

IntesisBox®

ME-AC-LON-1 v.1.6.10

User's Manual

Rev 5

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LonWorks Interface for Mitsubishi Electric air conditioners.
Compatible with all models of Domestic & Mr.Slim lines.

Order Code: **ME-AC-LON-1**

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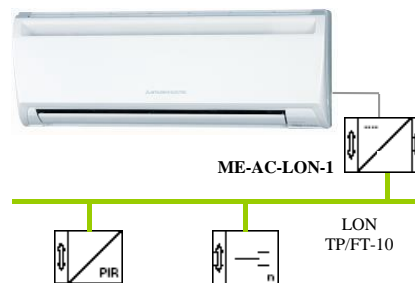
1. Presentation



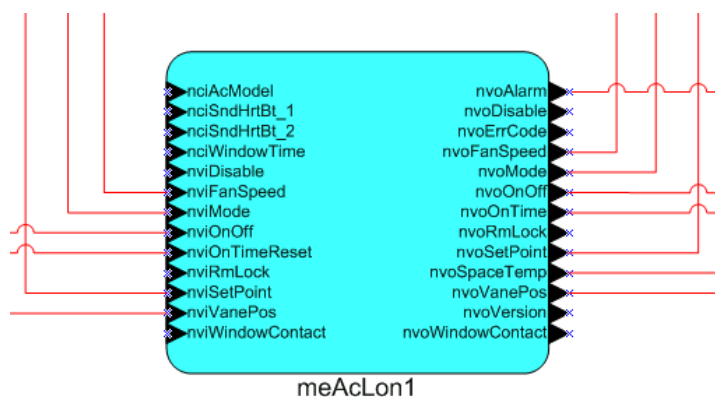
The ME-AC-LON-1 interface allows a complete and natural integration of **Mitsubishi Electric** air conditioners into LonWorks networks.

Compatible with all models of Domestic and Mr.Slim line.

- Reduced dimensions. 93 x 53 x 58 mm.
- Quick and easy installation.
Mountable on DIN rail, wall, or even inside the indoor unit in some models of AC.
- External power not required.
- Direct connection to LONWORKS TP/FT-10 bus.
- Direct connection to the AC indoor unit.
The cable for this connection is also supplied.



- Configuration from any LONWORKS commissioning tool.
- Total Control and Supervision.
- Real states of the AC unit's internal variables.
- Allows to use simultaneously the IR remote control and LONWORKS.



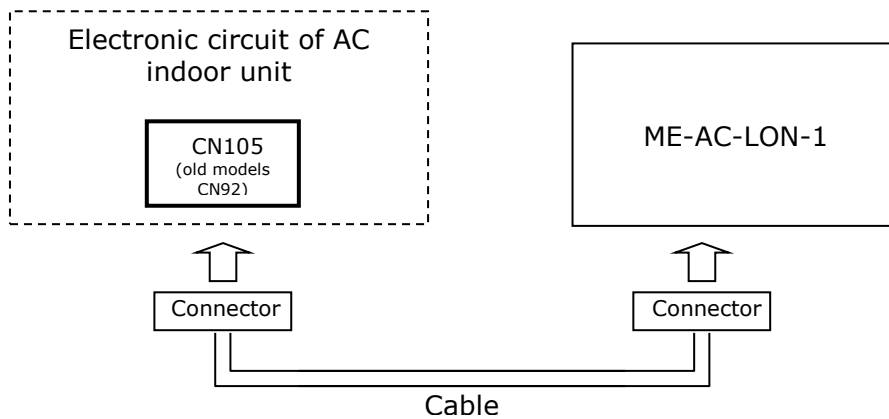
2. Connection

The interface comes with cable + connectors for direct connection to the AC indoor unit, and with a plug-in terminal block of 2 poles for connection to a LonWorks TP/FT-10 bus.

