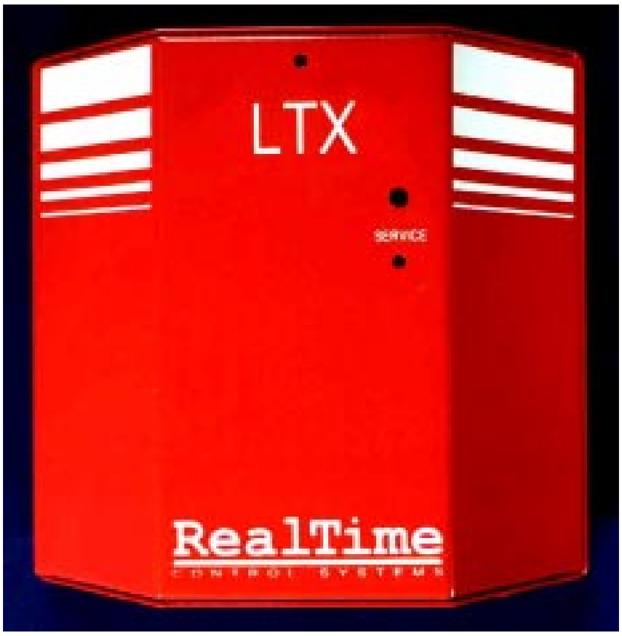
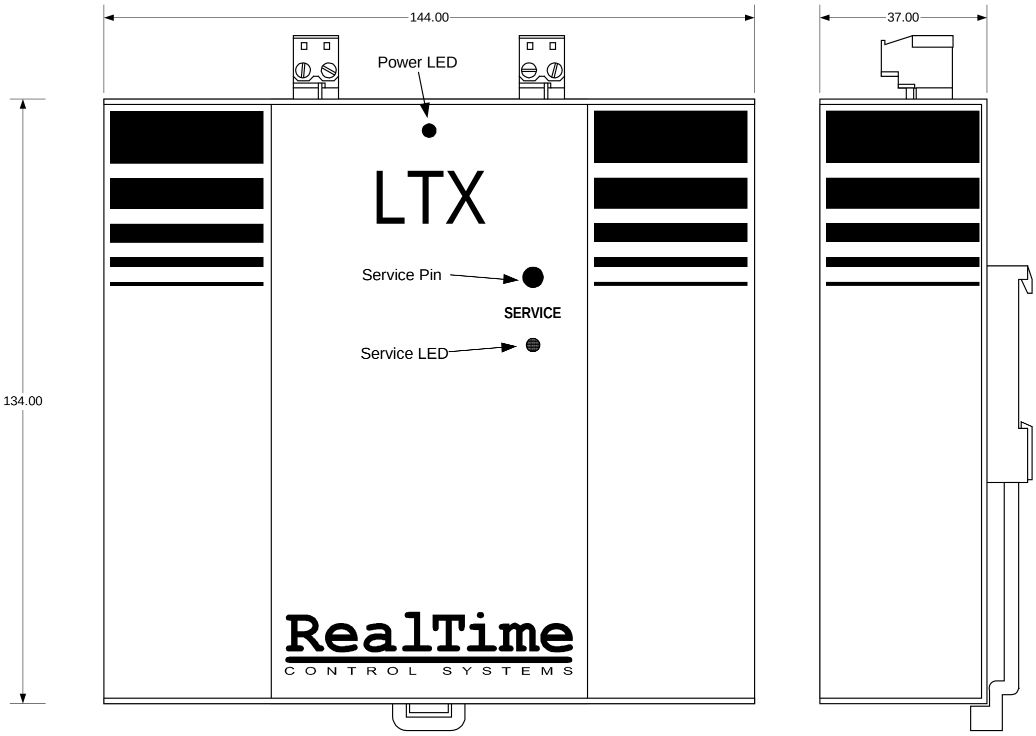


LTX-VCI
Virtual Control Interface

Description

The RealTime LTX-VCI extends RealTime air-conditioning control solutions by providing a compatible interface to a range of air-conditioning manufacturers. The LTX-VCI acts as virtual interface that allows the existing range of RealTime air-conditioning BMS interfaces and LonWorks Controllers to be instantly compatible with additional air-conditioning manufacturers products.

