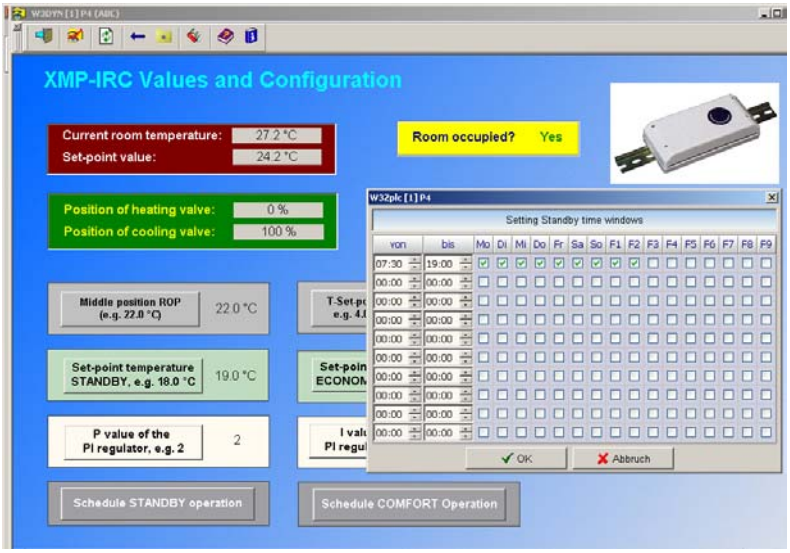
Babylon ***Uranus*** *XMP*

Building automation (BA)

Connection and parameter settings of the XMP-IRC

(Individual room controller)



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Contents

1 General remarks

This documentation contains all necessary information for putting into service the **XMP-IRC** (**I**ndividual **R**oom **C**ontroller). The documentation is directed on qualified personal with expert knowledge in electrical installations.
During operation of the **XMP-IRC** certain components of that device carry dangerous voltage. Because of that pay attention on it that disregarding of the saveguards given in this documentation can have in consequence serious personal injuries but also material damage.
The installation as well as the putting in operation of the device should be subject exclusive for personnel which was beeing instructed for this device.
The error-free regular operation of the device as well as the safety-technical aspects connected with it presume besides the professional mounting also the correct operating and maintenance of the device.
For the wiring to the **XMP-IRC** and the field devices connected on it, respectively, the corresponding VDE instructions have to be considered. An adequate distance to high voltage or high-frequency wires of other electrical devices must be guaranteed.

2 Technical data of the XMP-IRC

Power supply:	24V AC (alternating current) **A separate 24V AC power supply must be used for supplying the adjusting drives!**

Current consumption:	approx. 40 mA in idle mode approx. 250 mA with load
Power consumption:	approx. 1 W in idle mode approx. 6 W with load
4 digital inputs:	opto-coupler operation; device own operation voltage
3 digital outputs:	with closing contact function max. current: 5A for 250V~ or 30V-.
2 analog outputs:	0..10 V DC for control-motors (adjusting drives)
3 analog inputs:	**AI0** temperatur sensors Pt1000, Pt100, Ni1000 standard Messurement range : 10…35 °C Messurement accuracy : ±1.5 K **AI1** set-point transmitter (0..1 kOhm)

Ambiance conditions:	in operation: 0 to 50°C (32 to 122°F) storage: -40 to 70°C (- 40 to 158°F) 5 - 95% relative humidity, non condensing
Software versions	XMP-IRC : **V1.3** XMP-GA-Box-IRC: **V3.1**

Attention!

The adjusting drives for the heating and cooling valves - which are controlled by the analogue outputs of the **XMP-IRC** - must be supplied by a separate power supply **absolutely!**
That means: The power supply for the operation of the **XMP-IRC** and those of the adjusting drives must not be the same!
The ignoring of this hint can effect serious damages on the **XMP-IRC**.

3 Integration of the XMP-IRC into the BABYLON/NT system

The **XMP-IRC** was created for the connection at the host system **BABYLON/NT** primarily. Up to 32 **XMP-IRC** can be connected at the **XMP-GA-Box-IRC** controller module which is connected with the **BABYLON/NT** system by a local network. Within the **XMP-GA-Box-IRC** the IRC parameters and the *STANDBY* and *COMFORT* time schedules will be saved. After restarting the **GA-Box-IRC** and the **XMP-IRC** (e.g. for reasons of a power failure) the regulation will continue with the last parameter settings which are saved in the GA-Box.
The first start of the **XMP-IRC**'s (after installation) is realized with default parameters which are set in the **XMP-GA-Box-IRC** (see also 6.3 Data points of the XMP-IRC).

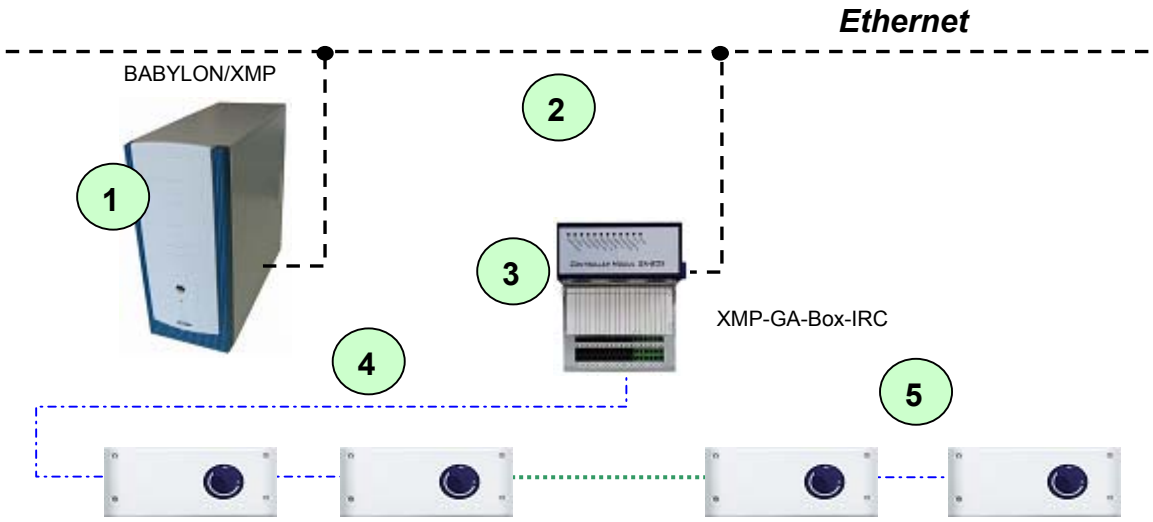


Fig. 1: Integration of the XMP-IRC into the automation system BABYLON/NT

1. BABYLON/NT host computer
2. local network (Ethernet)
3. XMP-GA-Box-IRC
4. RS485 databus to the IRC
5. up to 32 XMP-IRC (hardware addresses 0..31)

Hint:
It is also possible to run the **XMP-IRC** stand-alone – that means, without **BABYLON/NT** and **XMP-GA-BOX-IRC**. The IRC will work also with default values in this case. But pay attention on it, that no time schedules and re-settings of controller parameters are possible.