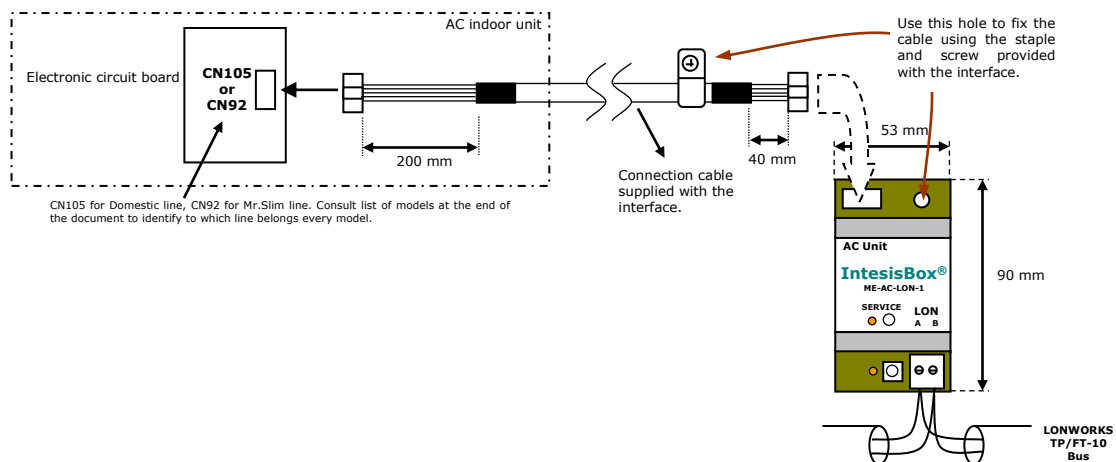
Disconnect mains power from the AC unit. Open the front cover of the indoor unit in order to have access to the electronic circuit. In the electronic circuit locate the socket connector marked as:

CN105 (old models CN92)

Using the cable that comes with the interface, insert one of its connectors, the one installed in the shortest uncovered part, into the socket of the ME-AC-LON-1, and the other connector, the one installed in the largest uncovered part, to the socket **CN105** (old models CN92) of the AC unit's electronic circuit. You can place the ME-AC-LON-1 inside or outside the AC indoor unit depending on your needs, remember that ME-AC-LON-1 must be also connected to the LonWorks TP/FT-10 network. Close the AC indoor unit's front cover again.