The VCI provides the necessary functionality to control individual A/C units as well as return fault and temperature readback data from each unit in a format compatible with existing RealTime BMS control solutions. The VCI can handle manufacturer interfaces with up to 64 units.



Dimensions (mm)

LTX-VCI Iss1.05

1 Introduction

1.1 LTX-VCI Features

- Provides a common control interface for many of the major brands of package Air-conditioning units
- Simplifies the monitoring and control of large numbers of A/C units
- Allows the monitoring and control of air-conditioning units from range of conventional and LonWorks Building Management Systems
- Provides backwards compatibility with existing RealTime BMS controllers and interfaces
- Provides a practical interface for managing thousands of network variables without the need for large numbers of bindings, and the ability to rezone the system without rebinding

1.2 Description

The LTX-VCI expands RealTime air-conditioning controls functionality to allow interfacing with a range of air-conditioning manufacturers. The LTX-VCI acts as virtual interface that allows the existing range of RealTime air-conditioning BMS interfaces and LonWorks Controllers to be instantly compatible with additional air-conditioning manufacturers products.

The following table provides the range of existing coverage for RealTime controllers and shows which solutions at present require the addition of the VCI. The range of solutions is constantly expanding, the latest solutions are available from the RealTime web site.

		Air-Conditioning Manufacturer		
BMS Manufacturer	**LonWorks Interface**	**Toshiba**	**Daikin**	**Mitsubishi**
Trend	LTX-21	✓	✓	✓
Cylon	LTX-51	✓	✓	✓
Andover	LTX-51	✓	✓	✓
RealTime	LTX-SC	✓	✓	✓
LTX-VCI Interface Required		-	YES	YES
Native A/C Interface		LG1	L-Gateway	LMAP

The LTX-VCI can handle A/C interfaces with up to 64 indoor units. Many LTX controllers are only designed to handle 16 units, therefore the VCI can serve data to up to 4 LTX controllers in order to allow access and control of all units.

Interfaces that the LTX-VCI are compatible with are associated with a *Device Interface Sheet* within this datasheet that describes specific details of interfacing, lists what functionality is available and provides fault code references. The current version of the LTX-VCI is compatible with the following device interfaces:

Manufacturer	**Product**	**Device Interface Sheet**
Daikin	L-Gateway DCS601A1R	page 5
Mitsubishi	LMAP02-E	page 7
Mitsubishi	LMAP03-E	page 9

1.3 Engineering

Engineering is a two step process, on one side connecting the VCI with the air-conditioning Interface, on the other connecting the BMS control system via a suitable LTX controller.

To engineer a specific system, follow the instructions in this datasheet to set up the linkage to the BMS interface and perform general configuration of the LTX-VCI. Refer to the relevant Device Interface Sheet within this datasheet for the relevant manufacturers product, this will provide product specific details of the available functionality and specific configuration information. Device Interfaces Sheets are specific to the LonWorks Program ID of the interface. If the program ID is different from that in the Device Interface Sheet then contact RealTime as there may be compatibility issues.

The system must be engineered by a suitably trained LonWorks integrator using the correct engineering tools. Engineers new to engineering RealTime products should contact us for additional information. The LonWorks functional profile for the VCI is available at the rear of this datasheet.

1.3.1 Air-Conditioning Interface

Note: Before the system is installed it is advisable to establish the unit addressing methodology being used in the system. As a general principle it is recommended that units are addressed from unit '1' (the lowest possible address) upwards with no gaps in the addressing scheme. Schemes that start the addressing at higher values and have gaps in the addressing scheme are liable to create problems in the interfacing and control of the system.