4 Operation modes of the XMP-IRC

There are three different operation modes which are relevant for the parameter settings of time windows of the **XMP-IRC**:

4.1 ECONOMY mode

In *ECONOMY operation* the IRC **cannot** be switched in COMFORT operation. Set-point transmitter and presence push button of the room operation device are **not** active.
For reasons of energy saving cooling is **not** possible in *ECONOMY* operation.
During the heating period the room is kept on a temperature (*ECONOMY* set-point) which makes it possible to heat-up again to the *COMFORT* temperature range in a relative short time (e.g. 17°C).
Heating will be interrupted if a window is opened.
The *ECONOMY operation* mode is always active than, if neither the *STANDBY* nor the *COMFORT operation* mode was activated.

4.2 STANDBY mode

In *STANDBY operation* the IRC can be switched in COMFORT operation by releasing the presence contact (presence push button). I.e., after pressing the presence push button the room temperature set-point transmitter of the room operation panel comes in function.
For reasons of energy saving cooling is **not** possible in *STANDBY operation*, too.
During the heating period the room is kept on a temperature (*STANDBY* set-point) which makes it possible to heat-up again to the *COMFORT* temperature range in a relative short time (e.g. 19°C).
Heating will be interrupted if a window is opened.
The *STANDBY operation* times can be set by **BABYLON/NT** time schedules or routines.

4.3 COMFORT mode

The *COMFORT operation* can be realized only in time ranges of IRC *STANDBY* operation (STANDBY time window). In *COMFORT operation* the operator can adjust the room temperature on a pleasant value (e.g. 22°C ±4 °C) at the room operation panel. If the *COMFORT operation* is not realized via presence push button, the activation can also be realized by parameter setting.
Heating and cooling will be interrupted, if the dew-point is reached or a window is opened.

5 Connection of the XMP-IRC

5.1 Description of the circuit board

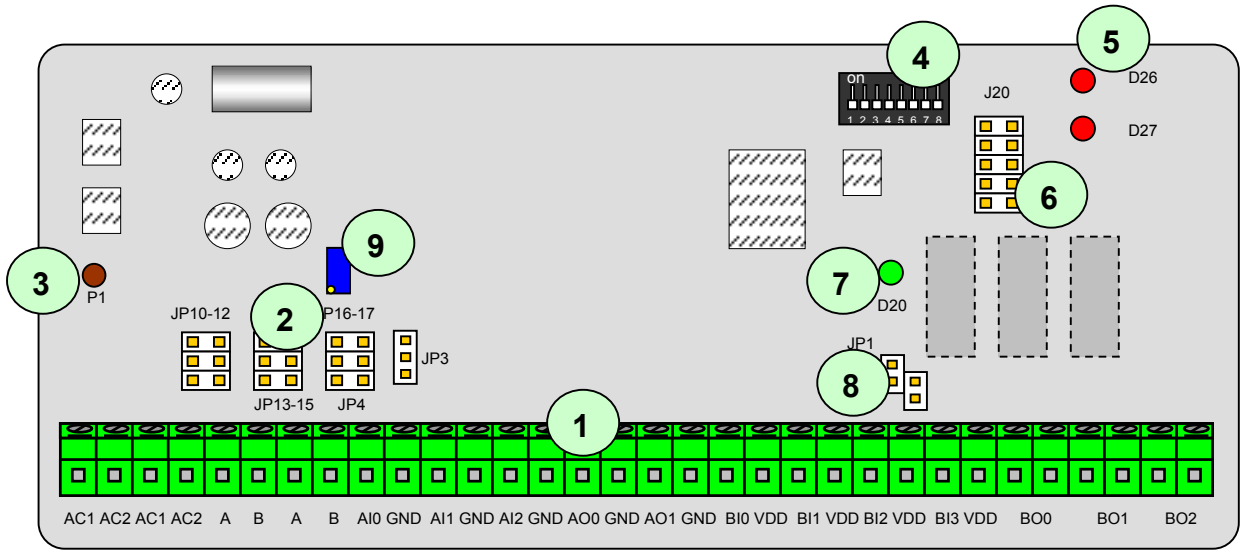


Fig. 2: Scheme of the IRC circuit board

1. termination ledge
2. jumper blocks for configuration of the peripherie
3. potentiometer for justifying the nominal value adjuster
4. micro switch block for addressing the IRC (0..31)
5. communication LED's (GA-Box ←→ IRC)
6. programming interface
7. operation status display IRC
8. jumper block for configuration of the BO0 (potentialfree or carrying voltage 15 V for triggering the set-point adjuster presence LED)
9. potentiometer for justifying the Pt100 temperature sensor