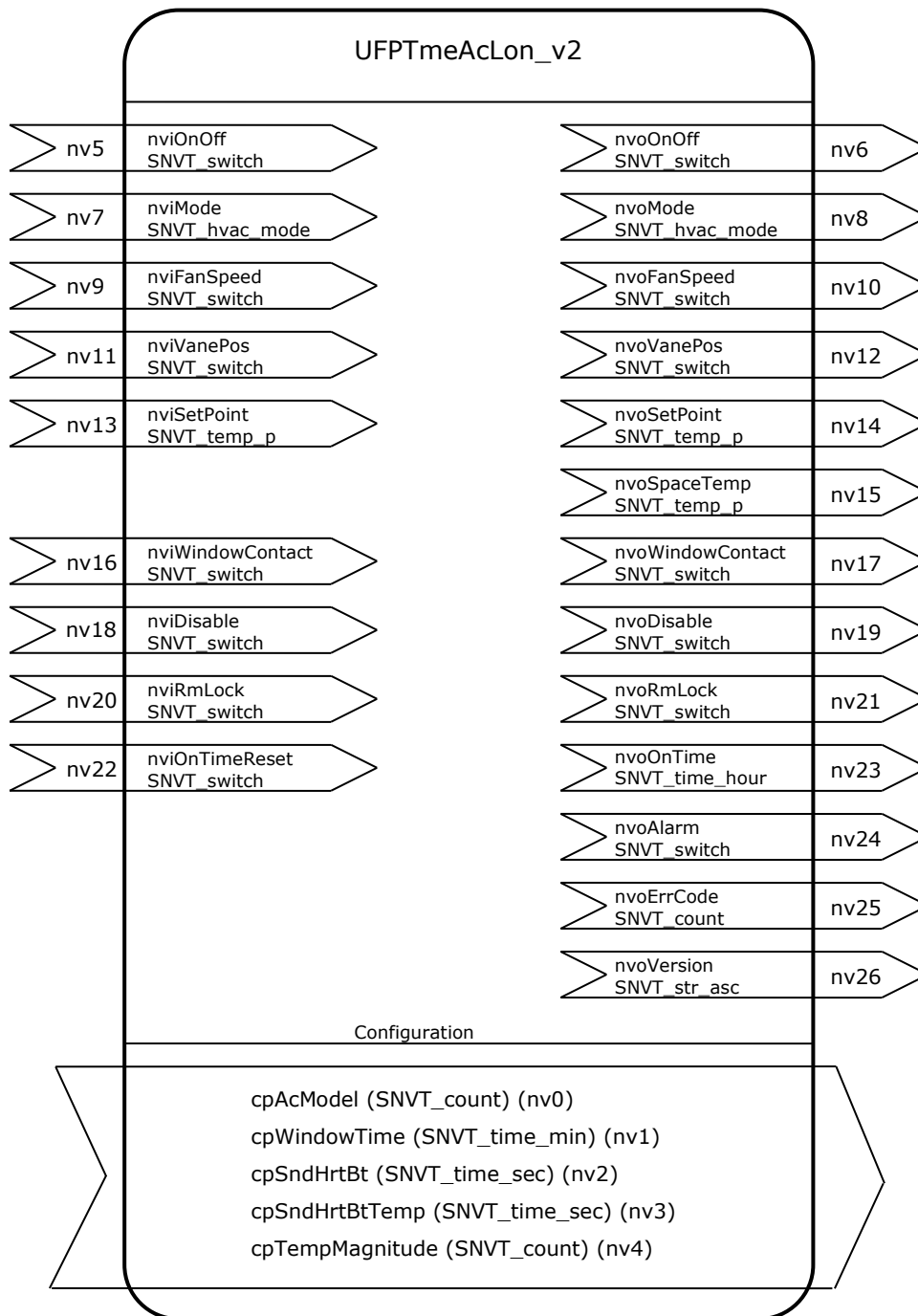
Do not modify the length of the cable supplied with the interface, it may affect to the correct operation of the interface.



3. LonWorks Interface Specification

Program-Id for firmware release v1.6.10 is **9F:FD:51:56:00:06:04:02**.
 Previous (older) firmware releases have program-id **9F:FD:51:56:00:06:04:01**.

3.1 Functional Profile



3.2 Network Variables Interface

nv5 nviOnOff

network input SNVT_switch nviOnOff;

This input network variable is used to switch On and Off the indoor unit

Valid Range

Unit Command	NV content
ON	value > 0% AND state ≥ 1
OFF	value = 0% OR state = 0

nv6 nvoOnOff

network output SNVT_switch nvoOnOff;

This output network variable indicates present On/Off status of the indoor unit

Valid Range

Unit Status	NV content
ON	value = 100%; state = 1
OFF	value = 0%; state = 0

Default Value

Present value in unit once indoor unit is powered, and ME-AC-LON-1 is in configured online mode

Default Service Type

Acknowledged

Update Rate

The value is defined by *cpSndHrtBt*

nv7 nviMode

network input SNVT_hvac_mode nviMode;

This input network variable is used to change the operation mode of the indoor unit

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

Unit Command	NV content
AUTO	HVAC_AUTO (0)
HEAT	HVAC_HEAT (1)
DRY	HVAC_PRE_COOL (5)
COOL	HVAC_COOL (3)
FAN	HVAC_FAN_ONLY (9)
FAN	Any other (n)

nv8 nvoMode

network output SNVT_hvac_mode nviMode;

This output network variable indicates present operation mode of the indoor unit

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

Unit Status	NV content
AUTO	HVAC_AUTO (0)
HEAT	HVAC_HEAT (1)
DRY	HVAC_PRE_COOL (5)
COOL	HVAC_COOL (3)
FAN	HVAC_FAN_ONLY (9)