Firstly consult the *Device Interface Sheet* relevant to the system being installed, these are found in this datasheet. The device interface sheet will provide device specific information on the device functionality and any special steps that need to be taken during installation and engineering. The Device Interface Sheet provides the relevant *VCI Mode Number* for the device in question, this value configures the VCI to the correct configuration for the selected interface. The first task in configuring the VCI is set this value in the *Node: UCPTVCIMode*. If unsure of the value, setting *Node: UCPTVCIMode* equal to 0 disables any communication with the interface. **WARNING: Using an incorrect value for *UCPTVCIMode* can lead to unpredictable behaviour of the system.**

Once the VCI Mode is selected the VCI will be configured to the maximum number of indoor units for the selected interface, should the actual number of units be less than the maximum this it is possible to restrict the overall range of units addressed by the VCI by using the configuration parameters *Node:UCPTMinUnitNum* and *Node:UCPTMaxUnitNum* This will reduce the amount of time required to scan the system in order to produce faster updates of readback data and will also prevent invalid unit addresses from being processed.

To enable communication between the VCI and the A/C Interface create a single message tag binding between the tag **VCItag** on the VCI and the standard **msg_in** tag on the selected A/C interface[1] using a suitable LonWorks engineering tool.

The VCI should now be communicating with the air-conditioning interface, polling data from the selected range of units. The VCI will not write any data to the units until it receives control data from the BMS interface.

1 Message tags in LonMaker for Windows are found on the Virtual Function Block (VFB) of each of the devices. If adding by hand it will be necessary to drop the VCItag *msg_out* object onto the VCI VFB and a *msg_in* object on the a/c interface VFB to make them visible. Connecting them as normal will bind the tags.

1.3.2 BMS Interface

The VCI consists of four *VCI Proxy* function blocks that manage data exchange between one or more BMS interfaces and the A/C interface. Each proxy can be bound to a different LTX controller in order to allow the control of up to 64 units. In the default configuration the main proxy, *VCI Proxy[0]* can be used to directly address up to 64 A/C units. The remaining three proxies *VCI Proxy[1]* to *VCI Proxy[3]* each address 16 consecutive units. The following are the default address ranges of the units

Function Block	Start Unit	End Unit
VCI Proxy[0]	1	64
VCI Proxy[1]	17	32
VCI Proxy[2]	33	48
VCI Proxy[3]	49	64

In the simplest configuration a single LTX controller is bound to *VCI Proxy[0]* and can monitor and control units in the range 1 to the maximum unit count for the LTX controller. Typically this is to a limit of 16 units, but some new LTX controllers may be able to address up to 64 units.

If it is necessary to use more than one interface then each interface is bound to successive VCI Proxies. For example a second LTX interface would be bound to VCI Proxy[1], this performs a default mapping so that unit 1 in the second LTX corresponds to unit number 17 in the VCI and unit 16 in the second LTX corresponds to unit number 32 in the VCI.

Each of the proxy function blocks has two configuration parameters *UCPTStartUnitOffset* and *UCPTEndUnitOffset* which can be used to map each proxy to any address range within the range 1 to 64. If the configuration parameters are set to zero the function block will operate with default address ranges outline above. These offset values can be used to map units into the correct address range should a site addressing scheme not begin at 1.

1.3.3 Fault Code Mapping

Existing LTX controllers use an established fault reporting system that allows fault codes to be translated and reported in various different BMS architectures. To retain backwards compatibility the current version of the VCI translates manufacturers fault codes into the established fault code format. In the BMS the LTX can be translated back into the native manufacturers codes either manually or using suitable lookup mechanisms. Each Device Interface Sheet provides the necessary translation between LTX and manufacturers fault codes.

Device Interface Sheet: Daikin L-Gateway DCS601A1R

Manufacturer	Daikin
Device Name	L-Gateway Prototype
Product Code	DCS601A1R
Program ID	90:00:87:48:50:04:04:02
Indoor Units	64
VCI Mode Number	10
LTX-VCI compatibility	v0.90 or greater

Interface Functionality

Control Function	Comments
`Setpoint`	Range restrictions may be applied by LTX interfaces
`Fanspeed`	Only low or high speed available. Fanspeed settings of AUTO, LOW and MEDIUM are treated as LOW, HIGH is treated as HIGH
`Run Mode`	HEAT, COOL, AUTO and FAN_ONLY available
`Louver`	Not available on L-Gateway.
`On/Off`	Standard behaviour
`Central/Local Control`	L-Gateway allows separate switching of On/Off, Setpoint and Mode switches. The LTX-VCI will switch all as a single global setting of Central or Local.

