Intelligent house
Intelligent building
Home automation
Industrial control
Building automation

1-Wire, RS232, RS485, DS18B20
USB, ETHERNET, DMX512, DS18S20
HVAC, lighting control, DS1822
BMS CIRCUIT DIAGRAMS!
Flood sensors, fire sensors
C#, C++, Delphi DLL library
LabVIEW importable C# DLL
Astronomical clock / timer

AES256 encrypted transmission
Alarm system
Timestamping and salting
Motion sensors and detectors

Home Automation - How To Get Started
Building a Home Automation and Security System
How to Wire Your Home for Automation

Monitoring via a smartphone
Internet operated from smartphone
PLC2011A0 fail safe circuit diagrams. PLC failure will not bring down the light.

http://en.wikipedia.org/wiki/Multiway_switching

"NO", "LIKELY bistable", Smartphone / PC / DLL comands: ISL ICL. This circuit will consume 0.5W more power if the internal relay is turned on.

Sch.1

3-WAY

http://en.wikipedia.org/wiki/Relay

Sch.2

3-WAY

Sch.3

3-WAY

Sch.4

3-WAY

http://en.wikipedia.org/wiki/Relay


This circuit does not consume extra power other than that required for 1-second pulses.

RECOMMENDED !!!

施.1

VOLTAGE PRESENCE_WIRE

施.2

VOLTAGE PRESENCE_WIRE

施.3

VOLTAGE PRESENCE_WIRE

施.4

VOLTAGE PRESENCE_WIRE
"NO", "Bistable + click", Smartphone / PC / DLL comands: INS, INC, INP. This circuit will consume 0.5W more power if the internal relay is turned on.

"NO", "LIKELY monostable", "Input Time to OFF" = 1s, Smartphone / PC / DLL comands: ISL ICL
This circuit does not consume extra power other than that required for 1-second pulses.

ON / OFF "Likely" means conditionally and depends on the state of the input. "Likely" is applicable when sending commands with the "Likely" suffix and "LIKELY monostable" or "LIKELY bistable" mode of operation is selected and the "VOLTAGE PRESENCE WIRE" is used.

http://en.wikipedia.org/wiki/Multiway_switching
http://en.wikipedia.org/wiki/Relay
http://en.wikipedia.org/wiki/Relay
http://en.wikipedia.org/wiki/Voltage_preseance_wire
PLC2011A0 other circuits - power outlets - example

2 x Normal outlets

1. L1 / Live / Hot / 110VAC ... 240VAC
2. EARTH

2 x Standby outlets

3. STANDBY Live / Hot
4. NEUTRAL

THE MOST RECOMMENDED !!!

Use 4 or 5 wire cable to the group of outlets

"NO", "LIKELY monostable", "Input Time to OFF" = 1s, Smartphone / PC / DLL commands: ISL ICL
This circuit does not consume extra power other than that required for 1-second pulses.

http://en.wikipedia.org/wiki/Relay

http://www.elkom.com.tw
PLC2011A0 fail safe circuit - RECOMMENDED FOR BUILDING AUTOMATION !!!

This circuit does not consume extra power other than that required for 1-second pulses.

Be careful what type of bistable relays you are buying! They must be mechanic bistable relays, not consuming power. They must sink 0.00 Watts of energy during standby. Beware of electronic, so called "bistable" relays!
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VOLTAGE PRESENCE WIRE

http://en.wikipedia.org/wiki/Relay

可编程继电器。中国制造的。http://www.elkom.com.tw
PLC2011A0 other circuits - power outlets - example

Sch.18

110VAC / 240VAC

4 or 5x 2.5mm²

4 - 5

110VAC / 240VAC

4 or 5x 2.5mm²

4 - 5

110VAC / 240VAC

4x 2.5mm²

4

110VAC / 240VAC

4x 2.5mm²

4

110VAC / 240VAC

4x 2.5mm²

3

110VAC / 240VAC

3x 2.5mm²

3

PLC2011A0 BOX
PLC2011B0 BOX
PLC2011C0 BOX

http://www.elkom.com.tw
Connecting pulse counters / power meters and similar devices with NPN or PNP transistor output PLC2011A0 input must be low voltage type. Use only external, additional power supply unit. Don't use any external resistors. They are already inside PLC2011A0 (~5k). Never use PLC's power supply unit nor PLC's accu / battery as a voltage source!