Default Value

Present value in unit once indoor unit is powered, and ME-AC-LON-1 is in configured online mode

Default Service Type

Acknowledged

Update Rate

The value is defined by *cpSndHrtBt*

nv9 nviFanSpeed

network input SNVT_switch nviFanSpeed;

This input network variable is used to change fan speed of the indoor unit

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

Unit Command	NV content
AUTO	state = 0
LOW	state ≥ 1 AND 0% ≤ value ≤ 25%
MID-1	state ≥ 1 AND 25% < value ≤ 50%
MID-2	state ≥ 1 AND 50% < value ≤ 75%
HIGH	state ≥ 1 AND 75% < value ≤ 100%

nv10 nvoFanSpeed

network output SNVT_switch nviFanSpeed;

This output network variable indicates present fan speed of the indoor unit

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

Unit Status	NV content
AUTO	state = 0; value = 0%
LOW	state = 1; value = 25%
MID-1	state = 1; value = 50%
MID-2	state = 1; value = 75%
HIGH	state = 1; value = 100%

Default Value

Present value in unit once indoor unit is powered, and ME-AC-LON-1 is in configured online mode

Default Service Type

Acknowledged

Update Rate

The value is defined by *cpSndHrtBt*

nv11 nviVanePos

network input SNVT_count nviVanePos;

This input network variable changes vane position of the indoor unit

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

Unit Command	NV content
AUTO	state = 0
HORIZ	state ≥ 1 AND 0% ≤ value ≤ 10%
POS2	state ≥ 1 AND 10% < value ≤ 30%
POS3	state ≥ 1 AND 30% < value ≤ 50%
POS4	state ≥ 1 AND 50% < value ≤ 70%
VERT	state ≥ 1 AND 70% < value ≤ 90%
SWING	state ≥ 1 AND 90% < value

nv12 nvoVanePos

network output SNVT_count nvoVanePos;

This output network variable indicates present vane position of the indoor unit

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

Unit Status	NV content
AUTO	state = 0
HORIZ	state = 1; value = 10%
POS2	state = 1; value = 30%
POS3	state = 1; value = 50%
POS4	state = 1; value = 70%
VERT	state = 1; value = 90%
SWING	state = 1; value = 100%

Default Value

Present value in unit once indoor unit is powered, and ME-AC-LON-1 is in configured online mode

Default Service Type

Acknowledged

Update Rate

The value is defined by *cpSndHrtBt*

nv13 nviSetPoint

network input SNVT_temp_p nviSetPoint;

This input network variable controls temperature setpoint of the indoor unit.

As per LonMark standard, *SNVT_temp_p* uses SI units (Celsius), as in general all LonMark-compliant SNVTs do (there is no native Fahrenheit support in LonWorks).

Though, user might want to represent this value at user-level interface in other non-SI units (e.g. Fahrenheit). LonWorks visualisation and network management tools (TAC Vista, LonMaker, ...) generally allow transforming a value contained in a *SNVT_temp_p* into the Fahrenheit scale for end-user convenience.

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

16...31°C

nv14 nvoSetPoint

network output SNVT_temp_p nvoSetPoint;

This output network variable indicates present temperature setpoint of the indoor unit

As per LonMark standard, *SNVT_temp_p* uses SI units (Celsius), as in general all LonMark-compliant SNVTs do (there is no native Fahrenheit support in LonWorks).

Though, user might want to represent this value at user-level interface in other non-SI units (e.g. Fahrenheit). LonWorks visualisation and network management tools (TAC Vista, LonMaker, ...) generally allow transforming a value contained in a *SNVT_temp_p* into the Fahrenheit scale for end-user convenience.

If Fahrenheit end-user representation is desired, *cpTempMagnitude* (nv4) can be adjusted so that NV *nvoSetPoint* makes slight changes into the set of discrete values it represents, so that, when *nvoSetPoint* actual value is converted into the Fahrenheit scale by the visualisation / network management tool, it gives a Fahrenheit value as close as possible to an integer in the Fahrenheit scale.

See description for *cpTempMagnitude* (nv4) in section 3.3.

