

Project	: InfoControl Network and Modules english
Scope	: InfoControl 2.0 (updated March 2006)
Author	: InfoByte AG

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1. General

To operate the InfoControl 2.0 Network a PC with one free COM-Port and the InfoControl Software is required. On the same PC it is possible to use more than one COM-Port for expansion. The structure is the same for every COM-Port and found in the attached drawing.

2. Network

The different Modules of the Rootsegment are connected to the PC via a Converter. The Power is supplied via Converter too. For this purpose a Power Supply is connected. The Switch-Box is an exception. It has to be supplied by its own mains.

Attention : The Power Supply for Modules and **all** Switch-Boxes have to be supplied by a single phase and must be protected by a **single** fuse or circuit breaker !

One Segment consists of one or two Strings. The total Bus length depends on the number of Modules and the cross-section of the wire. At any point the Supply Voltage must not be less than 20 V. Current consumption of any Module at 20 V is not more than 35 mA. The total current per string is limited by the RJ 12 to 1.2 A. The total number of Modules per string may not exceed 32. Per COM-Port a maximum of 256 Modules is allowed.

The connections are made via RJ 12 6-pole with all Pins 1:1 wired. Wires 1/2, 3/4 and 5/6 must be twisted pairs! To achieve the lowest possible resistance a special cable with 65 Ohm/km should be used.

The following table shows the relation between length of one String and the possible number of Modules. Please note that both Strings together or the whole Segment must be always less than 1000 meter.

String	100 m	200 m	300 m	400 m	500 m	600 m	700 m	800 m	900 m	1000 m
Modules	32	25	17	12	10	8	7	6	5	5

To achieve a high Data Rate the last Module on each side of the Bus must be terminated by fixing two Jumpers on the respective Module, Converter or Repeater. In this way the Onboard Termination Resistors are activated.

To increase the number of Modules or the Bus length a Repeater is used to create different Subsegments.

Attention : It is not allowed to connect Modules under Power !

Attention : The wiring must not be located close to mains voltage !!! It is necessary to use a separate installation.

Attention : The Modules are designed to be used indoors.

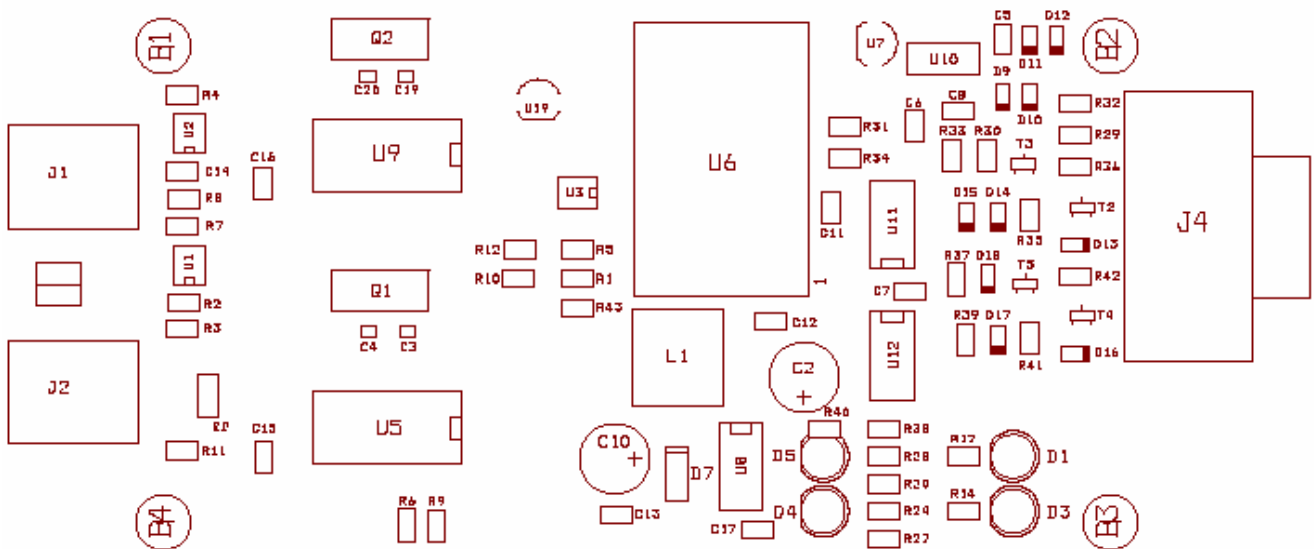
2.1 Converter

The Signal input from the PC is a DB 9 F 9-pole female D-Sub connector as it is used for a Standard RS 232 cable.

The Power connection is a 2.1 mm Power plug.

To connect the different Modules there are two similar RJ 12 plugs. Both plugs can be used depending on the location of the Converter or the Modules. If there is one plug not used the Converter needs to be terminated by fixing two Jumpers located between the two RJ 12 plugs.