5.2 Terminal occupancy

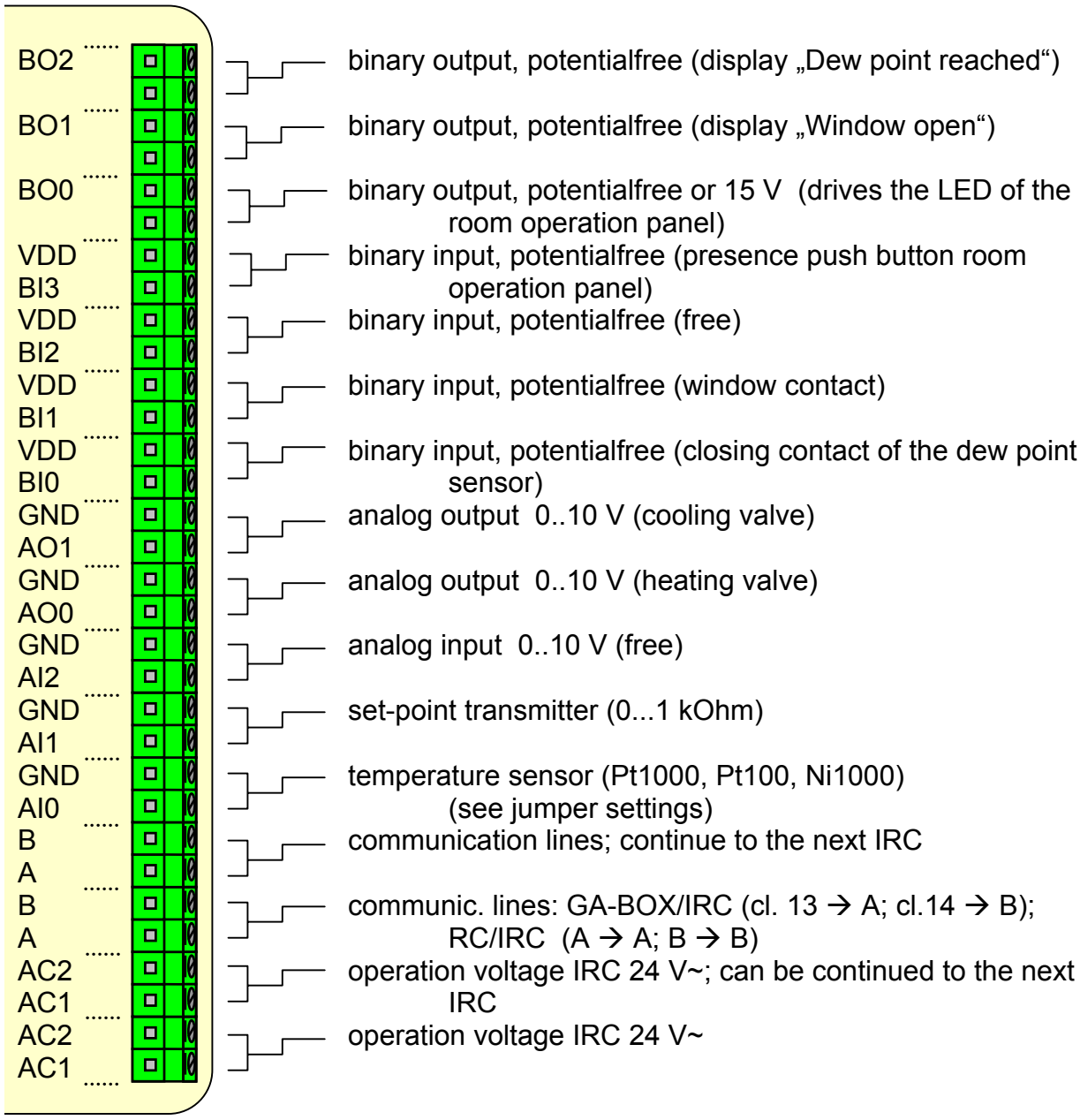


Fig. 3: Termination clamps of the IRC

5.2.1 Binary inputs

There is a potential difference of 15 V between the terminals BI0..BI3 and VDD. The binary inputs will be set activ from the side of the field by potentialfree contacts.

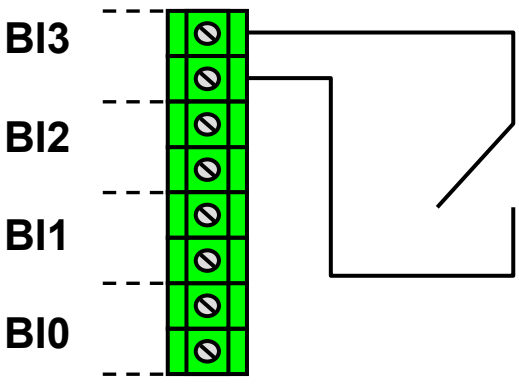


Fig. 4: Connection example for a binary input

- BI0 acts as closing contact of the dewpoint sensor. If not set in other way it will activate BO2.
- BI1 acts as opening contact for the windows of the room. If not set in other way it will activate BO1.
- BI2 is not used at the moment
- BI3 acts on BO0 and thus activates the presence LED on the room operation panel.

Hint:
Using the **CO** (configuration) attribute of the **AC** datapoint it is possible to configure certain binary inputs as opening or closing contacts, as pushbutton or as raster.

5.2.2 Binary outputs

The binary outputs BO0..BO2 are potentialfree outputs with closing contact function. The BO0 can be configured carrying voltage (15 V) via jumpers (position 8 in Fig. 2). This output is provided for driving a LED installed on the room operation panel. For BO1 and BO2 this option does ***not*** exist!

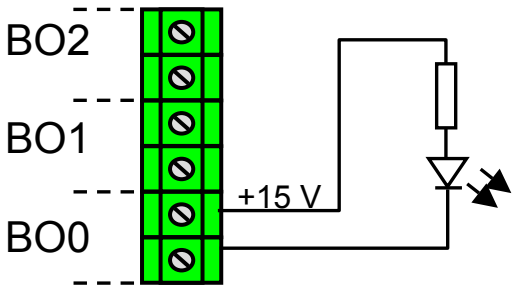


Fig. 5: Connection example for a binary output. For this the BO0 has to be jumpered as carrying voltage (15 V).

Fig. 6: Configuration of the BO0 a) as potentialfree, b) as carrying voltage (15 V) by jumpers

The jumper blocks correspond to position 8 in Fig. 2

Attention!
This option is valid exclusive for BO0!

- BO0 drives the presence LED on the room operation panel activated by the presence button or by the system indicating the running *COMFORT* operation of the XMP-IRC.
- If not set in other way the BO2 is activated if the dewpoint sensor comes into reaction.
- If not set in other way the BO1 is activated if the window contact is released.

Hint:
It is possible to overdrive the BO's signal (normally set by the regulation control) also by the BABYLON/NT system corresponding to the user's requirements.
For this the **O0..O2** attributes of the **AC** datapoint must be set on corresponding values (**0 = OFF**, **1 = ON**).

5.2.3 Analog inputs

The analog inputs AI0 and AI1 are provided for the direct connection to the room operation panel - AI0 for the temperature sensor (Pt1000, Pt100, Ni1000-standard) and AI1 for the input signal of the temperature set-point transmitter (range 0..1kOhm). AI2 is not used at the moment.

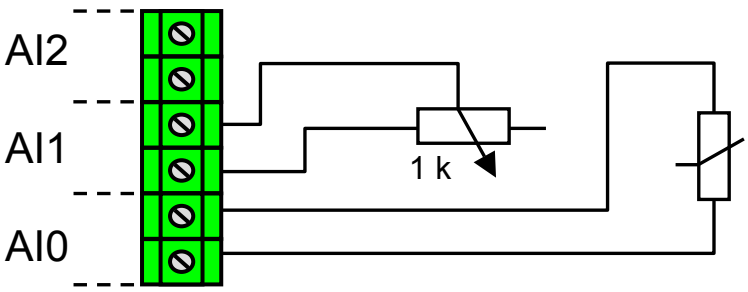


Fig. 7: Connection example for the analog inputs

The IRC periphery from the side of the field can be configured by positioning corresponding jumpers (position 2 in Fig. 2), e.g. set-point adjuster connected / not connected, temperature sensor connected / not connected, type of temperature sensor: Ni1000-standard/ Pt1000 or Pt100.

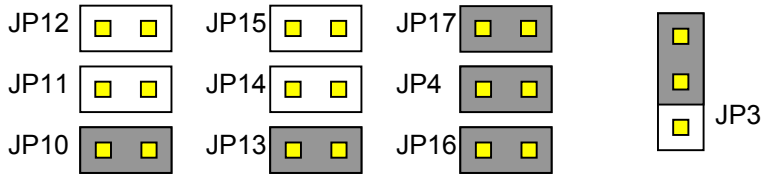


Fig. 8: Jumper positions in in delivery state.