Readback Function	Comments
`Return air temperature`	Available in L-Gateway
`Heat-exchanger temperature`	Not available
`Fault Code`	Selected Daikin fault codes are mapped into the LTX – see fault code reference table
`Setpoint`	Setpoint readback will indicate the actual unit setpoint, this may be offset by the unit from the demand setpoint
`Fanspeed`	Readback will return either LOW or HIGH
`Run Mode`	Run mode readback will indicate actual operating mode, during AUTO operation readback will indicate actual mode (COOL, HEAT etc)
`Louver`	Not available
`On/Off`	Standard

Additional Functions	Comments
`Fault Reset`	Not Available
`Filter Reset`	Available if implemented on LTX BMS controller

Configuration Notes

No specific configuration requirements.

Operation Notes

Master/Slave Operation

Some Daikin A/C units operate in AUTO with separate heating and cooling setpoints. The readback values of run-mode and setpoint reflect the actual values the unit is operating to rather than those initially set by the BMS or keypad. With the LTX Master/Slave operation the LTX controllers copy the read-back data from the keypad master and write it into the slave units. If the master unit is operating in AUTO with an initial setpoint of 20 degrees then when it moves into heating mode the readback data will be 18 degrees, HEAT, and the slave units will be placed in this state. Hence the slave units will mirror the operation of the master as expected and will perform the same setpoint transitions as the master even though they will not be operating in AUTO. It is recommended that the system designer should check that this functionality is acceptable.

Fault Mapping

The following mapping provides a list of the Daikin fault codes that are reported individually and the corresponding single byte codes that the VCI generates for these codes. In some control systems the VCI code will be visible and manual translation will have to performed, in others the supervisor software can be used to automatically map the VCI code to the original Daikin fault code so the native codes can be presented. Future versions of LTX controllers will allow the original codes to be reported directly.

LTX-VCI Code		Daikin Fault Code
Decimal	Hex	
21	15	A0
22	16	A1
23	17	A3
24	18	A6
25	19	A7
26	1A	A9
27	1B	AF
28	1C	AJ
29	1D	C4
30	1E	C5
31	1F	C9
32	20	CJ
33	21	E0
34	22	E1
35	23	E3
36	24	E4
37	25	E9
38	26	F3
39	27	H9
40	28	J3
41	29	J5
42	2A	J6
43	2B	JA
44	2C	JC
45	2D	JH

LTX-VCI Code		Daikin Fault Code
Decimal	Hex	
46	2E	L4
47	2F	L5
48	30	L8
49	31	L9
50	32	LC
51	33	P1
52	34	P4
53	35	U0
54	36	U1
55	37	U2
56	38	U4
57	39	U5
58	3A	U7
59	3B	U8
60	3C	U9
61	3D	UA
62	3E	UC
63	3F	UF
64	40	UH
101	65	Unknown Fault Code
111	6F	AC Non-Existance
112	70	AC Comms Error
153	99	LTX Query Fail
255	FF	No fault

Device Interface Sheet: Mitsubishi LMAP02-E

Manufacturer	Mitsubishi
Device Name	LMAP
Product Code	LMAP02-E
Program ID	90:00:71:00:76:00:02:02
Indoor Units	50
VCI Mode Number	20
LTX-VCI compatibility	V1.00 or greater

Interface Functionality

Control Function	Comments
`Setpoint`	Range restrictions may be applied by LTX interfaces
`Fanspeed`	LTX Mappings of 0 = LOW, 1 = MID2, 2 = MID1, 3=HIGH Consult LMAP datasheet for mappings for units with fewer fan speeds.
`Run Mode`	HEAT, COOL, AUTO and FAN_ONLY available
`Louver`	Not available
`On/Off`	Standard behaviour
`Central/Local Control`	LMAP allows separate switching of On/Off, Setpoint and Mode switches. The LTX-VCI will switch all as a single global setting of Central or Local.