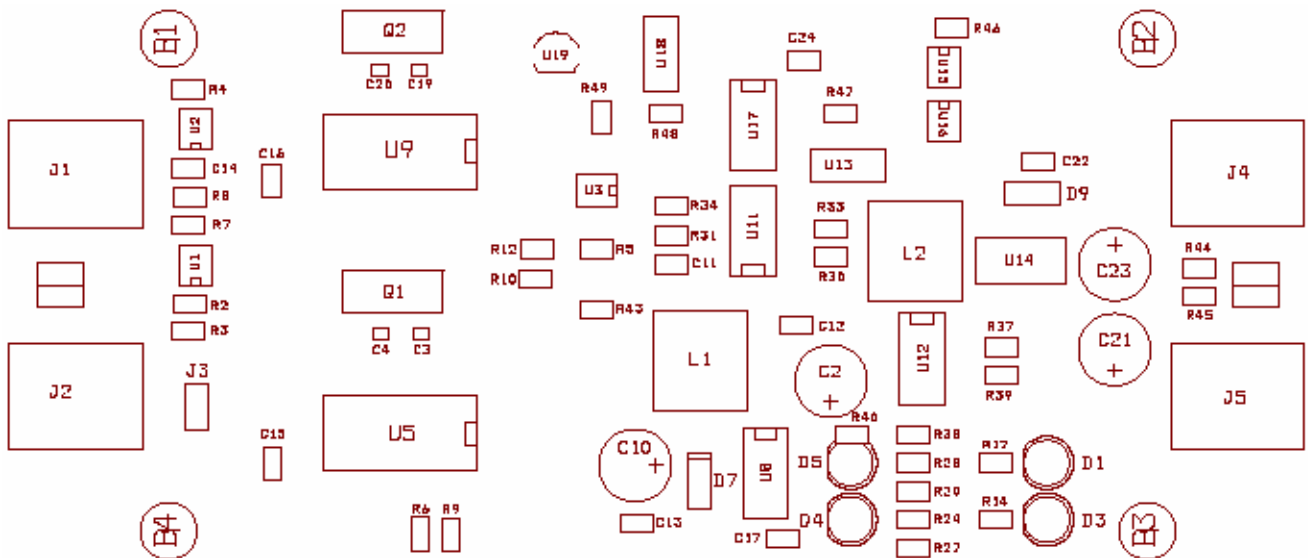
To reduce interference from Ground or Earthloops the Converter is isolated from the PC and isolated up to 1500 VDC.



J4	Connector for RS 232 / PC
J1, J2	Busconnector (1 Segment, 2 Strings)
JP1	Jumper for Termination Resistors (between J 1 and J2)
U9	Processor für Communication with PC
U5	Processor für Communication with Bus
D1	Green LED for Bussupply
D3	Green LED for Convertersupply
D4, D5	Red LED for Trouble

2.2 Repeater

The Signal inputs from the Bus are two RJ 12. The Repeater can be placed anywhere in the Bus and introduces a new segment (isolated with up to 1500 VDC) and increases the number of Modules or the Bus length by two. If it is connected at the end of the segment it needs to be terminated as described in the Converter section. The Power to the new segment is connected via a 2.1 mm Power Plug.



J1, J2 Busconnector New Segment (1 Segment, 2 Strings)
 J4, J5 Rootsegment

JP1 Jumper for Termination Resistors New Segment (between J1 and J2)
 JP2 Jumper for Termination Resistors Rootsegment (between J4 and J5)

U9 Processor for Communication with Rootsegment
 U5 Processor for Communication with new Segment

D1 Green LED for Bussupply
 D3 Green LED for Repeatersupply

D4, D5 Red LED for Trouble

Attention: To achieve a high Datarate the Repeater should have the lowest Serialnumber in the corresponding Segment !

2.3 Operation Modes

To show the Operation Mode there are LED (Light Emitting Diodes) on the Converter and Repeater.

The two green LED D 1 and D 3 show the Status of the Voltage of the Power Supply and the internal Supply Voltage.

To display faults there are two red Light Emitting Diodes D 4 and D 5. After the Power Supply is connected both LED should light up for approximately one second. This indicates a proper Initialization of both Processors and a passed Selftest.

After that both LED should extinguish. Now the LED D 4 indicates the traffic on the Bus or the communication with the internal data memory (FRAM) with a weak flickering.

Die LED D 5 shows on the Converter the Status of the RTS Signal or on the Repeater the traffic on the Rootsegment.

If RTS is False the LED 5 on the Converter is continuously on.

2.4 Diagnostic

Are both green Light Emitting Diodes D 1 and D 3 dark it means either the Power Supply is faulty or not properly connected or there is a short-circuit on the Bus. To differentiate between the two possibilities one should remove all the Modules first. If only D 3 is dark it means the internal Power Supply of the Converter or Repeater is faulty. In this case either the Converter/Repeater needs to be replaced or there is a faulty Module in the Bus.

If both LED do not blink after the Power Supply is connected there is something wrong with the RAM in the Processor or the Flash Program Memory has lost some information (Checksum wrong !)

In most cases it is sufficient to remove the Processor, reprogram it and fix it back. However if this is not successful one has to change the entire Module.

If LED D 5 on the Converter remains on it indicates that the PC is not ready to receive data (RTS False) or the InfoControl SW is not active. On the Repeater it means that the data cannot be sent to the Rootsegment.