- Set-point transmitter connected JP17,
- Pt1000 connected (JP3, JP4, JP10, JP13, JP16)

Overview of jumper setting possibilities for the analog inputs

(JP3 always must be set in upper position)

Connection status	**JP16**	**JP10**	**JP13**	**JP11**	**JP14**	**JP12**	**JP15**	**JP4**	**JP17**	**JP3**
Set-point transmitter (0..1kOhm)									●	●
Pt1000	●	●	●					●		●
Pt100	●			●	●					●
Ni1000 – standard	●					●	●	●		●

5.2.4 Analog outputs

The output voltage range for the analog outputs AO0 and AO1 is 0 - 10V DC.

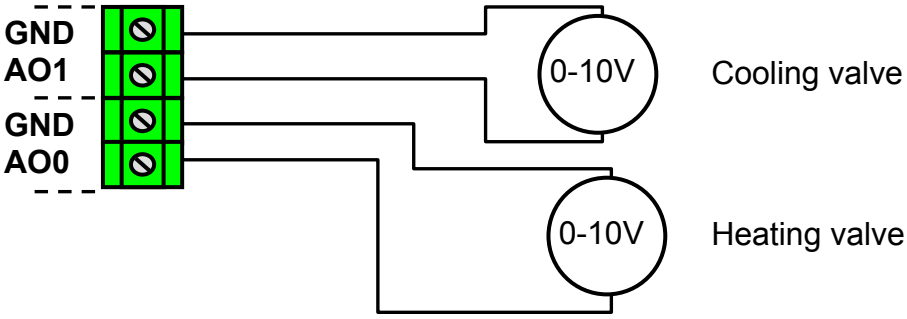


Fig. 9: Connection example for analog outputs

AO1 must be connected with the driving input of the control-motor for the cooling valve, and AO0 with the driving input of the control-motor for the heating valve.
The maximum burden (R_{min}) is 600Ω per output.

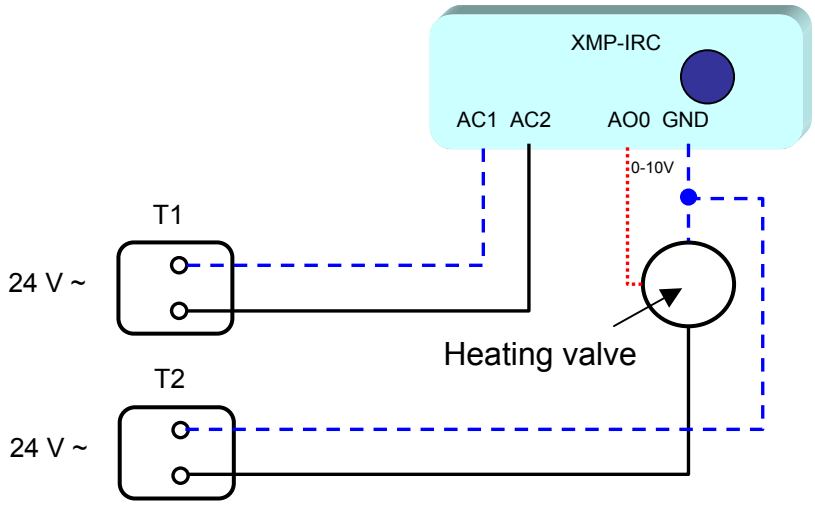


Fig. 10: Scheme for the connection of a heating valve with an operating voltage of 24 V ~ and a driving voltage of 0 – 10 V DC.

Attention!
The adjusting drives for the heating and cooling valves - which are controlled by the analogue outputs of the **XMP-IRC** - must be supplied by a separate power supply **absolutely!**
That means: The power supply for the operation of the **XMP-IRC** and those of the adjusting drives must not be the same!
The ignoring of this hint can effect serious damages on the **XMP-IRC**.

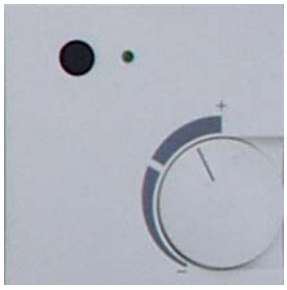
5.3 Connection of a room operation panel to the XMP-IRC

The individual room controller **XMP-IRC** is designed for the connection of the following room operation panels:

- RTF5 NI1000 (standard)
- RTF5 PT1000
- RTF5 PT100

The possibility to connect other types of room operation panels must be proved in particular case.
The following table shows the terminal occupancy of the **XMP-IRC** corresponding to the terminal occupancy of the room operation panel **RTF5 PT1000** (representative).

IRC terminal	room operation panel terminal no.
BI3	10
VDD (BI3)	11
BO0 (left)	1
BO0 (right)	9
AI1	5
GND (AI0)	4
AI0	3



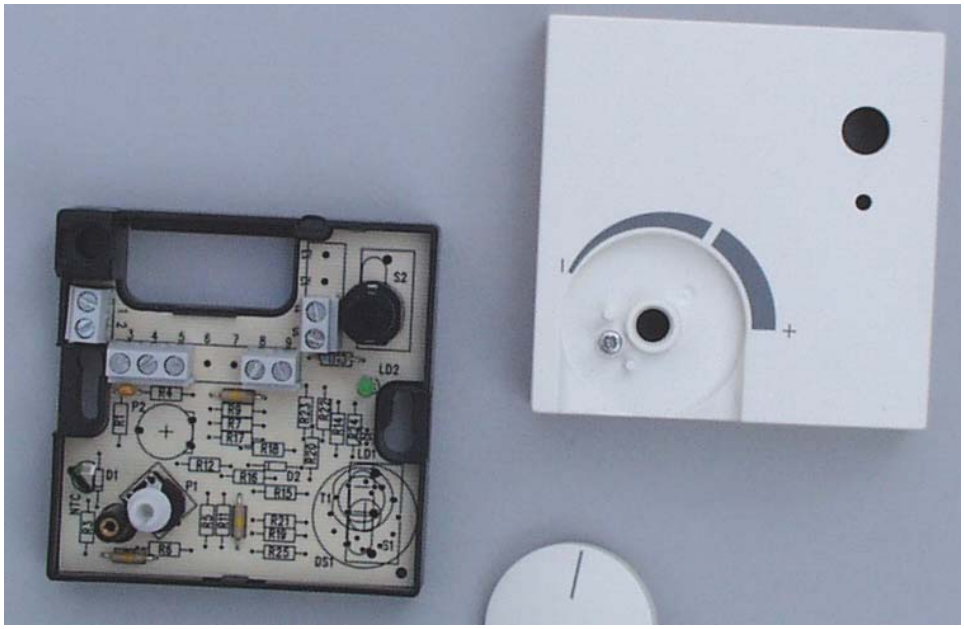
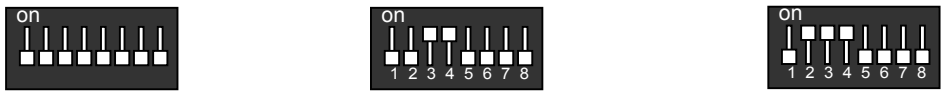


