Building system automation
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  - Tel.: +49 (0) 70 62 / 95 95 - 0
General overview by taking the example of a building
Automation of technical installations via AS-i

- Open, decentralised and intelligent wiring system
- Manufacturer-independent fieldbus as a sensible extension of higher-level systems such as PLC, Profibus DP, Ethernet, BACnet etc.
- Relieves higher-level systems including considerable cost savings – see also: "Calculation help.xls"
- Also available as fail-safe Smart SPS for safety applications up to SIL 3, PL e

Technical key data:
- Topology: flexible tree structure
- Bus cable: unscreened two-wire cable for data and energy
- Cable length: 100 m - 600 m possible through extension via AS-i repeater
- Number of slaves: 31 single slaves or 62 A/B slaves per AS-i line
- Number of binary I/Os: 248 binary sensors and 186 actuators per AS-i line
- Number of analogue I/Os: 31 x 4 channels (in- or outputs) per AS-i line
- Error detection: identification and repetition of corrupted messages

Analogue inputs and outputs:
- Pressure
- Temperature
- Volume

Digital inputs and outputs:
- ventilation systems
- escalators
- lifts

E.g. monitoring of rolling element bearings

Digital and analogue control cabinet modules
Connection options of diagnostic data via Ethernet

Control system and other connections via Ethernet:
- operational data logging
- long-term trend records
- SAP / PM
- teleservice

Ethernet interface:
- Modbus TCP
- OPC server

Binary signals:
- pre-alarm
- main alarm

Maximum length of the sensor cable: 30 m

Ethernet interface:
- OPC server
- octavis software

Direct 24 V DC supply
Black cable: 24 V DC

Further signals
Building-spanning management and visualisation

Manufacturer-independent control system on Ethernet basis with data exchange via different protocols

Control system

Building one

Central computer

Building two

Elevator systems

Building three

Building management concept
### Cost comparison intelligent wiring system AS-Interface

<table>
<thead>
<tr>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laying of cables: cable with PVC sheath DIN VDE 0260 supplied and laid incl. wiring</td>
</tr>
</tbody>
</table>

| Time & costs for troubleshooting, wiring diagrams, components and commissioning times have not yet been included !!! |

#### Explanation of the calculation:
The pure "wiring times" and the resulting costs are compared (figures from the association Zentralverband der Deutschen Elektro- und Informationstechnischen Handwerke).

Time & costs for troubleshooting, wiring diagrams, components and commissioning times have not yet been included !!!
Smoke and heat exhaust ventilation systems (SHEVS)

- Measured signal converter with temperature sensor e. g. TP3237 with TT1050
- Airflow sensor e. g. SL5101
- Vibration diagnosis e. g. VSE002 + VSA001
- Speed monitor Compact e. g. DI6001

Building management concept

SHEVS

Fire damper systems

Sprinkler systems

General concept escalators

Ventilation systems

Sanitary systems

Refrigeration systems

Heating systems

Compressed air systems

Industrial energy towers

Energy monitoring
Fire damper systems and AS-i components at system partner Trox
Sprinkler systems

- Pressure measurement with electronic manometer e.g. PG2457
- Flow monitor with non-return valve e.g. SBY334
- Flow rate measurement Magnetic-inductive flow meter e.g. SM6000
- Capacitive level sensor e.g. KQ6001
- Flow sensor e.g. SI5000
- Vibration diagnosis e.g. VSE002 + VSA001

Building management concept
- SHEVS
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- Sanitary systems
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- Industrial energy towers
- Energy monitoring

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General concept escalators

AS-i as an intelligent wiring system including AS-i Safety at Work

Monitoring of ice build-up via temperature sensor

Temperature monitoring of motor via bolt-on sensor

Analogue control of frequency converter

Rotational speed monitoring, synchronous operation of handrail + staircase

Monitoring of chain tightener and step position

Missing step detection

Emergency-stop functions

Visualisation via CoDeSys

Data exchange with control systems:
- Ethernet via customer-specific XML data structure
- Modbus on IP
- Ethernet via OPC
- Profibus DP
- Ethernet IP (Allen-Bradley)

AS-i ControllerE + AS-i safety monitor with safety function

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Ventilation systems

Pressure measurement with electronic manometer e.g. PG2457

Flow monitor with non-return valve e.g. SBY334

Flow rate measurement Magnetic-inductive flow meter e.g. SM6000

AS-i field module
4 inputs
4..20 mA
 e.g. AC2916

Vibration diagnosis e.g. VSE002 + VSA001

Intelligent wiring system

Airflow sensor e.g. SL5101

Analogue pressure sensor e.g. PTxxxx

Measured signal converter with temperature sensor e.g. TP3237 with TT1050

Speed monitor Compact e.g. DI6001

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Sprinkler systems

General concept escalators

Ventilation systems

Sanitary systems

Refrigeration systems

Heating systems

Compressed air systems

Industrial energy towers

Energy monitoring

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Page 12
Sanitary systems

Building management concept

- SHEVS
- Fire damper systems
- Sprinkler systems
- General concept escalators
- Ventilation systems
- Sanitary systems
- Refrigeration systems
- Heating systems
- Compressed air systems
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Flow sensor
e.g. SI5000