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

16...31°C

Default Value

Present value in unit once indoor unit is powered, and ME-AC-LON-1 is in configured online mode

Default Service Type

Acknowledged

Update Rate

The value is defined by *cpSndHrtBt*

nv15 nvoSpaceTemp

network output SNVT_temp_p nvoSpaceTemp;

This output network variable indicates present ambient temperature measured by the indoor unit.

As per LonMark standard, *SNVT_temp_p* uses SI units (Celsius), as in general all LonMark-compliant SNVTs do (there is no native Fahrenheit support in LonWorks).

Though, user might want to represent this value at user-level interface in other non-SI units (e.g. Fahrenheit). LonWorks visualisation and network management tools (TAC Vista, LonMaker, ...) generally allow transforming a value contained in a *SNVT_temp_p* into the Fahrenheit scale for end-user convenience.

If Fahrenheit end-user representation is desired, *cpTempMagnitude* (nv4) can be adjusted so that NV *nvoSpaceTemp* makes slight changes into the set of discrete values it represents, so that, when *nvoSpaceTemp* actual value is converted into the Fahrenheit scale by the visualisation / network management tool, it gives a Fahrenheit value as close as possible to an integer in the Fahrenheit scale.

See description for *cpTempMagnitude* (nv4) in section 3.3.

Valid Range

(See section 6 for detail on indoor unit model differences and function availability)

10...38°C

Default Value

Present value in unit once indoor unit is powered, and ME-AC-LON-1 is in configured online mode

Default Service Type

Acknowledged

Update Rate

The value is defined by *cpSndHrtBtTemp*

nv16 nviWindowContact

network input SNVT_switch nviWindowContact;

This input network variable is used to change the window contact status of the indoor unit

Once contact is ON –window is open– indoor unit will be switched OFF after a timeout, configured at *cpWindowTime* (nv1)

Valid Range

Unit Command	NV content
Window OPEN	value > 0% AND state ≥ 1
Window CLOSED	value = 0% OR state = 0

nv17 nvoWindowContact

network output SNVT_switch nvoWindowContact;

This output network variable indicates the window contact status of the indoor unit

Valid Range

Unit Status	NV content
Window OPEN	value = 100%; state = 1
Window CLOSED	value = 0%; state = 0

Default Value

state = 0; value = 0%

Update Rate

This network variable is updated always that its value changes

nv18 nviDisable

network input eeprom SNVT_switch nviDisable;

This input network variable is used to disable/enable ME-AC-LON-1 device.

Value is stored in ME-AC-LON-1's eeprom

Once disabled, the only input NV active will be this one, the rest of input NVs will be disabled. To enable again the device, just write in this NV the appropriate value/state.

Valid Range

Unit Command	NV content
ME-AC-LON-1 DISABLED	value > 0% AND state ≥ 1
ME-AC-LON-1 ENABLED	value = 0% OR state = 0

nv19 nvoDisable

network output SNVT_switch nvoDisable;

This output network variable indicates whether ME-AC-LON-1 is disabled

Valid Range

Unit Status	NV content
ME-AC-LON-1 DISABLED	value = 100%; state ≥ 1
ME-AC-LON-1 ENABLED	value = 0%; state = 0

Default Value

state = 0; value = 0%

Default Service Type

Acknowledged

Update Rate

This network variable is updated always that its value changes

nv20 nviRmLock

network input eeprom SNVT_switch nviRmLock;

This input network variable is used to disable indoor unit’s remote control
Value is stored in ME-AC-LON-1’s eeprom

Valid Range

Unit Command	NV content
Remote Control DISABLED	value > 0% AND state ≥ 1
Remote Control ENABLED	value = 0% OR state = 0

nv21 nvoRmLock

network output SNVT_switch nvoRmLock;

This output network variable shows current status of remote control disablement

Valid Range

Unit Status	NV content
Remote Control DISABLED	value = 100%; state = 1
Remote Control ENABLED	value = 0%; state = 0

Default Value

state = 0; value = 0%

Default Service Type

Acknowledged

Update Rate

This network variable is updated always that its value changes

nv22 nviOnTimeReset

network input SNVT_switch nviOnTimeReset;

This input network variable is used to reset the operation time counter shown in *nvoOnTime*.