Fig. 11: Room operation panel RTF5 PT1000

5.4 Addressing

The addressing of the **XMP-IRC** is realized by micro switches which are being on the IRC circuit board (position 4 in Fig. 2). With the micro switches the IRC address (0..31) must be adjusted in binary coded manner.



a) b) c)

Fig. 12: Addressing examples: a) address 0, b) address 12, c) address 14

5.5 Communication interface

The data transfer between BABYLON/NT substation (XMP-GA-Box-IRC) and XMP-IRC is realized via the the corresponding communication interfaces**.**

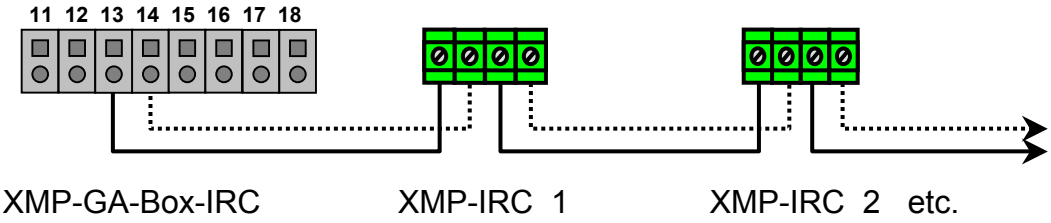


Fig. 13: Connection of the communication interfaces between the XMP-IRCs and the XMP-GA-Box-IRC and XMP-IRC, respectively.

Hint:
In stand alone operation of the IRC the terminals A and B must not be connected. After restart the **XMP-IRC** the regulation is determined by default values given in the IRC firmware.

5.6 Programming interface

The **XMP-IRC** circuit board is equipped with a programming interface for firmware updates (position 6 in Fig. 2).
The programming procedure of the **XMP-IRC** is described in a separate documentation.

6 Parameter settings for the individual room controller and the XMP-GA-Box-IRC, respectively

The announcement of the substation for the management system **BABYLON/NT** must be realized corresponding to the following procedure:

1. assignment of an IP address for the **MNET** assembly of the substation **XMP-GA-Box-IRC** corresponding to the hardware address;
2. announcement of the substation in the ***MBOX Configuration*** of **BABYLON/NT**;
3. creation of IRC data points.

6.1 Assignment of an IP address

Within the DOS input window:
Example:

```
D:\exos386p>U3SIP 2 192.168.002.202
```

U3SIP = BABYLON utility program for the assignment of an IP address
2 = hardware address of the substation
192.168.002.202 = IP address that should be assigned to the substation

6.2 Announcement of the substation in the MBOX Configuration

- ***Main Menu***
- ***Configuration***
- ***MBOX-Config.***
- Select the corresponding position
- *F5 Device* → select 01 MBOX
- *F2 Change*
- Enter IP address!
- Activate polling by setting the flag in column ‚Poll'!
- Confirm the entries with <Enter>!
- The asterix in the column ‚Errors' is a hint for the correct communication to the substation.

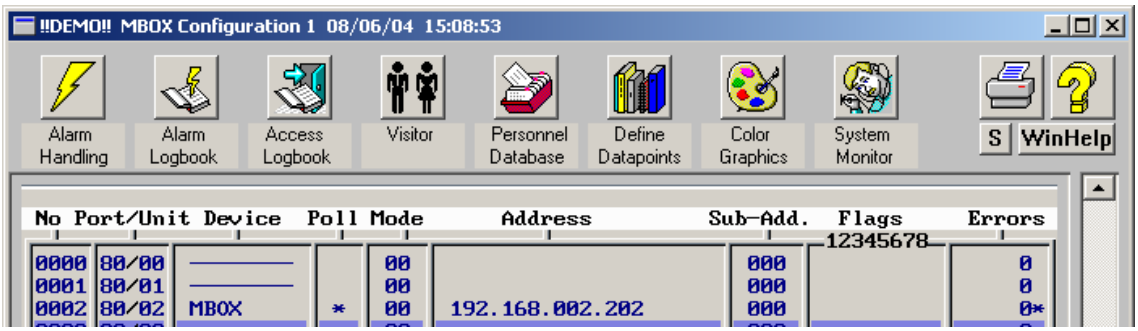


Fig. 14: Announcement of the substation in the MBOX Configuration page 1

- On the second page of the ***MBOX configuration*** with F5 the driver “GABOX “ has to be selected.
- Confirm the entries with <Enter>!

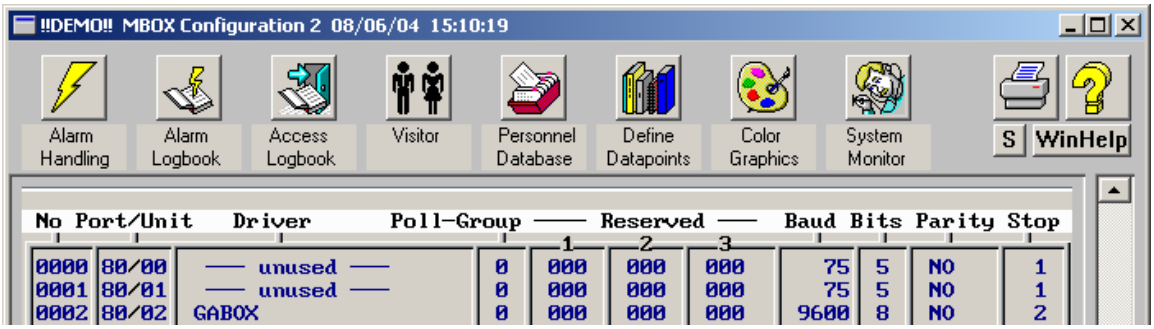


Fig. 15: Announcement of the substation in the MBOX Configuration page 2

Now the **XMP-GA-Box-IRC** is announced.

6.3 Data points of the XMP-IRC

For reading and setting the IRC data one AC type data point per connected XMP-IRC has to be created.
On card 0 channel 0..31 of this AC data point the following attributes are available.