Is the InfoControl SW active and the LED remains on the communication with the internal data memory (FRAM) is not working and the Module has to be replaced.

If LED D 4 lights up continuously the Bus is blocked.

If the Bus is very busy it could mean in normal Operation Mode LED D 4 and on the Repeater D 5 as well are flickering !

3. Modules

3.1 General

3.1.1 Installation

It is important to first connect all Modules with each other and without any Supply Voltage. After all the connections are made the Supply of the Power Supply and **all** Switch-Boxes has to be switched on simultaneously !

To connect an additional Module, the Supply to **all** Modules has to be switched off first. Then connect the new Module and switch on the Power again.

3.1.2 Operation

It is possible to connect different Modules depending on the requirements. If the Module is connected at the end of one string it needs to be terminated by fixing two Jumpers beside the two RJ 12 plugs. The operating temperature of the Modules is -10 to $+40$ C. Relative Humidity up to 90 %. The Supply Voltage ranges from 20 to 48 VDC.

The maximum current consumption is

Supply Voltage [v]	Maximum current [mA]
20	35
24	30
48	18

The Switch-Box needs a separate Supply from the mains. It is important to switch on all the Modules and the Switch-Boxes at the same time. Only one phase of the mains and a single Fuse or Circuit-Breaker should be used !

3.1.3 Operation Modes

To indicate the Operation Mode the Modules are equipped with LED.

The green LED on the Switch-Box indicates the Power Supply.

To show different faults there is a red LED on all Modules. After connecting the Power Supply to the Module latest after 3 to 4 s the LED must blink for approximately 1 s. This indicates a proper Start of the Processor and a passed Selftest.

After that the LED should extinguish. Now it indicates the traffic on the Bus or the communication with the internal data memory (FRAM) with a weak flickering.

3.1.4 Diagnostic

If the green LED on the Switch-Box is dark the Power Supply is defective, the mains voltage is missing or the Switch-Box is not wired correctly.

Does the LED not blink the Modules Processor has a fault in the internal RAM or the Flash program memory has lost some information (Checksum wrong !). In most cases it is sufficient to remove the Processor, reprogram it and fix it back. However if this is not successful one has to change the entire Module. Does the LED remain on the communication with the internal data memory (FRAM) is not working and the Module has to be replaced. Does the LED light up after a certain time the Bus is blocked. If the Bus is very busy or there is heavy communication with the internal data memory (FRAM) it could mean in normal Operation Mode the LED is flickering !

Does the LED blink at a high rate one command cannot be sent to another Module. Either the Module was removed or a wrong command is stored.

3.2 Switch-Box

The Switch-Box is used for switching loads with 8 relays. The Voltage is up to 230 VAC and the current from 0.1 A up to either 6 A or 10 A. If the relay is on or activated it is indicated by a green LED.

There are 8 isolated inputs for controlling the Box. This inputs can be adjusted for different input voltages. On every input either no, one or two Jumpers can be fixed. Without Jumper the input is configured for 230 V, with one Jumper for 120 V and with two Jumpers for 12 – 24 V. All control voltages use a common neutral or common. An active input is indicated by a yellow LED.

Two Inputs are used to connect an external isolated contact. An active input is indicated by a yellow LED.

Attention : It is not allowed to connect Voltage or Power to these two Inputs !!!

3.2.1 General

The Switch-Box combines any of it's inputs with any of it's outputs. Inputs can be either 8 photo-coupler isolated voltage, 2 closing contact non-isolated no-voltage or virtual inputs from Switch/Sensor-Module. Outputs are 8 relays with a normally closed (NC) and normally open (NO) contact each.

3.2.2 Definitions

Whenever one input changes, the Switch-Box evaluates the configurations for all inputs stored in the RAM (Backup in NVRAM) and switches the appropriate relays on or off. A rising edge of an input (voltage applied to isolated input, non-isolated input closed, switch pressed on Switch-Module or event in Sensor-Module) starts a function. A falling edge (voltage removed, input opened, switch released or event over) stops a function. A rising edge is called Start, a falling edge Stop. The time between Start and Stop is measured for Relaisgroup Timeout.

A relay can be used independently or it is assigned to a Relaisgroup. The functions of a single relay differ from the ones of a Relaisgroup. Functions for a single relay have no effect on a Relaisgroup and vice versa.

Attention: With the InfoControl Software it is possible to actuate all outputs independent of the assignment to a Relaisgroup. If improperly used this can seriously damage the load !

3.2.3 Independent Relays

There are 8 different functions.

3.2.4 Passive

Start and Stop have no effect on the relays.

3.2.5 Message to Computer

Start sends a message to the Computer. Stop has no effect.

3.2.6 Monostable

Start switches the relay on. Stop switches it off. If a relay is controlled by more than one input in the monostable way these inputs are ORed. The relay switches off after the last of these inputs is not active anymore.

3.2.7 Toggle

Start changes the relais on → off or off → on. Stop has no effect.

3.2.8 Master

Start first checks all relais belonging to the Master. If any of these relais is on, their status is stored in memory and the relais are switched off.

If all relais are off, the status is restored from memory and the appropriate relais are switched on. Stop has no effect.

3.2.9 Absolute On

Start switches the relais on. Stop has no effect.

