stakohome®

INNOVATION

Integrations

BES-GW632200

Programming manual

ingenium*

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Index

1   General description

The LGAC-KNX gateway is a device used for control interface between the LG HVAC own protocol and KNX devices.

The integration of the LG air conditioning systems with the KNX system is done by a simply direct connection to the RS485 bus of LG outdoor units. The gateway allows to control a HVAC system with up to 64 indoor units connected to 1 outdoor unit.

For each indoor unit individually, the LGAC-KNX gateway allows to control the most common functions like set point temperature, measured temperature, working mode (cool, heat, fan, dry and automatic mode) and fan speed (low, medium and high).
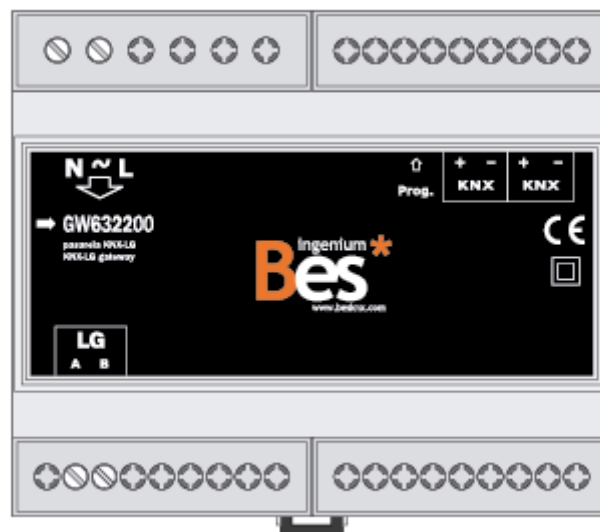
General characteristics:

- Control up to 64 indoor units connected to 1 outdoor unit.
- Full functionalities for each unit: set point temperature, measured temperature, working mode (heat, cool, auto), fan mode (low, medium, high speed) and several failure feedbacks.
- Compatible LG systems: in some cases the integration requires the installation of an additional card in the outdoor unis of the LG system, the type of the additional card depends on the indoor units model used in each case, see technical information (next paragraph).

2   Technical information

Main power supply	230 Vac	
Max. power consumption	0,5W @ 230Vac	
KNX Supply	29VDC from KNX BUS	
KNX current consumption	1mA from KNX BUS	
Mounting	DIN rail	
Size	6 DIN modules	
Connections	BUS connection terminal KNX Screw terminals for main power supply and LG bus	
Max. number of indoor units	Up to 64 units individual control	
LG bus	RS-485	
LG compatible systems	Indoor HVAC system	Adapter card
	Multi V plus Multi V sync Multi V space	PMNFP14A0 (16 indoor units) or PMNFP14A1 (64 indoor units).
	Single A, Multi	PMNFP14A0
	Eco-V	PHNFP14A0
	Multi V plus II Multi V sync II Multi V space II Multi V mini	No additional card required
Environment temperature range	Operation: -10ºC/55ºC Storage: -30ºC/60ºC Transportation: -30ºC/60ºC	
Regulation	According to the directives of electromagnetic compatibility and low voltage: EN 50090-2-2 / UNE-EN 61000-6-3:2007 / UNE-EN 61000-6-1:2007 / UNE-EN 61010-1.	

3 Programming

This manual explains how to configure the LGAC-KNX gateway memory to control an LG climate installation through the KNX system.

3.1 Application program information

Application program: Ingenium (manufacturer) / LGAC-KNX (program name).

Dynamic objects table generation: No.

Maximum number of communication objects: 22.

Maximum number of assignments: 22.

The parameterization of the gateway is configured directly with the ETS4 and no additional applications are required.