Readback Function	Comments
`Return air temperature`	Available
`Heat-exchanger temperature`	Not available
`Fault Code`	The LMAP02 only supplies Fault/No Fault indication, for comprehensive fault code reporting it is necessary to use the LMAP03
`Setpoint`	Available
`Fanspeed`	Available
`Run Mode`	Available
`Louver`	Not available
`On/Off`	Available

Additional Functions	Comments
`Fault Reset`	Not Available
`Filter Reset`	Not Available?

Configuration Notes

1) To use keypad lockout (prohibit) functionality, SW1-1 on the LMAP must be ‘ON’.

Fault Mapping

The following mapping provides a list of the Mitsubishi fault codes that are reported individually and the corresponding single byte codes that the VCI generates for these codes. In some control systems the VCI code will be visible and manual translation will have to performed, in others the supervisor software can be used to automatically map the VCI code to the original Mitsubishi fault code so the native codes can be presented. Future versions of LTX controllers will allow the original codes to be reported directly.

Note that the Mitsubishi LMAP02 (Firmware version 2.xx) does not return fault codes and only provides a fault/no fault indication for each unit. To return detailed fault codes it is necessary to use the Mitsubishi LMAP03 (Firmware version 3.xx), contact Mitsubishi for details. See the Device Interface Sheet for the LMAP03 for details of the fault codes returned.

LTX-VCI Code		Fault Code
Decimal	**Hex**	
153	99	LTX Query Fail
201	C9	Fault (unknown)
255	FF	No fault

Device Interface Sheet: Mitsubishi LMAP03-E

Manufacturer	Mitsubishi
Device Name	LMAP
Product Code	LMAP03-E
Program ID	90:00:A2:00:76:00:03:03
Indoor Units	50
VCI Mode Number	21
LTX-VCI compatibility	V1.05 or greater

Interface Functionality

Control Function	Comments
`Setpoint`	Range restrictions may be applied by LTX interfaces
`Fanspeed`	LTX Mappings of 0 = LOW, 1 = MID2, 2 = MID1, 3=HIGH Consult LMAP datasheet for mappings for units with fewer fan speeds.
`Run Mode`	HEAT, COOL, AUTO and FAN_ONLY available
`Louver`	Not available
`On/Off`	Standard behaviour
`Central/Local Control`	LMAP allows separate switching of On/Off, Setpoint and Mode switches. The LTX-VCI will switch all as a single global setting of Central or Local.

Readback Function	Comments
`Return air temperature`	Available
`Heat-exchanger temperature`	Not available
`Fault Code`	Available – See following table for mapping to LTX ranges
`Setpoint`	Available
`Fanspeed`	Available
`Run Mode`	Available
`Louver`	Not available
`On/Off`	Available

Additional Functions	Comments
`Fault Reset`	Not Available
`Filter Reset`	Not Available?

Configuration Notes

1) To use keypad lockout (prohibit) functionality, SW1-1 on the LMAP must be 'ON'.

Fault Mapping

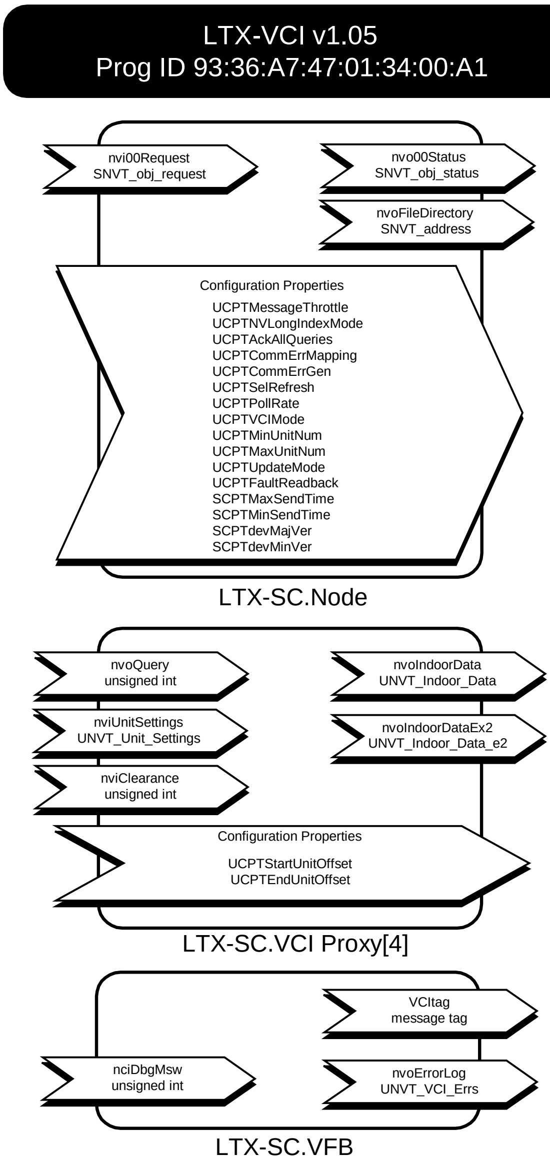
The following mapping provides a list of the Mitsubishi fault codes that are reported individually and the corresponding single byte codes that the VCI generates for these codes. In some control systems the VCI code will be visible and manual translation will have to performed, in others the supervisor software can be used to automatically map the VCI code to the original Mitsubishi fault code so the native codes can be presented. Future versions of LTX controllers will allow the original codes to be reported directly.