3.2.10 On for Relais OnTime

Start switches the relais on for the time defined in relais OnTime. Stop has no effect.

3.2.11 Absolute Off

Start switches off the relais. Stop has no effect.

3.2.12 Relaisgroups

It is possible to define up to 4 Relaisgroups with a minimum of 2 and a maximum of 8 relais. After defining a Relaisgroup all relais are initially switched off.

3.2.13 Relaisgroup up/down

Every Start switches the Relaisgroup one relais up or down. Stop is used for Relaisgroup TimeOut. Whenever the time between Start and Stop is longer than the Relaisgroup TimeOut it switches to its initial state.

3.2.14 Interrupt

If Interrupt is selected the Relaisgroup doesn't switch to the next relais directly but switch off all relais first. This ensures that different levels of a load are switched on with a break. (For example the different levels of a Fan).

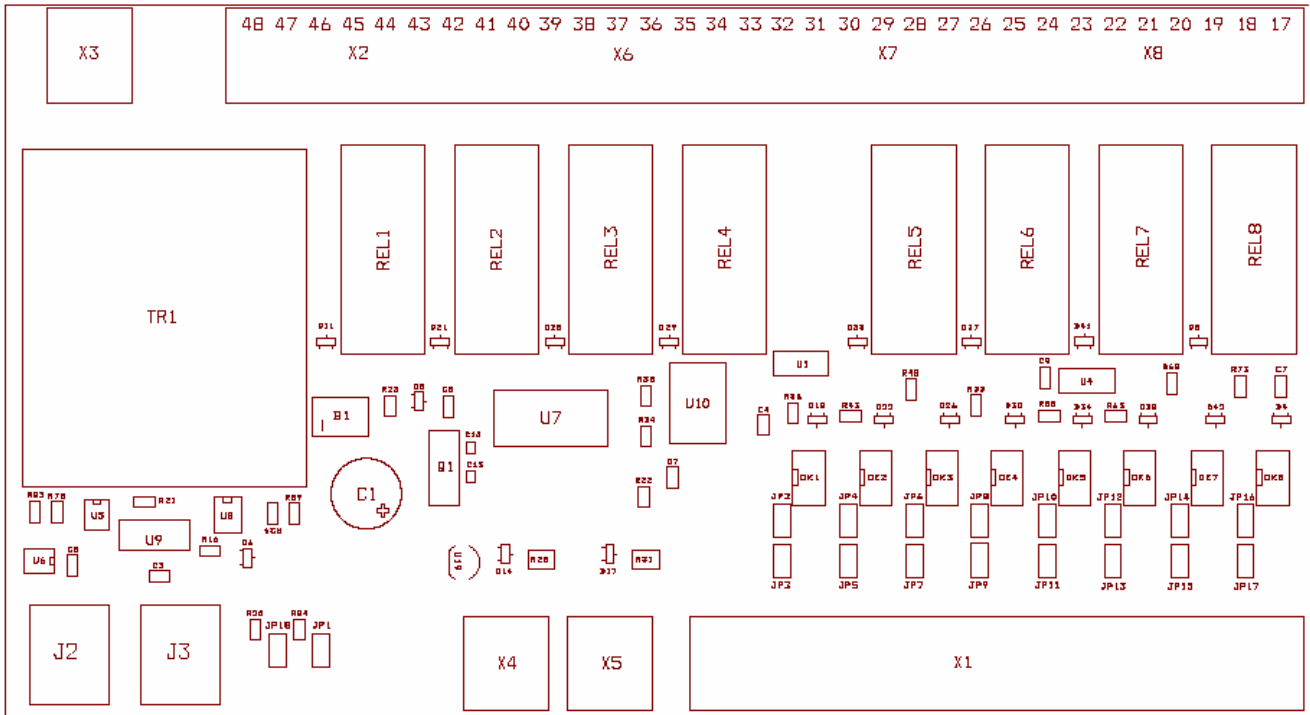
3.2.15 Autoreverse

Normally a Relaisgroup stops for down at all relais off or for up at the last relais on. If Autoreverse is selected the group automatically changes the direction from up → down and down → up. This feature allows to control a group with a single input instead of a separate up and down input.