	Número ▲	Nombre	Función del Objeto	Descripción	Direcciones de Gr...	Longit...
	0	Communication AC Error : 0-OK 1-Error(R)	Communication AC Error			1 bit
	1	On/Off: 0-Off 1-On	On/Off			1 bit
	2	Mode: 0-Cool, 1-Heat, 2-Dry, 3-Fan, 4-Auto	Mode			1 Byte
	3	Mode: 1-Cool	Cool			1 bit
	4	Mode: 1-Heat	Heat			1 bit
	5	Mode: 1-Dry	Dry			1 bit
	6	Mode: 1-Fan	Fan			1 bit
	7	Mode: 1-Auto	Auto			1 bit
	8	Setpoint temperature Celsius value, 16 to 30 <AC>	Set Room Temp			2 Bytes
	9	Ambient temperature Celsius value, 10 to 40 <AC>	Room Temp			2 Bytes
	10	Air direction: 0-Stop, 1-Start, <<Only AC>>	Swing			1 bit
	11	Fan Speed: 0-Auto, 1-Low, 2-Middle, 3-High	Fan Speed			1 Byte
	12	Fan Speed: 1-Auto	Auto			1 bit
	13	Fan Speed: 1-Low	Low			1 bit
	14	Fan Speed: 1-Middle	Middle			1 bit
	15	Fan Speed 1-High	High			1 bit
	16	Remote control: 0-Enabled, 1-Disabled	Lock			1 bit
	17	Compressor Running Hours	Compressor Running Hours			2 Bytes
	18	Error sign: 0-Normal, 1-Error	Error Sign			1 bit
	21	HVAC Mode	HVAC Mode			1 Byte

3.2   Individual address assignment

The LGAC-KNX Gateway has a programming button for the KNX individual address assignment which is located near to the KNX connector of the device.

A red led near the programming button lights up when it is pressed manually or if the device is set remotely to programming mode state. The led is automatically turned off if the ETS has assigned an individual address correctly or if the programming button is pressed again manually.

The LGAC-KNX gateway is a device that allows to have more than one individual address. Each LGAC indoor unit is virtually represented in its memory as a KNX device with its own communication objects and individual address.

The gateway answers always with the individual address 15.15.255 to the "devices in programming mode" check procedure from the ETS, even if it has been already programmed with virtual LGAC indoor unit. However, an individual address existence check or line scan will report all virtual KNX devices programmed in its memory.

When a new LG indoor unit is programmed in the gateway memory, the individual address cannot be overwritten with the same device because the ETS will show a "more than one device in programming mode" error. It is highly recommended to delete the internal memory of the device before programming in order to avoid these problems (see 3.6 Restore factory settings pag.12).

3.3   Communication objects tables

Some communication objects of the LGAC-KNX gateway will be shown or hidden according to the parameters configured (see 3.5 Parameters pag.11).

3.3.1   General objects

These are the objects that are always available for each LGAC-KNX indoor unit:

Object	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
0	Communication AC error | Error feedback	1 bit	1.001	●	●		●	
1	On/Off | Indoor unit switch on/off	1 bit	1.001	●	●	●	●	
2	Mode | Working mode setting	1 byte	5.001	●	●	●	●	
3	Mode: cool | Working mode cool setting	1 bit	1.001	●	●	●	●	
4	Mode: heat | Working mode heat setting	1 bit	1.001	●	●	●	●	
5	Mode: dry | Working mode dry setting	1 bit	1.001	●	●	●	●	
6	Mode: fan | Working mode fan setting	1 bit	1.001	●	●	●	●	
7	Mode: auto | Working mode auto setting	1 bit	1.001	●	●	●	●	
11	Fan speed | Fan speed setting	1 byte	5.001	●	●	●	●	
12	Fan: Auto | Fan auto speed setting	1 bit	1.001	●	●	●	●	
13	Fan: low | Fan low speed setting	1 bit	1.001	●	●	●	●	
14	Fan: middle | Fan medium speed setting	1 bit	1.001	●	●	●	●	

15	Fan: high | Fan high speed setting	1 bit	1.001	•	•	•	•	
16	Remote control | Enable/disable control	1 bit	1.001	•	•	•	•	
17	Compressor running hours |	2 bytes	7.007	•	•		•	
18	Error sign | AC unit error feedback	1 bit	1.001	•	•		•	
21	HVAC mode | HVAC mode setting	1 byte	5.010	•	•	•	•	•

3.3.2   AC mode objects

These are the objects that are available when AC mode is selected (see 3.5 Parameters pag.11).

Object	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
8	Set point temperature | Room temp setting	2 bytes	1.001	•	•	•	•	
9	Ambient temperature | Room measured temp.	2 bytes	1.001	•	•		•	
10	Air direction | Swing mode switch on/off	1 bit	1.001	•	•	•	•	

3.3.3   VENT mode objects

These are the objects that are available when VENT mode is selected (see 3.5 Parameters pag.11).

Object	Name | Function	Length	DPT	Flags				
				C	R	W	T	U
19	Filter alarm | Filter alarm feedback	1 bit	1.001	•	•		•	
20	Filter reset | Filter alarm reset	1 bit	1.001	•		•		

3.4   Communication objects description

3.4.1   General objects

Name	Object 0: Communication AC error
Function	1 bit communication object for feedback signalling of communication errors.
Description	When there is a communication error with the AC unit a feedback telegram with value "1" is sent through this object. If the error is corrected a "0" is sent too. The object can also be read.