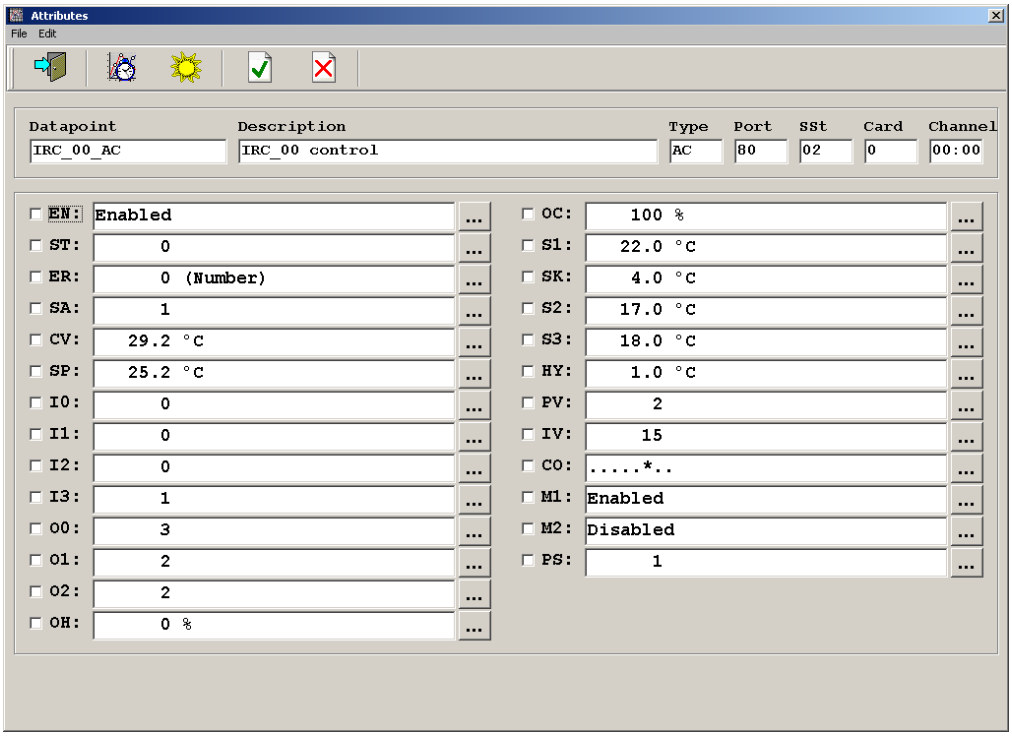


Fig. 16: Data point attributes for a XMP-IRC connected at the XMP-IGA-Box-IRC

Meaning of the Attributes

Desig-nation	Description	Default value	Read/ Write
EN	**ENABLE POLLING** Setting 1: enables the polling from the XMP-GA-Box-IRC to the XMP-IRC Setting 0: disables the polling	-	W
ST	**COMMUNICATION STATUS** 0 = OK	-	R
ER	**TRANSMISSION COUNTER** Counts the number of transmission errors. During real-time monitoring the value should be constant for error free transmission.	-	R/W

Desig-nation	Description	Default value	Read/ Write
SA	**SABOTAGE INPUT** 0 = OK 1 = sabotage alarm	-	R
CV	**CURRENT VALUE** Displays the current room temperature in °C	-	R
SP	**SET-POINT VALUE** Displays the actual temperature value currently adjusted by the set-point transmitter of the room operation panel.	-	R
I0..I3	**BINARY INPUTS** Current states of the binary inputs **BI0..BI3** 0 = activated 1 = not activated (see also **CO** attribute)	-	R
BO0..BO2	**BINARY OUTPUTS** Current states of the binary outputs **BO0..BO2** 0 = OFF - set by the system user, overdrives the IRC control 1 = ON - set by the system user, overdrives the IRC control 2 = OFF - set by the IRC control 3 = ON - set by the IRC control	-	R/W
OH	**HEATING OUTPUT** Opening status of the heating valve in %	-	R
OC	**COOLING OUTPUT** Opening status of the cooling valve in %	-	R
S1	**SET-POINT COMFORT** Defines the set-point for the *COMFORT* temperature if the potentiometer of the set-point transmitter is in middle position	22.0°C	W
SK	**SET-POINT COMFORT CORRECTION** Defines the range of influencing the room temperature around the middle position of the set-point transmitter. **T_{min} = S1 – SK** **T_{max} = S1 + SK**	4.0°C	W

Desig-nation	Description	Default value	Read/ Write
S2	**SET-POINT ECONOMY** Defines the set-point for the *ECONOMY* temperature.	17.0°C	W
S3	**SET-POINT STANDBY** Defines the set-point for the *STANDBY* temperature.	18.0°C	W
HY	**REGLER HYSTERESE** Defines the range of the contoller hysteresis. Within this range the position of the heating or cooling valves stay constant.	1.0°C	W
PV	**REGLER PROPORTIONALBAND** Defines the P value for the PI regulation.	2	W
IV	**REGLER INTEGRAL VALUE** Defines the I value for the PI regulation.	15	W
CO	**CONFIG** The use of this attribut allows the configuration of the binary inputs as follows: **BI0:** Closing contact: **. . . . . _** Opening contact: **. . . . . x** **BI1:** Opening contact: **. . . . . _ .** Closing contact: **. . . . . x .** **BI3:** Push button: **. . . . . _ . .** Raster: **. . . . . x . .** Closing contact: **. . . . _ . . .** Opening contact: **. . . . x . . .** (**_** means: no flag must be set at this position **x** means: flag (*) must be set at this position) Combinations are possible.	. . . . .	W
M1	**STANDBY ACTIVE** If enabled the STANDBY operation mode is active. The attribute can be used for activating Stanby operation times with the help of BABYLON/NT time schedules.	enabled	W

Desig-nation	Description	Default value	Read/ Write
M2	**COMFORT ACTIVE** If enabled the *COMFORT* operation mode can be forced by the user. **But, this is only possible if the M1 attribute is enabled.** The attribute can be used for activating *COMFORT* operation times with the help of BABYLON/NT time schedules. **The M2 attribute overdrives the current switching position of the room operation panel!**	disabled	W
PS	**PRESENT STATUS** Displays the occupation status of the room. 0 = room is not occupied 1 = room is occupied (only possible in Stanby operation mode)	0	R

The *COMFORT operation* times can be set by BABYLON/NT time schedules or routines. **However, this is also possible only in time windows for which the STANDBY operation mode is already active.**

Activation possibilities of the operation modes - overview

ECONOMY mode	STANDBY mode	COMFORT mode
Active	-	-
Active	**Active**	-
Active	Active	**Active**

Hint:
The *ECONOMY operation* mode must not considered separately because this mode is always than active if neither *STANDBY* nor *COMFORT* operation mode is forced.

Setting of the STANDBY and *COMFORT* (occupancy) times

The setting of the STANDBY and *COMFORT* times by the **BABYLON/NT** system can be realized very easy using the **BABYLON/NT** time schedules.
We preassume the existence of the GA-Box download file ***$$X2PPUU.386*** (PP = port, UU = unit) with a file size of 1024 kBytes.
If not, please allocate the corresponding file!