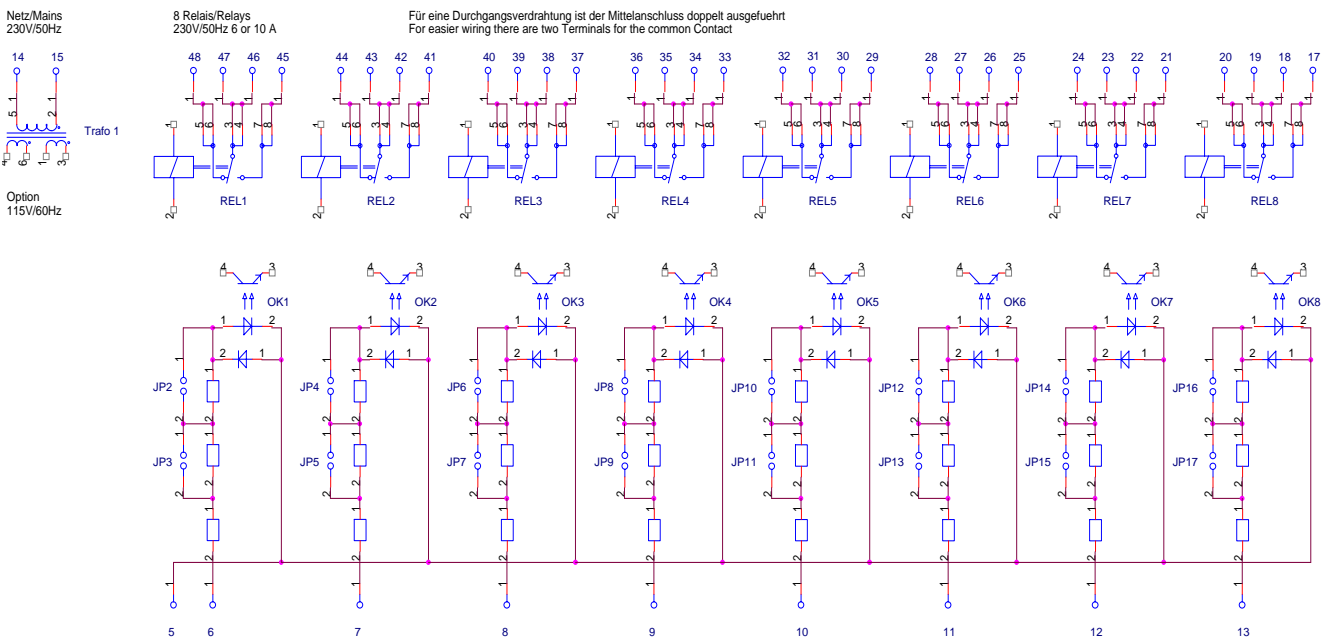
3.2.16 Shuttergroup

The Shuttergroup is a special Relaisgroup with 2 relais and Interrupt and Autoreverse selected. The initial state is both relais off. Every Start will change from first relais on, both off, second relais on, both off and so on. The SW makes sure that there is a minimum deadtime between the two relais. Like this one cannot change between forward and backward to fast. Otherwise some loads would trigger the circuit breaker !

Stop is used for Relaisgroup TimeOut as for normal Relaisgroups but the Shuttergroup will return to its initial state also after the time defined by the TimeOut Shuttergroup is over. With this feature a up or down function can be initiated with a short Start command.



- X3 Mains supply
- J2, J3 Busconnectors RJ 12
- X4, X5 Closing contacts
- X1 Photocoupler inputs (isolated)
- X2, X6, X7, X8 Relays Output
- D8 green LED for Power Supply
- D6 red LED for Trouble
- JP1, JP18 Termination Resistors



Klemme 5 ist gemeinsam für alle Optokoppler
Terminal 5 is common for all Photocouplers

8 Optokoppler wahlweise 230V/50Hz 115V/60Hz 12-24V/50Hz
8 Photocouplers for either 230V/50Hz 115V/60Hz or 12-24V/50Hz

Fuer 230V keinen Jumper installieren / For 230 V No Jumper

Fuer 115V einen Jumper installieren / For 115 V One Jumper

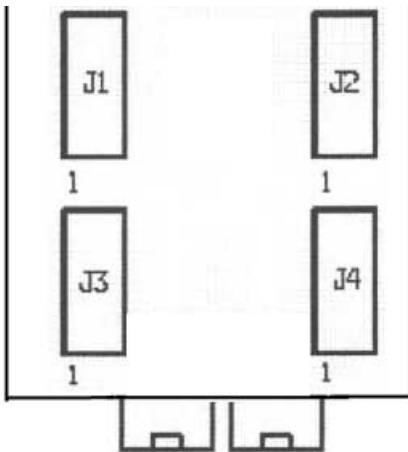
Fuer 12-24V zwei Jumper installieren / For 12-24V Two Jumpers

3.3 Switch-Module

The Switch-Module is used with an array of up to 16 Low Voltage pushbuttons and up to 16 LED indicators. Depending on the requirement different arrays can be used.

The Switches and Light Emitting Diodes can be used on up to 4 Levels. The change between the Levels can be done in different ways. The selection and definition of the operation mode is done with the InfoControl SW.

To connect the different Switches and LED a flatcable is used that is connected via a 10-pole flatcable-connector :



The Pinning of the flatcable (Pin 1 red) is :