Name	Object 1: On/Off
Function	1bit communication object for switching on / off the AC unit.
Description	When a telegram with value "1" is sent to this object, the corresponding AC indoor unit is switched on. When a telegram with value "0" is sent to this object, the unit is switched off.
	The object can also be read.
	The status of the AC indoor unit is memorized, so when a unit is switched off, next time it will be switched on in the same operation mode, set point temperature, etc.

Name	Object 2: Mode
Function	1 byte communication object for setting the operation mode of the AC unit.
Description	The value sent to this communication object makes the AC unit changing its operation mode according to the following values: 0 = Cool; 1 = Heat; 2 = Dry; 3 = Fan; 4 = Auto.
	The current operation mode of the unit can also be read through this object.

Name	Object 3: Mode: cool
Function	1bit communication object for setting the cool operation mode of the AC unit.
Description	When a value of "1" is sent to this communication object, the AC unit mode changes to cool.
	A value of "0" is sent automatically as feedback signalling through the other bit mode objects.
	Sending a value of "0" to this communication object does not have any function.

Name	Object 4: Mode: heat
Function	1bit communication object for setting the heat operation mode of the AC unit.
Description	When a value of "1" is sent to this communication object, the AC unit mode changes to heat.
	A value of "0" is sent automatically as feedback signalling through the other bit mode objects.
	Sending a value of "0" to this communication object does not have any function.

Name	Object 5: Mode: dry
Function	1bit communication object for setting the dry operation mode of the AC unit.
Description	When a value of "1" is sent to this communication object, the AC unit mode changes to dry. A value of "0" is sent automatically as feedback signalling through the other bit mode objects. Sending a value of "0" to this communication object does not have any function.
Name	Object 6: Mode: fan
Function	1bit communication object for setting the fan operation mode of the AC unit.
Description	When a value of "1" is sent to this communication object, the AC unit mode changes to fan. A value of "0" is sent automatically as feedback signalling through the other bit mode objects. Sending a value of "0" to this communication object does not have any function.
Name	Object 7: Mode: auto
Function	1bit communication object for setting the auto operation mode of the AC unit.
Description	When a value of "1" is sent to this communication object, the AC unit mode changes to auto. A value of "0" is sent automatically as feedback signalling through the other bit mode objects. Sending a value of "0" to this communication object does not have any function.
Name	Object 11: Fan speed
Function	1 byte communication object for setting the fan speed of the AC unit.
Description	The value sent to this communication object makes the AC unit fan speed change according to the following values: 0 = Auto; 1 = Low; 2 = Middle; 3 = High. The current fan speed of the unit can also be read through this object.
Name	Object 12: Fan auto
Function	1bit communication object for changing the fan speed of the AC unit to auto.
Description	When a value of "1" is sent to this communication object, the AC unit fan speed changes to auto. A value of "0" is sent automatically as feedback signalling through the other bit fan objects. Sending a value of "0" to this communication object does not have any function.
Name	Object 13: Fan low
Function	1bit communication object for changing the fan speed of the AC unit to low.
Description	When a value of "1" is sent to this communication object, the AC unit fan speed changes to low. A value of "0" is sent automatically as feedback signalling through the other bit fan objects. Sending a value of "0" to this communication object does not have any function.

Name	Object 14: Fan middle
Function	1bit communication object for changing the fan speed of the AC unit to middle.
Description	When a value of "1" is sent to this communication object, the AC unit fan speed changes to middle.
	A value of "0" is sent automatically as feedback signalling through the other bit fan objects.
	Sending a value of "0" to this communication object does not have any function.
Name	Object 15: Fan high
Function	1bit communication object for changing the fan speed of the AC unit to high.
Description	When a value of "1" is sent to this communication object, the AC unit fan speed changes to high.
	A value of "0" is sent automatically as feedback signalling through the other bit fan objects.
	Sending a value of "0" to this communication object does not have any function.
Name	Object 16: Remote control
Function	1bit communication object for enabling/disabling the remote control of the AC unit.
Description	When a value of "1" is sent to this communication object, the AC unit remote control is locked and it is no longer controlled by the LGAC-KNX gateway. When an AC unit is locked, it can only be controlled through LG own systems, and it will not respond to any KNX command.
	A value of "0" unlocks the AC unit.
Name	Object 17: Compressor running hours
Function	2bytes communication object for reading the compressor running hours.
Description	If this function is available in the AC indoor unit, the hours that the compressor have been working can be read through this communication object.
Name	Object 18: Error sign
Function	1bit communication object for feedback signalling of an error in the AC unit.
Description	If this function is available in the AC indoor unit, the hours that the compressor have been working can be read through this communication object.
	A value of "0" is sent automatically as feedback signalling through the other bit mode objects.
Name	Object 21: HVAC mode
Function	1byte communication object for setting the HVAC mode of the AC unit.
Description	Reserved for future implementations.

