EIB-KNX SPLITS CONTROLLER

1. A necessity in the market.

Millions of air conditioning machines are annually installed in the world. Facility in the installation, unnecessary facilities, relation suitable price-convenience, low consumptions (specially in the inverter models) and remote handling by means of remote control are their basic characteristics. But, which are their deficiencies? The following ones like most important can be mentioned:

- The remote drive is limited the place where they are located because the control is made by means of infrared commands,
- It is not possible to recreate climate scenes previously saved by the user,
- Incapacity to integrate in an only home control system its functionality. Applications like mobile telephony, fixed telephony, Internet, television, etc., do not speak their same language not being able to take advantage of their features that would increase the comfort, power saving and the communication to the home or building.
- The need of batteries in the remote controllers causes that, when these are near the final of their life, the commands are not sent with the power enough and cause malaise to the user when having to press several times push bottoms.

2. Project premises.

The solution to satisfy the previous necessity is to create a communication interface the home automation system installed in a house/building and any air conditioned split so that this one is integrated completely in the installation, becoming possible its control like one component more of the network. In order to make this interface the following premises were considered:

- To develop an interface for standard home automation systems that fulfilled CENELEC 50090. Nowadays only the EIB Konnex system fulfills this norm being a standard.

- Not to influence in the operation cycles of the air conditioning machines to avoid generating any type of anomaly, damages, interference, reduction of the thermodynamic yield or diminution of the machine's life. This one point is made sure when defining that the communication channel interface-split is made by means of infrared commands that could be sent by an original manufacturer's remote control.

Zennio Avance y Tencnología, S.L., fulfilling the previous premises, has developed the Infrared Splits Controller (IRSC) under the EIB-KNX standard specifications with the following physical, installation and functional characteristics.

3. Physical and Installation characteristics.

Size. 46x46x12mm.

Connections.

- One side, the connection to the bus EIB Konnex bus by means of its accredited connector.
- The other side, to an emitting infrared diode by means of a 2x0,15mm2 parallel cable (2,1m).
- It's possible to completely hide the device. That way, only a minimum amount of the cable from the emitter is exposed that will depend on the model of split.
- The IRSC does not need any additional feeding since the necessary one is received from the bus.

4. Functional Characteristics.

The interface device is equipped with the sufficient functions to govern conditioned air splits completely, adding more value to them when being united to an installation with the bus EIB, these are:

ON/OFF.
The ON and OFF commands (if different in the split model as usual) will be different to avoid mistakes when manipulating this variable from different users and to thus assure their consistency. An independent object "revertive signal" will inform on each change of state.
Mode Control.
Selecting among the following modes: AUTO, COOL, DRY, FAN, HEAT. They will have 1 bit and 1 byte bidirectional objects associated to assure consistency in all the bus devices concerned.
Temperature.
By means of a read/write 2 bytes object it will be possible to modify/know the consigned temperature at any moment. A parametrical rank for a correct operation will be settled down (typically 18 to 30ºC).
FAN.
It will be possible to increase or to reduce the FAN speed and/or in addition to select the FAN speed wished directly between the following values: AUTO, MIN, MED and MAX.
Swing.
By this function, if the split incorporates this option, lamellas will be moving or stopped , and even, to make the function step by step.
Device enabling/disabling. This object is specially thought for buildings' maintenance people. It will allow them to manipulate the different variables without affecting the split, besides to avoid changes non wished on the part of users without authorization. Also they could be used for paternal control at home
Climate scenes.
Up to six independent climate scenes are considered. A climate scene consists of reproducing by means of the pulsation of a button, "OnE PusH OnlY", a combination previously recorded on the following parameters:

- ON/OFF
- MODE
- FAN SPEED
- SWING
- CONSIGNED TEMPERATURE

It is not necessary to have ignited the split previously. The interface will automatically do it before generating the scene. In addition, when being fulfilled the scene order, all the communication objects of the remaining EIB devices will properly be updated by means of "revertive signal" objects, making sure therefore the consistency information in all the Bus.
How is a scene saved?
By sending orders to the split until leading it to the combination required by the user and afterwards pressing the button to save the scene.