J1 Group

Switch	1	2	3	4	GND
Wire	1	4	2	3	5
LED	1	2	3	4	GND
Wire	10	7	9	8	6

J3 Group

Switch	9	10	11	12	GND
Wire	1	4	2	3	5
LED	9	10	11	12	GND
Wire	10	7	9	8	6

J2 Group

Switch	5	6	7	8	GND
Wire	1	4	2	3	5
LED	5	6	7	8	GND
Wire	10	7	9	8	6

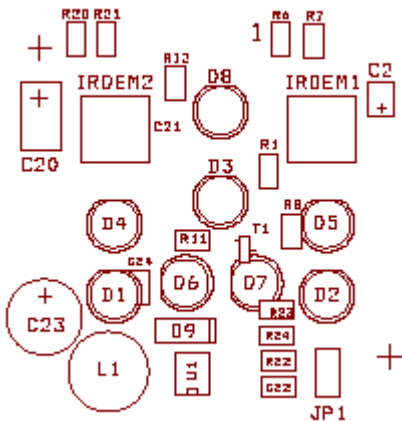
J4 Group

Switch	13	14	15	16	GND
Wire	1	4	2	3	5
LED	13	14	15	16	GND
Wire	10	7	9	8	6

3.4 IR-Module

The IR-Module is used to send, receive or learn Infrared Signals from different sources. For example it can learn, receive and transmit Philips RC5 and B&O. In addition InfoControl contains an extensive library. With the library one can control Feller BeamIt and a great number of common equipment of many manufacturers.

It can be operated in either Normal Power-Save Mode for most applications or High-Power Mode (on the Transmit-Unit one Jumper must be fixed) for high Transmitpower or high range.



Attention : In High-Power Mode the number of Modules on the Bus is reduced by 25 % !!!

3.5 Sensor-Module

The Sensor-Module has to detect and measure the following actions and environment states:

- movement movement of persons and other objects
- pressure pressure of the air in a room or outdoor
- humidity humidity of the air in a room or outdoor
- light the light intensity in a room or outdoor
- temperature temperature of the air or other objects

3.6 Definition of sensor name / type

Each sensor becomes a name appropriate to its type:

- Light
- Movement, IR
- Pressure
- Humidity
- Temperature
- Movement, Radar

3.7 Definition of sensor technology

We use for movement detection two different sensors. One is based on infrared technology, the other works with radar technology. That we can distinguish between sensors of same type but different technologies, we write first name and after technology separated by comma:

- Movement, IR-Sensor
- Movement, Radar-Sensor

3.8 Physical units

Depending on the sensor type are different physical units useful:

- Movement-Sensor m/s meter per second
- Pressure-Sensor mbar
- Humidity-Sensor % percent
- Light-Sensor lux
- Temperature-Sensor °C degree Celsius

3.9 Calibration/Linearization

The Sensor-Module hardware has to be calibrated, if it leaves the factory. Some Sensors need a linearization to get the exact value of the measurement.

sensor	calibration	linearization
Light-Sensor	required	no
Movement, IR-Sensor	no	no
Pressure-Sensor	required	no
Humidity-Sensor	required	required
Temperature-Sensor	required	required
Movement, Radar-Sensor	required	no

3.10 Module Hardware

3.10.1 Configuration

The software can determine, which sensors are on the board and which not. For this functionality the factory has to set or remove some jumpers on the board. The current hardware supports eight different sensors and in maximum six sensors together on the module. The PIC can address the jumpers with a three bit address on the outputs RC 3, 2, 1 with RC 1 as the LSB. The input RC 4 is '1' for jumper and sensor present and '0' for no jumper. RC 5 is spare and must be defined as an output with 0. The jumpers should be read at start-up of the program only.

Jumper	sensor	output RC 321	input RC 4
Li	Light-Sensor	000	1
IR	Movement, IR-Sensor	001	1
Pr	Pressure-Sensor	010	1
Hu	Humidity-Sensor	100	1
Te	Temperature-Sensor	101	1

3.10.2 Voltage reference, VREF

The supply voltage of the module is not exactly enough. Due to this we use a external voltage reference, which has to be enabled in the PIC software:

VREF is connected to pin RA3 on PIC

The GND is not more separate, it has not to be enabled in the PIC software.

3.10.3 A/D Converter

- we use the A/D Converter of PIC18F252, 10 bit resolution
- 10 bit resolution is the standard for each sensor

3.10.4 Sensor signals

Most sensor signals are analog voltages and have to be measured with the internal A/D converter of the PIC processor. The "Movement, IR-Sensor" and "Humidity-Sensor" have a digital output.

sensor	pin on PIC	signal type	measurement
Light-Sensor	RA1	analog, GND..VREF	A/D conversion
Movement, IR-Sensor	RA4	digital, 0/1	bit check
Pressure-Sensor	RA5	analog, GND..VREF	A/D conversion
Humidity-Sensor	RC0	digital, 0/1, 10..20kHz	pulse count
Temperature-Sensor	RA0	analog, GND..VREF	A/D conversion
Movement, Radar-Sensor	RA1	analog, +- VREF/2	A/D conversion

3.10.5 Light-Sensor

Delivers a DC-Signal with superimposed AC-Voltage. The Light-Sensor has a very fast response time.

3.10.6 Movement, IR-Sensor

The digital Output delivers a square wave with a pulse width between 1 and 3 s. After this output signal there is a dead time of the sensor of roughly 3 s before movement can be detected again.

Attention: After switching on the Sensor it must reach the same temperature as the surrounding. If it is taken from hot to cold places or vice versa this will result in wrong output signals since the sensor detects a temperature difference. Important for initial installation.

Room Catch Angle is 104 Degrees horizontal and 30 Degrees vertical.

There is no minimum object distance.

Detection range (Human body) is about 5 m.

3.10.7 Pressure-Sensor

Delivers a pure DC-Signal with fast reaction time. The Warm-up Time is 20 ms.