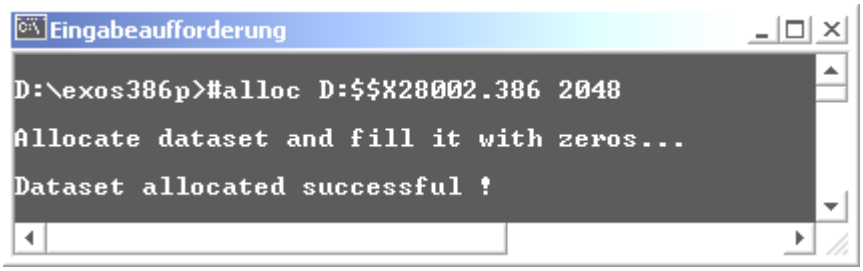


Fig. 17: Example for the allocation of the GA-Box download file $$X28002.386 (port 80, unit 02)

Starting from the ***MBOX Configuration*** please select the corresponding GA-Box. Continuing with *F7 Data*, afterwards *F5 XMP-Parameters* one gets the following menu:

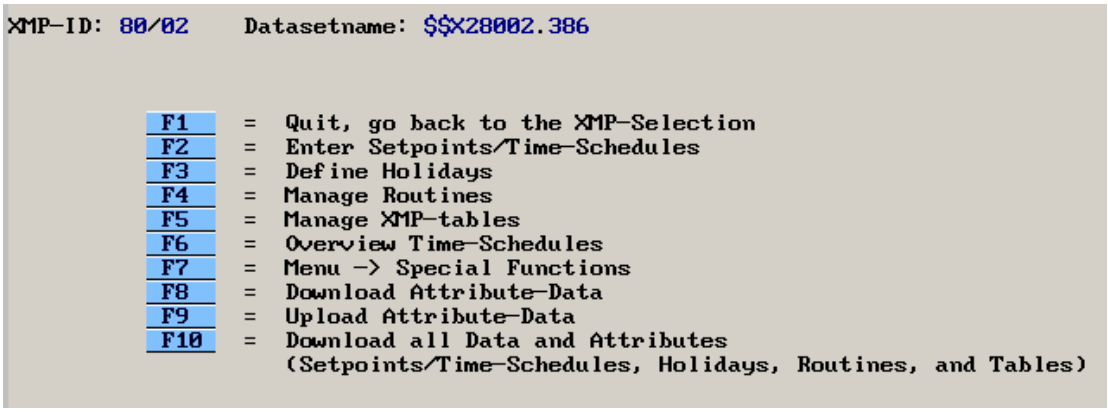


Fig. 18: Menu for XMP substation configurations

The definition of times schedules with a corresponding number can be realized with *F6 Overview Time-Schedules*.

Fig. 19: Time schedule overview

By selection of the corresponding number and pressing *F7 Select Time-Schedule* one reaches the definition of schedules. The definitions can look, for example, as follows:

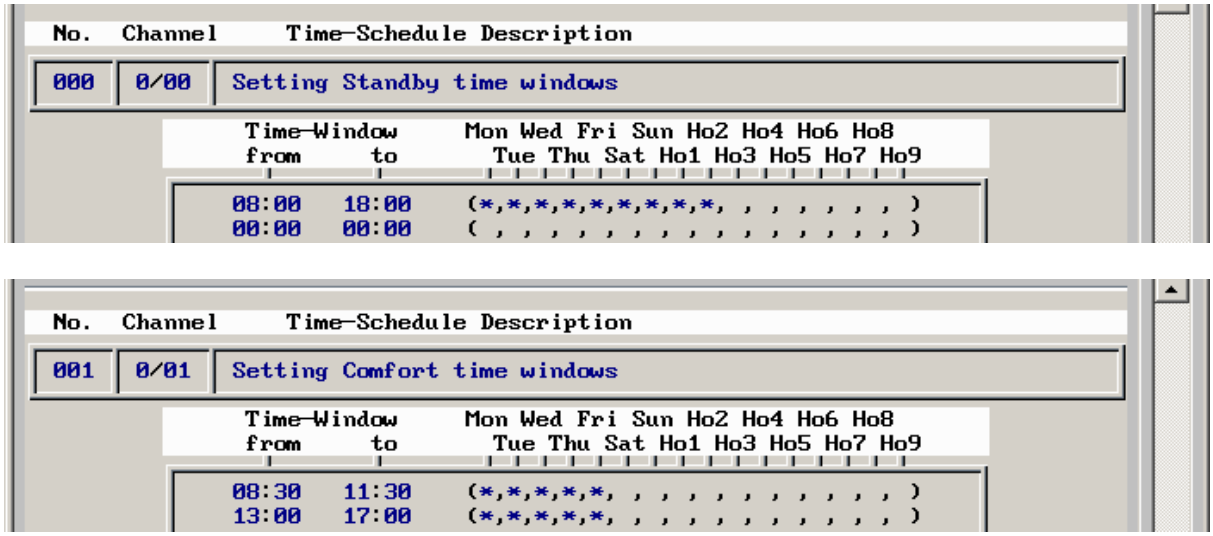


Fig. 20: Setting of time schedule parameters

Please pay attention on it, that the time windows for the *COMFORT operation* are within the *STANDBY operation* window.

The assignment of datapoint attributes for which the time schedules should be valid is realized via the menu item *F2 Enter Setpoints/Time schedules*.

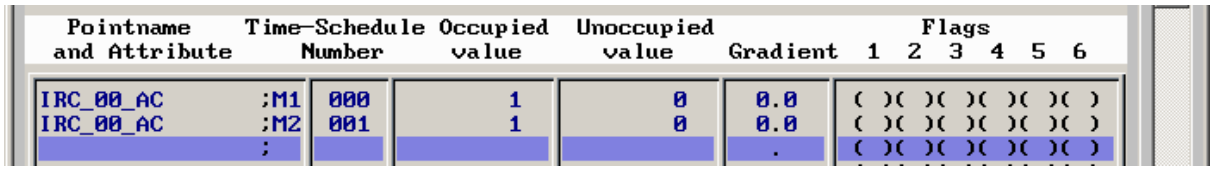


Fig. 21: Configuration of set-points for the time schedules

For times, in that the *STANDBY* (M1) or the *COMFORT* (M2) operation mode had to run the corresponding *'Occupied value'* is 1.

With *F10 Download* the time schedules will be downloaded into the **GA-Box-IRC** and are ready to run.

7 Example for controlling the XMP-IRC using the BABYLON/NT graphic program

The use of the **BABYLON/NT** graphic program allows it to simplify the control and the parameter setting of the **XMP-IRC** in a very convenient way.
The following graphic example should be only a suggestion for the possibly appearance of a IRC control graphic.