3.4.2   AC mode objects

Name	Object 8: Set point temperature	
Function	2 bytes communication object for sending a new set point temperature to the AC unit.	
Description	A value sent to this communication object changes the current working set point temperature of the AC indoor unit. The temperature range can vary from 16 ^{O}C to 30°C.	
Name	**Object 9: Ambient temperature**	
Function	2 bytes communication object for reading the current measured temperature of the AC unit.	
Description	The current measured temperature of the AC indoor unit can be read through this communication object. Take into account that this temperature it is not the room temperature, that must be measured by an external thermostat. The measured temperature range can vary from 10 ^{O}C to 40°C.	
Name	**Object 10: Air direction**	
Function	1 bit communication object for enabling / disabling the swing mode of the AC unit.	
Description	When a value of "1" is sent to this communication object the swing mode of the AC unit is activated and the blades start moving. A value of "0" deactivates the swing mode.	

3.4.3   VENT mode objects

| Name	Object 19: Filter alarm	
Function	1 bit communication object for feedback signalling of a filter alarm error in the AC unit.	
Description	If this function is available in the AC indoor unit, when there is a filter alarm a feedback telegram with value "1" is sent through this object. The object can also be read.	
Name	**Object 20: Filter alarm reset**	
Function	1 bit communication object for reset the current filter alarm of the AC unit.	
Description	If this function is available in the AC indoor unit, a current filter alarm can be reset by sending a value of "1" to this object.	

3.5   Parameters

The parameterization of the LGAC-KNX gateway is very simple. The configuration of the gateway do not need any connection to the LG HVAC installation or any AC unit parameterization.

The addressing and internal parameters definition of each indoor AC unit must be already done. The programmer must be provided of all this information and only needs to configure the gateway, setting how many AC indoor units exist, and what addresses do they have. After that, the programmer work is only the assignment of the communication objects to KNX group addresses.

3.5.1   Address

Remember that the LGAC-KNX gateway is a device that allows to have more than one individual address. Each LG AC indoor unit is virtually represented in its memory as a KNX device with its own communication objects and individual address.

The parameter address defines which AC indoor unit will be controlled by this KNX virtual device.
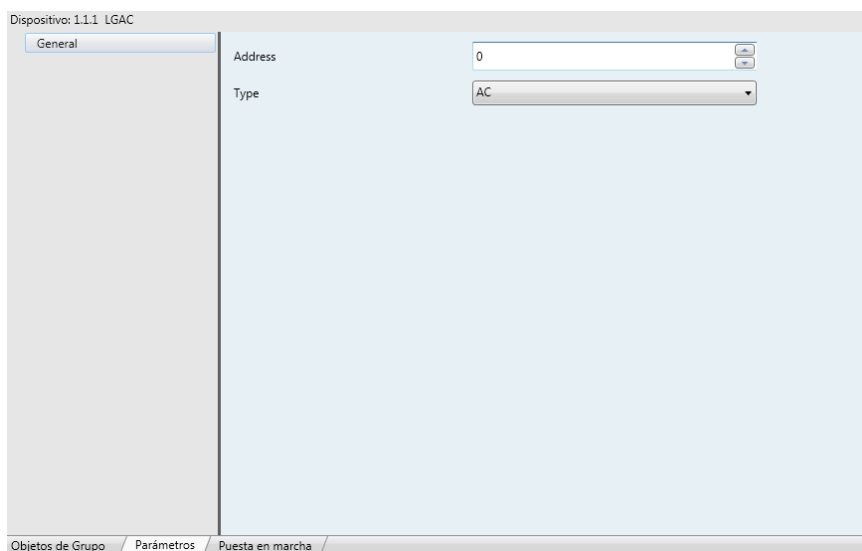
The programmer must add as much as LGAC-KNX virtual devices to the ETS project as LG AC indoor units there are modifying the address parameter in each one.