3.10.8 Humidity-Sensor

Delivers a Square-wave signal with a frequency depending on the humidity. A change in humidity will change the frequency.

3.10.9 Temperature-Sensor

We will use the complete range of the Sensor and it is also possible to select via jumper an external sensor. Delivers a pure DC-Signal with very slow reaction time.

3.10.10 Movement, Radar-Sensor

Delivers two DC-Voltages of VREF/2 with a superimposed AC-Voltage. The Output-Swing is from 0 to 5 V. The Amplitude of the AC is depending on the size of and distance to the object. The frequency depends on the speed of the object .

3.10.11 Absolute maximum ratings

The Sensors have absolute maximum ratings. If these values are exceeded the sensor will be permanently damaged or degraded.

Sensor	Minimum	Maximum
Light	0 lux	100000 lux
Movement, IR		
Pressure	0 mBar	4000 mBar
Humidity	0 %	100 %
Temperature	-50 °C	+150 °C
Movement, Radar		

3.10.12 Operating range

The possible range of the different sensors where the output signal could be measured.

Sensor	Minimum	Maximum
Light	0 lux	100000 lux
Movement, IR		
Pressure	150 mBar	1150 mBar
Humidity	5 %	95 %
Temperature	-30 °C	+130 °C
Movement, Radar		

3.10.13 Measuring range

We use a part of the possible range for our design. This range is depending on the Sensor and the Hardware. The output signal of the Hardware is either voltage or frequency. The Module delivers the SW values to InfoControl-Network with the different resolutions.

Min. Range	Minimum Range used
Max. Range	Maximum Range used
Min. Signal	Minimum Output Signal of the Hardware
Max. Signal	Maximum Output Signal of the Hardware
Min. SW	Minimum Reading of the Module to the InfoControl Network
Max. SW	Maximum Reading of the Module to the InfoControl Network
Resolution	Resolution of the Module

Sensor	Min. Range	Max. Range	Min. Signal	Max. Signal	Min. SW	Max. SW	Resolution
Light	0 lux	5115 lux	0 V	5 V	0	1023	5 lux
Movement, IR			0 V	5 V	0	1	
Pressure	150 mBar	1150 mBar	0 V	5 V	0	1023	0,978 mBar
Humidity	5 %	95 %	15000 Hz	17025 Hz	15000	17025	1 %
Temperature	- 30 °C	+ 130 °C	0 V	5 V	0	1023	0,156 °C
Movement, Radar			0 V	5 V	0	1023	

3.10.14 Technical data

Temp Operating Temperature Range, Communication Module Limit is $-25/+50$ °C
 Error Total Error due to Tolerance, Drift plus Linearity after Calibration
 Tol Tolerance before Calibration
 Drift Change of initial Signal over Operating Temperature Range and Aging of Sensor
 Lin Linearity over whole measuring range
 Time Response time

Sensor	Temp.	Error	Tol.	Drift	Lin.	Time
	°C	%	%	%	%	
Light	-40 / +80	+/- 3,0	+ 82,0	+/- 3,0	0	100 ms
Movement, IR	-10 / +50					
Pressure	-40 / +125	+/- 1,5	+/- 1,5	+/- 1,0	+/- 0,5	1 ms
Humidity	-40 / +180	+/- 3,0	+/- 15,0	+/- 2,0	+/- 1,0	60 s
Temperature	-30 / +130	+/- 1,3	+/- 1,0	0	+/- 1,3	10 s
Movement, Radar	-20 / +60	+/- 10	+/- 10	0	0	

3.10.15 Transfer Functions

The number n is the reading from the Module to the InfoControl Network.

Light-Sensor

Light [lux] = $n \times 5115 / 1023$

Pressure-Sensor

Pressure [mBar] = $n \times (1150 - 150) / 1023 + 150$

Movement, Radar-Sensor

Movement = $n - 511,5$

3.10.16 Linearization Functions

The number n is the reading from the Module to the InfoControl Network. The number f is the frequency from the Module to the InfoControl Network.

Humidity-Sensor

Humidity [%] = $95 - (90 \times (f - 15000) / (17025 - 15000))$

Temperature-Sensor

The Measurement depends on Resistance change :

$$R_{temp} = R_{25} \times (1 + \alpha \times T + \beta \times T \times T)$$

R_{temp} Resistance at Temperature T

R_{25} Resistance at Temperature 25 Degrees Celsius

Linear coefficient $\alpha = 7,88 \times 10^{-3}$

Square coefficient $\beta = 1,937 \times 10^{-5}$

The Temperature Factor k_T is measured and defined as :

$$k_T = R_{temp} / R_{25}$$

$$k_T = k_{(-30)} / (1 - (n \times (-2.5 \times ((k_{(-30)} / k_{(+130)}) - 1)) / (1023 \times 2.5)))$$

$$k_{(-30)} = 0.625$$

$$k_{(+130)} = 2.041$$

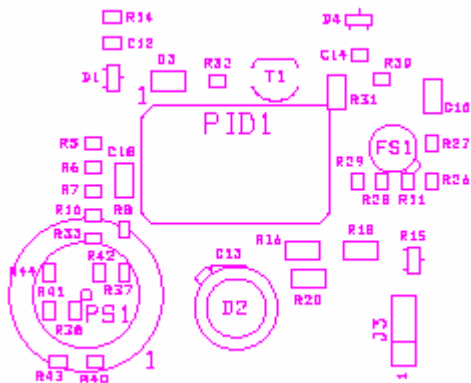
The above reading from the A/D Converter results in the following Temperature at the sensor :

$$\text{Temperature [}^{\circ}\text{C]} = 25 + (\sqrt{(\alpha^2 - 4\beta + 4\beta \times k_T) - \alpha} / 2\beta)$$

