external control bypass, 250 W
APS-75	Relay module for controlling special functions (4 relays)

Other modules and components can be found on our website

Monitoring modules in accordance with EN 54-16 EN 60849 BS 5839 NEN 2575	APS-177-EV	Central processor monitoring module in accordance with international safety standards (EU Standard)
	APS-178-32-EV	Digital line/impedance monitor, 32-channel
	APS-180-Loop	Interruption free line monitor with 2-wire loop line
Processor modules	APS-990-Modem	Central processor module with data memory, freely programmable with telemaintenance function
System housings MC-03		8 module slots with I ² C bus connection 1 module slot without I ² C bus connection
System housings with integrated mixing amplifier AM-CD-XX		5 module slots with I ² C bus connection 1 module slot without I ² C bus connection
	AM-CD-50	50 W Content power (Sinus)
	AM-CD-100	100 W Content power (Sinus)
	AM-CD-150	150 W Content power (Sinus)
	AM-CD-250	250 W Content power (Sinus)
System output stages BO-CD-XX	BO-CD- 50	50 W Content power (Sinus)
	BO-CD-100	100 W Content power (Sinus)
	BO-CD-150	150 W Content power (Sinus)
	BO-CD-155	150 W Content power (Sinus) for induction loops
	BO-CD-250	250 W Content power (Sinus)
	BO-CD-500	500 W Content power (Sinus)
	BO-CD-50-2	2 x 50 W Content power (Sinus)
	BO-CD-100-2	2 x 100 W Content power (Sinus)
	BO-CD-100-4	4 x 100 W Content power (Sinus)
	BO-CD-150-2	2 x 150 W Content power (Sinus)
	BO-CD-250-2	2 x 250 W Content power (Sinus)
Programmable input modules for APS® central control panels	APS-01-EV	In accordance with Standard EN 54-16, with preamplifier, for dynamic microphone, capacitor microphone symmetrical, AUX asymmetrical
	APS-04	For remote controls APS-440, APS-451, APS-340 and ARC-340
	APS-11-4	4-channel DSP input module, selectable microphone or audio-inputs with delay, equaliser, compressor/limiter, volume control
	APS-16.1	Input module with interface for up to 32 parallel, digital microphone command consoles
	APS-16-LAN	Input module with interface for up to 32 parallel, digital microphone command consoles with LAN configuration type
	APS-18.3	Telephone interface (from any number of telephone stations to PA system)
	APS-40.1	Electronic program-selection module with preamplifier, for 4 music sources

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