DO NOT connect load to the battery because battery charging will fail!!!

RS232 needs a level converter and separate power supply for this level converter !!!

Do NOT connect directly to the PC !!! Use short and shielded cable !!!


DO NOT connect load to the battery because battery charging will fail !!!!
Shielded or unshielded UTP?

Unshielded UTP Cat5e has lower capacitance than shielded Cat5e.
On the other hand Shielded UTP is more immune to the electrical noise then unshielded UTP.
If the environment is quiet and 1-wire cable is far from electric cables then unshielded UTP will give a higher reach then unshielded UTP.
In numbers unshielded UTP in quiet environment and proper topology will allow you to install all 32 thermometers on a long 150-200m cable.
The same but shielded cable will allow only 100m but with higher immunity.

http://www.1wire.org
http://en.wikipedia.org/wiki/1-Wire

Recommended placement of 100nF size:1206 capacitor
Solder directly to “legs”

Leaving two remaining pairs of the ethernet Cat5e cable unconnected, floating.
Do not use them for any purpose. Don't ground them nor use them as a power supply because it will increase capacitive coupling between wires and will reduce reach of the one wire bus.

3 signals: +5V, 1-Wire BUS, 2xGND on any two pairs of wires.
Colors of pairs are not important.
USE: 1-Wire bus and GND in one pair
USE: +5V and GND in another pair
If telephone type, four/six wire flat cable is used, arrange signal order as follows:

**RJ11**
**TELEPHONE FLAT CABLE**

+5V

GND

1-Wire DATA

**PLC2011B0**

**PLC2011C0**

**1-Wire BUS**

Flat cable gives much lower reach than ethernet CAT5e cable!!!
If telephone type, four/six wire flat cable is used, arrange signal order as follows:
Such cable is not recommended for longer networks.

1-Wire BUS topology. Do not route separate cable for each sensor!

Max total length of the bus 150m

In practice it works up to 200 meters in quiet environments, far from power cables, inverters, radio transmitters.

1x32 .. 2x16 sensors to max 4x8 sensors in 4 subnets of the equal lengths

http://en.wikipedia.org/wiki/1-Wire

http://www.1wire.org
ALL switches and sensors are NC
Avoid mixing PIR sensors with Windows for further clarity!
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ALL switches and sensors are NC
Example: only 1 reed switch

Example: only 3 reed switches
PLC2011B0 circuits  ALARM SENSORS

Example: only 2 reed switches

Example: only 2 reed switches

PLC2011B0

Example: only 2 reed switches

Example: only 2 reed switches

PLC2011B0

Example: only 2 reed switches

Example: only 2 reed switches

PLC2011B0

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Example: only 2 reed switches

PLC2011B0

Example: only 2 reed switches

Example: only 2 reed switches

PLC2011B0
PLC2011B0 circuits  ALARM SENSORS

ALL switches and sensors are NC

Make connections close to the window

OR

REED-SWITCH

magnet

magnet

magnet

magnet

RESISTORS

0.5k

1k

2k

4k

0.27k ... 0.56k

0.27k ... 0.56k

0.27k ... 0.56k

0.27k ... 0.56k

http://www.elkom.com.tw
PLC2011B0 circuits  ALARM SENSORS

1 ETHERNET Cable = 16 sensors = 4 Windows!

For clarity follow this rule:

- INPUT1
- COMMON1
- INPUT2
- COMMON2
- INPUT3
- COMMON3
- INPUT4
- COMMON4

UTP Cat 5e Ethernet cable

4 x 2 (UTP)

RESISTORS

0.5k TOP LEFT
1k TOP RIGHT
2k BOTTOM LEFT
4k BOTTOM RIGHT

http://www.elkom.com.tw
PLC2011B0 circuits  Example of smoke detectors / indicators of fire...

http://en.wikipedia.org/wiki/Smoke_detector

DS18B20 on the ceiling can be used as an additional flame / overtemperature detector / sensor.