All of them will be programmed in the LGAC-KNX gateway. It is not possible to program more than one AC unit with the same address parameter (the second will overwrite the previous one).

3.5.2   Type

Use the type combo box to select the model of AC indoor unit which matches to the LG units that the gateway will be controlling. Depending on the type of unit selected there will be available different functionalities.
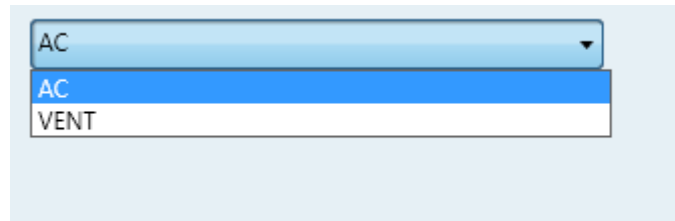

3.6   Restore factory settings

The LGAC-KNX Gateway allows to restore factory settings just using the programming button for the KNX individual address assignment which is located near to the KNX connector of the device.

To restore the factory settings it is necessary to remove the KNX BUS connector from the device, press the programming button and connect the KNX BUS again while holding the programming button for 5 seconds approximately. When the KNX red LED turns on, it indicates that the LGAC-KNX has been successfully restored, and it turns off again instantly when release the programming button.

4   Installation
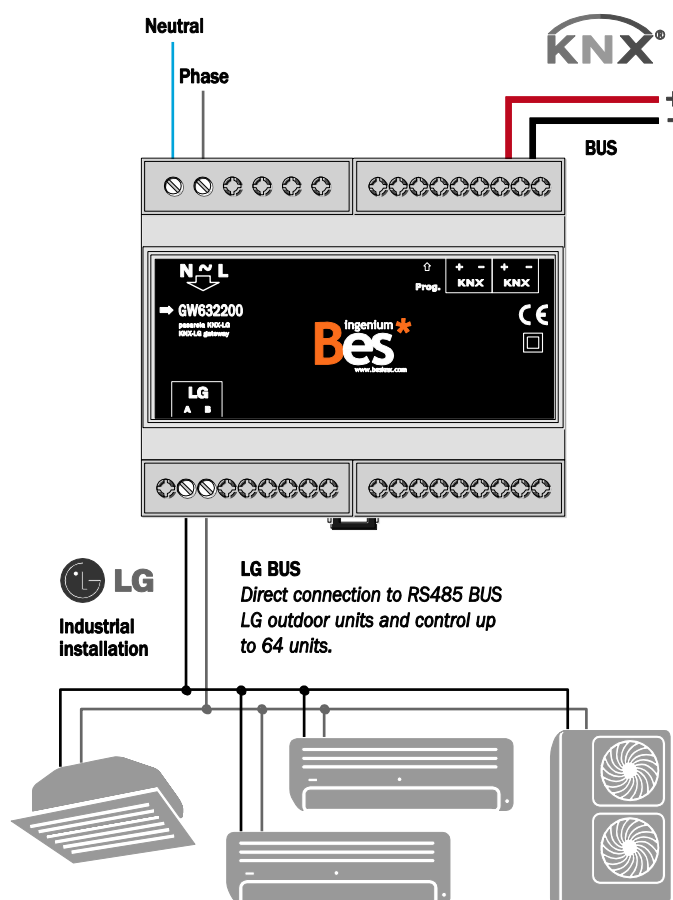
Feed low voltage lines (BUS and inputs) in separate ducting to that of power (230V) and outputs to ensure there is enough insulation and avoid interferences.

Do not connect the main voltages (230 V) or any other external voltages to any point of the BUS or inputs.
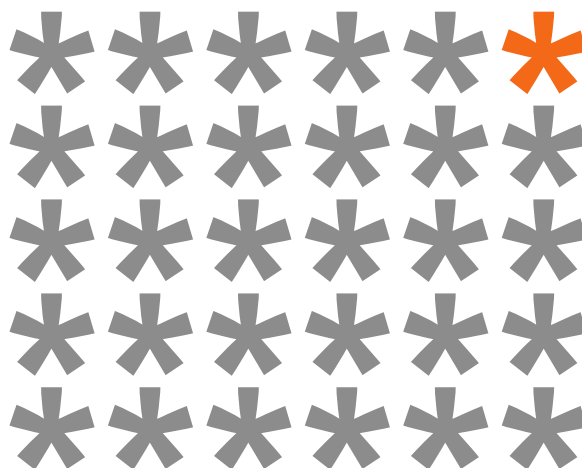
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