Valid Range

Unit Command	NV content
RESET <i>nvoOnTime</i>	value > 0% AND state ≥ 1

nv23 nvoOnTime

network output eeprom SNVT_time_hour nvoOnTime;

This output network variable indicates the operation time for the indoor unit
 Value is stored in ME-AC-LON-1's eeprom
 This value can be used for the maintenance of indoor unit's filter, as well as for monitoring the operation time of the unit

Valid Range

0~65535 hour

Default Value

N/A

Default Service Type

Acknowledged

Update Rate

This network variable is updated always that its value changes

nv24 nvoAlarm

network output SNVT_switch nvoAlarm;

This output network variable indicates failure in the communication between ME-AC-LON-1 device and the AC indoor unit

Valid Range

Unit Status	NV content
ON	value = 100%; state = 1
OFF	value = 0%; state = 0

Default Value

state = 0; value = 0%

Default Service Type

Acknowledged

Update Rate

This network variable is updated always that its value changes

nv25 nvoErrCode

network output SNVT_count nvoErrCode;

This output network variable indicates the present error code indicated by the indoor unit

Valid Range

Unit Status	NV content
No error	8000
Error	Error code: <ul style="list-style-type: none"> • 0001 ~ 7999: indoor unit error code (<i>nvoAlarm = (100%,1)</i>) • 8001: ME-AC-LON-1 Communication Error (<i>nvoAlarm = (100%,1)</i>) • 65535: Status of error has not been obtained from AC yet (initialization value)

Default Value

8000 (No error)

Default Service Type

Acknowledged

Update Rate

This network variable is updated always that its value changes

nv26 nvoVersion

network output polled SNVT_str_asc nvoVersion;

This polled output network variable indicates the firmware version of ME-AC-LON-1 device

Valid Range

Up to 30 ascii characters string

Default format is "V.x.yy.zz", where x.yy.zz stands for the firmware version on the device

Default Value

N/A

Default Service Type

N/A (non-bindable)

Update Rate

This network variable is polled (i.e. it will be never updated on change)

3.3 Configuration Properties

nv0 cpAcModel

From firmware version v1.5.9 this cp has been deprecated. There is no need to setup the AC unit any more onto ME-AC-LON-1 device

nv1 cpWindowTime

network input UCPTopenWindowTimeout config_prop cpWindowTime;

This configuration property is used to indicate the timeout that will take for ME-AC-LON-1 to switch OFF indoor unit after window has been open.

Value contained in *UCPTopenWindowTimeout* has the same format as *SNVT_time_min* (the UCPT type is referenced to this SNVT)

Valid Range

0~30 minutes

Factory Settings

0 minutes (will switch OFF indoor unit immediately after opening window)

nv2 cpSndHrtBt

network input SCPTmaxSendTime config_prop cpSndHrtBt;

This configuration property defines the maximum time between the previous and next update for following network variables:

- *nvoOnOff*
- *nvoMode*
- *nvoFanSpeed*
- *nvoVanePos*
- *nvoSetPoint*

Value contained in *SCPTmaxSendTime* has the same format as *SNVT_time_sec* (the SCPT type is referenced to this SNVT)

Valid Range

0~65535 seconds

Factory Settings

100,0 seconds

nv3 cpSndHrtBtTemp

network input SCPTmaxSendTime config_prop cpSndHrtBtTemp;

This configuration property defines the maximum time between the previous and next update for network variable *nvoSpaceTemp*

Value contained in *SCPTmaxSendTime* has the same format as *SNVT_time_sec* (the SCPT type is referenced to this SNVT)

Valid Range

0~65535 seconds

Factory Settings

900,0 seconds

nv4 cpTempMagnitude

network input UCPTtempMagnitude config_prop cpTempMagnitude;

As per LonMark standard, all variables using type *SNVT_temp_p* are based in SI units (Celsius), as in general all LonMark-compliant SNVTs do (there is no native Fahrenheit support in LonWorks).