ALL switches and sensors are NC

Room temperature

Floor heating

Floor heating

Stub max 3m

2 - 4ft
0.7 - 1.3m

Stub max 3m

1-Wire BUS UTP Cat5e

4 x 2 (UTP)
Don't forget to install 3-way and 4-way wiring for lights.
Don't forget to install 4 wires or 5 wires to power outlets.

More cables and sensors can be added. For example for roller shutters, more switches etc...

5 wire cable

Floor heating

Normal and standby outlets

2x Coax and 2x Ethernet

Don't forget to install 3-way and 4-way wiring for lights.
Don't forget to install 4 wires or 5 wires to power outlets.

5x 1.5mm²

4 or 5x 2.5mm²

4 or 5

Sch.1 to 4

4-way

5x 1.5mm²
Roller shutters with electric motors must use the same "hot / live" phase. More cables and sensors can be added. For example for roller shutters, more switches etc...

Colors are as an example and may differ.

2 or 3 wire cable as on Sch.6 (Page3)

More cables and sensors can be added. For example for roller shutters, more switches etc...
Roller shutters with electric motors must use the same "hot / live" phase

Signals in a cable:
Live, Neutral, Earth
Live for Open, Live for Close
(L, N, PE, OPEN, CLOSE)
PLC2011B0 circuits  ALARM INPUTS

From windows and PIR sensors

- PHOTORESISTOR
- RESISTIVE SENSOR
- Flood Sensor
- Resistive Sensor
- Flood Sensor
- Resistive Sensor
- Photoresistor

ANY 0...10k RESISTIVE SENSOR
temperature, level, humidity, wind, rain, soil or other sensors... We can set hysteresis on any analog input.

2 parallel wires

DO NOT connect load to the battery because battery charging will fail!!!

12V 3Ah, 18Ah
Lead acid accu

1.5Ω

EARTH / GROUND / PE

From windows and PIR sensors

http://www.elkom.com.tw
Always use external diodes of any type connected to coils of relays. Any diode will work: 1N4148, 1N4001-7 and so on.

With or without relays

12V RELAY
1N4007
12V RELAY
1N4007
12V RELAY
1N4007
12V RELAY
1N4007

GSM dialer
Siren
AUX
AUX

AUX Power
Power to PIR
2 x ~250mA

Always mount these diodes directly on relays!!!

With or without relays

1-Wire BUS UTP Cat5e

DO NOT connect load to the battery because battery charging will fail!!!

1 x DS2408
Extender with 8 x 1-Wire relays self powered 9-15V

BUS, 2xGND

12V 3Ah..18Ah
Lead acid accu

3.15A

100n

DS18B20

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PLC2011B0 circuits THERMOSTATS and Temperature regulators

1-Wire BUS UTP Cat5e

1-Wire BUS

NEUTRAL

LIVE / HOT 110...240VAC

+12VL

Use only +12VL LEFT 12V

Always mount these diodes directly on relays !!!
PLC2011B0 / PLC2011C0 circuits - DS2408 1-Wire extender with eight relays. It allows to connect additional eight devices, lights, motors, gates, outlets, window shutters etc.

1 x DS2408 Extender with 8 x 1-Wire relays self powered 9-15V

1-Wire DATA BUS
1-Wire 2xGND
1-Wire BUS UTP Cat5e

(110..230)VAC / (9...15)VDC

http://www.elkom.com.tw
 Turning ON/OFF is independent of DMX dimming to avoid dimmer power consumption during the day.
PLC2011C0 circuits - DMX512 BUS / RS485

THE MOST RECOMMENDED !!!

Turning ON/OFF is independent of DMX dimming to avoid dimmer power consumption during the day.
With or without relays

Always mount these diodes directly on relays !!!

Always use external diodes of any type connected to coils of relays
Any diode will work: 1N4148, 1N4001..7 and so on.

Do NOT connect load to the battery because battery charging will fail !!!

Relay 12V 1N4007

EARTH / GROUND / PE
Sometimes in a noisy environment it can be necessary to add pull up and pull down resistors to the DMX BUS. DMX(+) to +5V and DMX(-) to GND through 5k to 10k resistors.

Optically isolated low voltage input, for DMX512 SET and RESET 12VDC to 24VDC. The polarity is not important.