Auto ON/OFF.
In addition to the possibility of being modifiable any object from an EIB time switch programmer, the same device, IRSC, incorporates some parameters to allow the user On/Off the split with timings.
Connection with presence detector.
The device has a communication object to be linked to an EIB Konnex presence detector. This object, in the case of being used and if the user leaves the acclimatized zone by split, once passed a parametrical time, would stop the split unit. In case of returning the user, the device would start working again with such parameters that the last time worked.
Open window control.

As in the previous case and so that it results in the power saving, in case some window of the acclimatized room (having associated any opening detector), the split would stop working until this window was closed again.

Reset.

Through this communication object each communication object is set to a predetermined by parameter state.

5. Communication objects description.

ON/OFF	1BIT
ON/OFF (ESTADO)	1BIT
CONSIGNED TEMPERATURE	2BYTE
FAN SPEED (1)	1BYTE
FAN SPEED (2)	1BIT
FAN SPEED (STATE)	1BYTE

The FAN speed can be designated in a precise way by means of the 1 byte object or, step by step, with the 1BIT one. Each change causes an answer from the device to the bus indication. Speed FAN (been).

SWING	1BIT
SWING (STATE)	1BIT

Depending on the split model, the values of the object SWING (0,1) will imply the following changes:

- Possibility 1: Sending value 1 to split it and it will stop when sending another 1. When sending 0 lamellas will move step by step.
- Possibility 2: Sending 1 you will start moving lamellas and when sending 0 they are stopped in the wished position.

HEAT MODE	1BIT
HEAT MODE (STATE)	1BIT
COOL MODE	1BIT
COOL MODE (STATE)	1BIT
DRY MODE	1BIT
DRY MODE (STATE)	1BIT
FAN MODE	1BIT
FAN MODE (STATE)	1BIT
AUTO MODE	1BIT
AUTO MODE (STATE)	1BIT
MODES	1BYTE
MODES (STATE)	1BYTE

Note: STATE = RS (revertive signal)

There are two possibilities to designate the MODE operation, by means of 1 bit objects that select a concrete MODE (the apparatus bus orders to clear the MODE previously selected) or by means of the MODES 1 BYTE object (1 = HEAT, 2 = COOL, 3 = DRY.....). In any case, the object MODES (STATE) gives back the concrete value of the MODE for updates in screens or PC's.

SCENE1	1BIT
SCENE2	1BIT
SCENE3	1BIT

SCENE4	1BIT
SCENE5	1BIT
SCENE6	1BIT
SCENES	1BYTE
SCENES (STATE)	1BYTE
SAVE SCENE1	1BIT
SAVE SCENE2	1BIT
SAVE SCENE3	1BIT
SAVE SCENE4	1BIT
SAVE SCENE5	1BIT
SAVE SCENE6	1BIT

It is possible to save and later to reproduce a scene of operation in the split. It is enough with sending several orders to split until placing it in the MODE, TEMERATURE, FAN and SWING wished and to save by means of an object "SAVE SceneX". Later the scene with the object reproduces SceneX.
Also, any scene can be designated by the 1 Byte SCENES object (1 = SCENE1, 2 = SCENE2.....)

When a scene is selected, the bus device, by means of its revertive signal objects, updates the different values so that the rest of the bus devices are updated properly.

ACTUAL TEMPERATURE	2BYTE (PCB temperature)
DISABLE DEVICE	1BIT
AUTO ON	1BIT or 1BYTE
AUTO OFF	1BIT or 1BYTE
PRESENCE DETECTION	1BIT

Combined with a presence detector the split controller will stop the split if presence, in a period of time designated by parameter, is not detected.

WINDOW SENSOR	1BIT

Just as in the previous case, when opening a window in the room where the split is operating and window opening is detected, the controller will stop the split until closing the window again.

RESET	1BIT

Initial operation conditions can be defined by parameters.