Though, for *nviSetPoint*, *nvoSetPoint* and *nvoSpaceTemp* user might want to use the Fahrenheit scale at user-level interface. LonWorks visualisation and network management tools (TAC Vista, LonMaker, ...) generally allow transforming a value contained in a *SNVT_temp_p* into the Fahrenheit scale for end-user convenience (formally stated and *SNVT_temp_p#US* representation).

In case of using Fahrenheit end-user representation, the set of discrete values for *nvoSetPoint* and *nvoSpaceTemp* might become troublesome for representation. Internally, the AC unit works with Celsius temperatures and so do *nvoSetPoint* and *nvoSpaceTemp*, resulting in "strange" temperature values when converted to Fahrenheit (e.g. 23°C converts to 73,4°F, 24°C converts to 75,2°F).

In order to have more "natural" Fahrenheit values, *cpTempMagnitude* lets the integrator specify whether those *SNVT_temp_p* values are meant to be converted into Fahrenheit scale at control / visualisation level. In case that Fahrenheit is configured in *cpTempMagnitude*, the discrete values that *nvoSetPoint* and *nvoSpaceTemp* will show up will be specifically adjusted as close as possible to integer Fahrenheit values. So, for instance, instead of representing a value of 23°C (73,4°F) in a *SNVT_temp_p*, it will represent a 22,78°C (73,004°F), giving better proximity to a Fahrenheit integer (73°F in this case).

In any case, if using Fahrenheit for control / visualisation of *SNVT_temp_p* variables, rounding will be needed for the final value if integers are desired (this happens because of the limited resolution of *SNVT_temp_p* itself).

If using ME-AC-LON-1 along with a Mitsubishi Wall-mount or Infrared remote controller, and this remote controller is setup in the Fahrenheit scale, *cpTempMagnitude* should be set to Fahrenheit setting so that the values in *nvoSetPoint* fit with the ones in the remote controller.

Value contained in *UCPTtempMagnitude* has the same format as *SNVT_count* (the UCPT type is referenced to this SNVT)

Valid Range

0: Celsius (default) – Set of values for *SNVT_temp_p* will be 10°C to 38°C in steps of 1°C.

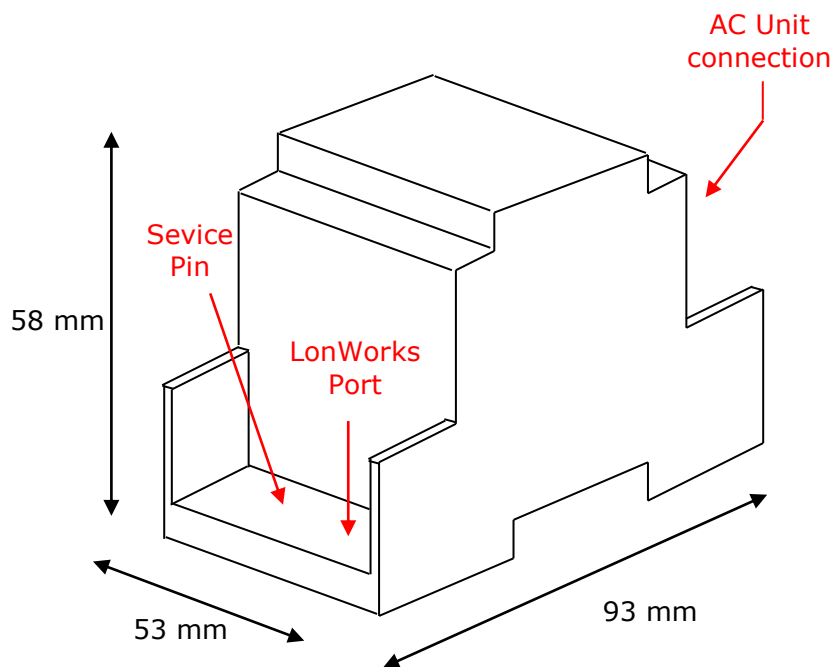
1: Fahrenheit – Set of values for *SNVT_temp_p* will be 50°F, 51,998°F, 53,996°F, 55,004°F, 57,002°F, 59°F, 60,998°F, 62,996°F, 64,994°F, 66,992°F, 68°F, 69,008°F, 71,006°F, 73,004°F, 75,002°F, 77°F, 78,998°F, 80,996°F, 82,994°F, 84,992°F, 87,008°F, 89,006°F, 89,996°F, 91,004°F, 93,002°F, 95°F, 96,998°F, 98,996°F, 100,004°F