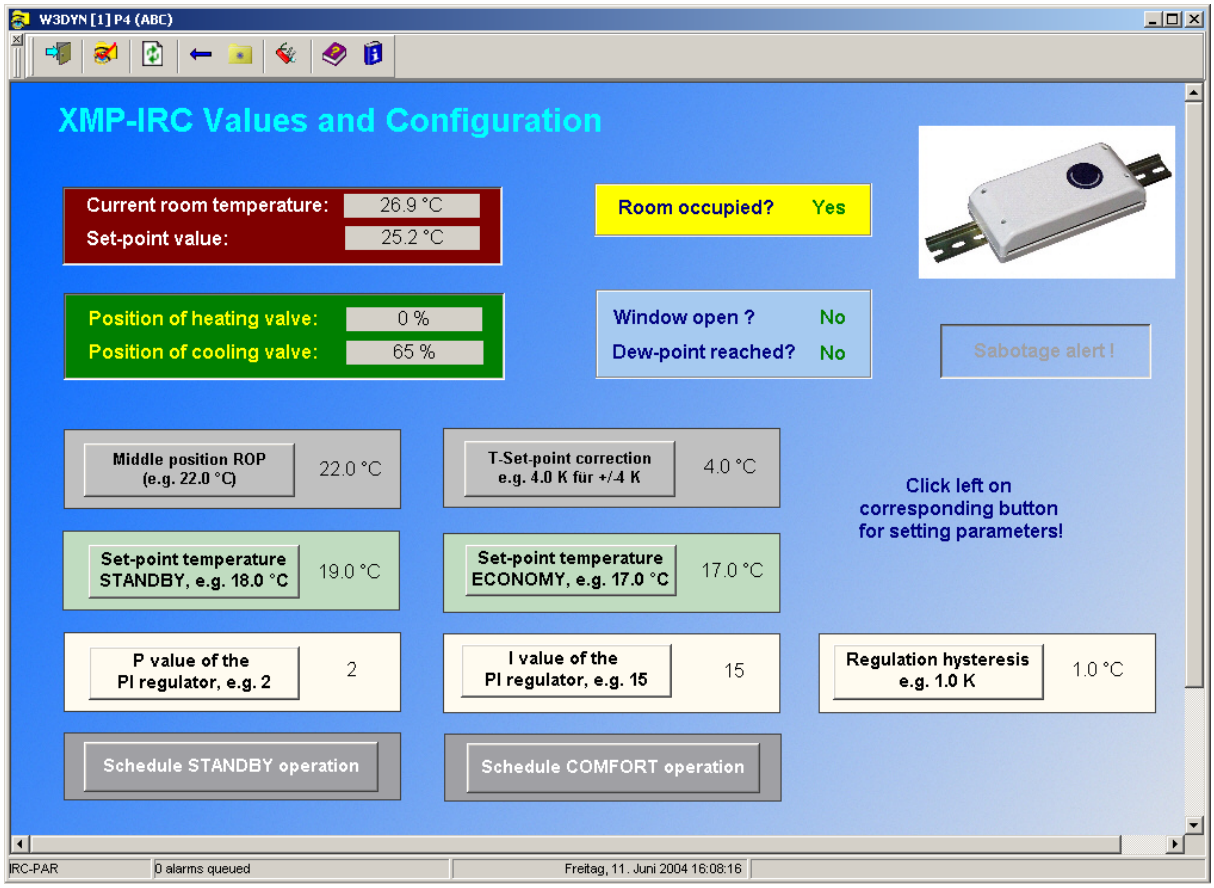


Fig. 22: Example for monitoring and parameter settings of the XMP-IRC using the BABYLON/NT graphic program

It is possible - for example - to monitor occupation states, alarm states and the current room temperature.

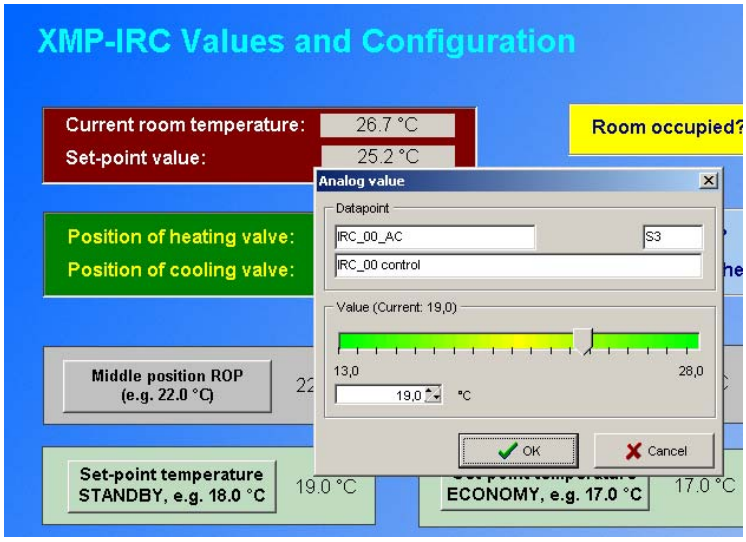


Fig. 23: Setting the STANDBY temperature set-point

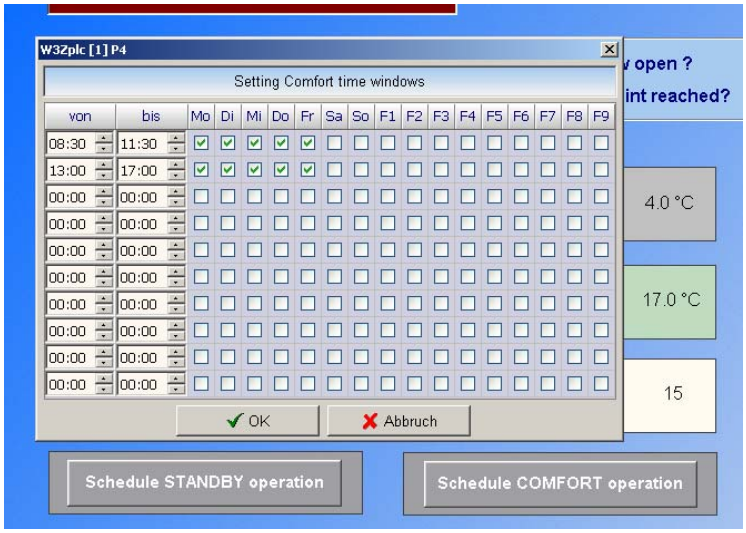


Fig. 24: Setting time schedules within the BYBYLON/NT graphic program

The setting of parameters and time schedules for the different operation states as well as the changing of regulation parameters can be realized very easy.

Hint:
Within the ***Graphic Editor*** of **BABYLON/NT** the program for the time scheduling **W3ZPLC.EXE** must be started as *External program* (as IBO program) with the parameters e.g. **8002 001 –t@8**. ***8002*** designates port and unit of the **XMP-GA-Box-IRC** and ***001*** the number of the corresponding time scheduling program desired.

8 Documentation updates

Version 1.4 (18.06.2004)	Figure 7 corrected (AI connection example)

List of figures