Analogue pressure sensor
e.g. PTxxxx

Capacitive Level sensor
e.g. KQ6001

Intelligent wiring system

AS-i field module
4 x input 4..20mA
e.g. AC2916

Pressure measurement with electronic manometer
e.g. PG2457

Flow monitor with non-return valve
e.g. SBY334

Flow rate measurement
Magnetic-inductive flow meter
e.g. SM6000

Vibration diagnosis
e.g. VSE002 + VSA001

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Page 13
Refrigeration systems

- Analogue pressure sensor e.g. PTxxxx
- Flow monitor with non-return valve e.g. SBY334
- Flow rate measurement Magnetic-inductive flow meter e.g. SM6000
- Measured signal converter with temperature sensor e.g. TP3237 with TT1050
- Volumetric flow quantity and temperature e.g. KSB BOATRONIC M-2
- Pressure measurement with electronic manometer e.g. PG2457
- Vibration diagnosis e.g. VSE002 + VSA001
- AS-i field module 4 x input 4..20mA e.g. AC2916

Building management concept
SHEVS
Fire damper systems
Sprinkler systems
General concept escalators
Ventilation systems
Sanitary systems
Refrigeration systems
Heating systems
Compressed air systems
Industrial energy towers
Energy monitoring

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Heating systems

- Analogue pressure sensor e.g. PTxxxx
- Flow sensor with evaluation unit e.g. SF6200 + SR5900
- Flow monitor with non-return valve e.g. SBY334
- Volumetric flow quantity and temperature e.g. KSB BOATRONIC M-2
- Measured signal converter with temperature sensor e.g. TP3237 with TT1050
- Pressure measurement with electronic manometer e.g. PG2457
- Vibration diagnosis e.g. VSE002 + VSA001
- AS-i field module 4 x input 4..20mA e.g. AC2916

Building management concept
SHEVS
Fire damper systems
Sprinkler systems
General concept escalators
Ventilation systems
Sanitary systems
Refrigeration systems
Heating systems
Compressed air systems
Industrial energy towers
Energy monitoring

As on: 29.08.2016
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Compressed air systems

- Building management concept
- SHEVS
- Fire damper systems
- Sprinkler systems
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- Ventilation systems
- Sanitary systems
- Refrigeration systems
- Heating systems
- Compressed air systems
- Industrial energy towers
- Energy monitoring

Air flow sensor e.g. SL5101

Pressure measurement with electronic manometer e.g. PG2457

Vibration diagnosis e.g. VSE002 + VSA001

Compressed air meter e.g. SD2000

Capacitive Level sensor e.g. KQ6001

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Industrial energy towers

Centralised continuous monitoring (pressure, flow rate and leakage) of all important process media (from left to right):
- Pressurised air 7bar, pressurised air 14bar, vacuum, return heating, forward heating, return process water (cold) building, return coldwater ventilation system, forward process water (cold) building, forward coldwater ventilation system

Pressure measurement with electronic manometer e. g. PG2457
Compressed air meter e. g. SD2000
Flow rate measurement Magnetic-ductive flow meter e. g. SM9000
Industrial energy towers

Provision and monitoring of process media (7bar, 14bar, vacuum, process water cold) at workplace via energy towers.

Further components on the energy tower: Ethernet/IO-Link, fuses, electricity meter, 220V/380V-connection IO-Link data transfer can be realised via Ethernet (fast) or AS-i (approx. 1min cycle) according to speed requirements.
Energy monitoring

Building management concept
SHEVS
Fire damper systems
Sprinkler systems
General concept escalators
Ventilation systems
Sanitary systems
Refrigeration systems
Heating systems
Compressed air systems
Industrial energy towers
Energy monitoring

IO-Link input modules

AC2625 / AL1010  AL1000  AL1030  AL1020  AC5225

Field bus

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Energy monitoring

Target
- Energy monitoring
- Quality management
- Realtime maintenance

Building management concept
SHEVS
Fire damper systems
Sprinkler systems
General concept escalators
Ventilation systems
Sanitary systems
Refrigeration systems
Heating systems
Compressed air systems
Industrial energy towers
Energy monitoring

SPS
Maintenance

Ethernet/TCP

AC5225
MODBUS/RTU
RS485

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Seite 20