3.11 Practical Implementation

The Sensor-Module is used for measuring either Temperature, Humidity, Pressure, Light or Movement Infrared. It can be configured depending on the requirements by fixing the appropriate Sensor and corresponding Jumper on the Measuring-Unit.

The Jumpers are located on the lower side of the PCB and are marked with Li(ght), IR(-Movement), Pr(essure), Hu(midity) and Te(mperature).



PS1	Pressure-Sensor
PID1	Passiv-Infrared Movement
FS1	Humidity-Sensor
R15	internal Temperature-Sensor
D2	Light-Sensor

Attention: Only after the Operating Temperature of the Sensormodule is reached (about 30 min.) the display will be correct !

For the internal Temperature-Sensor a Jumper has to be fixed on the upper position of J 3. To work with an external sensor one has to remove the Jumper and connect the external Sensor on the lower position of J 3. The Module can measure – 30 to 130 C.

3.12 Radar-Sensor

The Radar-Sensor is used for Movement detection with Microwave Frequency. It is suitable for measuring the Movement through walls or other obstacles. For the Zero- or Offsetadjustment in the factory the Jumper has to be fixed in the position adjustment. If the InfoControl SW shows exactly Zero the Jumper must be fixed in position operation !

Attention : Thick concrete walls and steel armour will greatly reduce efficiency !!!

3.13 Virtual Inputs

A Virtual Input contains objects, relations and a time frame. Examples:

sensor 1 AND sensor 2 -> in this case is AND the relation
 time frame AND sensor 3 OR sensor 4 -> in this case are AND, OR the relations
 sensor 1 OR time frame AND sensor 4 -> in this case are OR, AND the relations

Sensor X could be for example Light high, Pressure Low and so on

The first Virtual Input contains two objects with one relation.

The second and third Virtual Input contains three objects with two relations.

The maximum number of Virtual Inputs in the Sensor-Module is 10 !

3.13.1 Object

- the user can involve every "Object" only one times per Virtual Input
- a "Object" is a sensor or a time frame
- in maximum we have 5 sensors and one time frame, this means 6 objects
- between 6 objects are 5 relations, maximum 5 times OR / AND, examples:

o1 AND o2 AND o3 AND o4 AND o5 AND o6 o = "Object"
 o1 OR o2 OR o3 OR o4 OR o5 OR o6
 o1 AND o2 OR o3 AND o4 OR o5 AND o6
 o1 OR o2 AND o3 OR o4 AND o5 OR o6

3.13.2 Relation

- the supported relations are AND, OR
- use the default priority, where AND overrides OR
- use no brackets, take always the default priority

3.13.3 Time frame

The object "time frame" describes a begin time and a end time over one week. There are always both time points to set, "from" and "to". The minimum of a time point is 00:00 and the maximum of a time point is 23:59. We define also a set of weekdays on them the "time frame" is valid. All of the days, one of the days or any combination of the days must be possible.

Example:

Time	from	09:00
	to	21:30
Weekday	Monday	⊗
	Tuesday	⊗
	Wednesday	○
	Thursday	⊗
	Friday	⊗
	Saturday	○
	Sunday	○

3.14 Definition of "Virtual Output"

A Virtual Output is a message, that transmits information over the network. The destination module has to process this message and to act according the contained information. Currently we support Switch Commands, Infrared Commands and Communication.

3.14.1 Switch Command

Every input from a Module (Switch-Box, Switch-Module or Sensor-Module) can send a Switch Command to a Switch-Box. The maximum is 32 commands per input.

The Switch-Box can send the state of a relay back to a Switch-Module if the LED Output (maximum 16 per Relay) is selected.

3.14.2 IR Command

Every input from a Module (Switch-Box, Switch-Module or Sensor-Module) can send a IR Command to a IR-Module. The maximum is 40 per Module.

3.14.3 Communication

Every input from a Module (Switch-Box, Switch-Module or Sensor-Module) can send a Command to the PC. The PC then evaluates the command and sends for example one SMS or Email.

4. Power Supply

The Power Supply is 48 VDC. It must be Short-Circuit proof. Voltage Tolerance +/- 10 %. Current Rating depending on the number of Modules (35 mA each Maximum).

Please note the minimum Voltage of 20 V at any point of the Network due to the Voltage drop in the wiring ! A calculation formula is available on request.

The Power connector is a 2.1 mm Power Plug with Plus inside and Minus outside.

Attention : The Supply needs the Approval of the Authorities in the corresponding country !!!

5. InfoControl Network Wiring