Factory Settings

0 (Celsius)

4. Specifications

Dimensions:	93 x 53 x 58 mm
Weight:	85 g
Operating Temperature:	-25 . . . 85°C
Stock Temperature:	-40 . . . 85°C
Operating Humidity:	25-90% RH @50°C, non-condensing
Stock Humidity:	95% RH @50°C, non-condensing
Isolation voltage:	1000Vrms during 60 seconds, 277Vrms continuous
Lonworks Media:	Compatible with TP/FT-10 channels (FTT-10 and FTT-10A) Compatible with LPT-10 Link Power Transceivers
Lonworks Network polarity:	Polarity insensitive



5. AC Unit Types.

A list of Mitsubishi Electric indoor unit model's references compatible with ME-AC-MBS-1 and its available features can be found on this link:

http://www.intesisbox.com/intesis/support/compatibilities/IntesisBox_ME-AC-xxx-1_AC_Compatibility.pdf

6. Error Codes

Code (In Hexadecimal)	Description
8000	No active error
1102	Discharge Temperature high
1108	Internal thermostat detector working (49C)
1110	Outdoor unit fail
1300	Pressure low
1302	Pressure high (High pressure probe working 63H)
1503	Protection against freeze or battery high temperature
1504	Protection against freeze or battery high temperature
1504	Over heating protection
1509	High pressure error (ball valve closed)
1520	Super heating anomaly due to low temp. of discharge. (TH4)
2500	Erroneous operation of drain pump
2502	Erroneous operation of drain pump
2503	Drain sensor anomaly (DS)
4030	Serial transmission error
4100	Compressor pause due to excess of current (initial block)
4101	Compressor pause due to excess of current (overload)
4102	Phase detection opened
4103	Anti-phase detection
4108	Phase opened in phase L2 or connector 51CM opened
4118	Error in the anti-phase detector (electronic board)
4124	Connector 49L opened
4210	Cut due to over-current of compressor
4220	Voltage anomaly
4230	Radiator panel temperature anomaly (TH8)
5101	Ambient temperature probe anomaly (TH1), indoor unit
5102	Liquid probe anomaly (TH2)
5102	Cond/Evap probe anomaly (TH5)
5104	Error detection in discharge temperature
5105	Outdoor probe error TH3
5106	Outdoor probe error TH7
5107	Outdoor probe error TH6
5110	Outdoor probe error TH8
5202	Connector 63L opened
5300	Current probe error
6600	MNET duplicated address definition
6602	MNET Line transmission hardware error
6603	MNET BUS busy
6606	MNET Line transmission error
6607	MNET transmission error
6607	MNET without ack
6608	MNET transmission error
6608	MNET without response
6831	IR remote control transmission error (reception error)
6832	IR remote control transmission error (transmission error)
6840	Transmission error with the indoor/outdoor unit (reception error)
6841	Transmission error with the indoor/outdoor unit (transmission error)
6844	Error in inter-connection cable in the indoor/outdoor unit, indoor unit number deactivated (5 min or more)
6845	Error in inter-connection cable in the indoor/outdoor unit (cabling error, disconnection)
6846	Initial timer deactivated
8001	ME-AC-LON-1 device communication error
65535	Status of error has not been obtained from AC unit yet (initialization value)

In case you detect an error code not listed, contact your nearest Mitsubishi Electric technical support service.