LTX-VCI Code		Mitsubishi Codes	
Decimal	**Hex**	**Numeric Code**	**Fault Description**
21	15	110	Equipment abnormality
22	16	120	Equipment abnormality
23	17	403	Sub IF / outdoor communication trouble
24	18	900	Test run
25	19	10*0	Ref.cycle abnormality
26	1A	11**	Ref.cycle temperature abnormality - Common operand: **
27	1B	12**	Ref.cycle temperature abnormality allowance - Common operand: **
28	1C	13**	Ref.cycle pressure abnormality - Common operand: **
29	1D	14**	Ref.cycle pressure abnormality allowance - Common operand: **
30	1E	1500	Ref.cycle not operate due to overcharge
31	1F	1501	Ref.cycle not operate due to undercharge
32	20	1502	Ref.cycle not operate due to liquid back
33	21	1503	Ref.cycle not operate due to coil frost
34	22	1504	Ref.cycle not operate due to overheat protection
35	23	1505	Ref.cycle not operate due to compressor vacuum operation protection
36	24	1509	Abnormal high pressure (closed ball valve)
37	25	20*0	Water system abnormality
38	26	21**	Water system temperature abnormality - Common operand: **
39	27	22**	Allowance of water system temperature abnomality - Common operand : **
40	28	23**	Water system pressure abnormality - Common operand: **
41	29	24**	Water system pressure abnormality allowance - Common operand: **
42	2A	2500	Water system not operate due to water leak
43	2B	2501	Water system not operate due to water supply suspension
44	2C	2502	Water system not operate due to drain pump abnormality
45	2D	2503	Water system not operate due to drain sensor abnormality
46	2E	2504	Water system not operate due to liquid level abnormality
47	2F	2505	Water system not operate due to cool water valve abnormality
48	30	2506	Water system not operate due to warm water valve abnormality
49	31	2600	Water system operation restricted due to water leak
50	32	2601	Water system operation restricted due to water supply suspension
51	33	2602	Water system operation restricted due to drain pump abnormality
52	34	2603	Water system operation restricted due to drain sensor abnormality
53	35	2604	Water system operation restricted due to liquid level abnormality
54	36	3600	Air system operation restricted due to filter clogging
55	37	3601	Air system operation restricted due to filter maintenance
56	38	3602	Air system operation restricted due to damper position detecting abnormality
57	39	37**	Air system operation humidity abnormality allowance - Common operand: **
58	3A	4000	Electric system abnormality
59	3B	40*0	Electric system abnormality in line *
60	3C	4100	Electric system not operate due to overcurrent shut-off
61	3D	4101	Electric system not operate due to overcurrent protection
62	3E	4102	Electric system not operate due to open phase
63	3F	4103	Electric system not operate due to reversed phase
64	40	4104	Electric system not operate due to electric leak
65	41	4105	Electric system not operate due to short circuit
66	42	4106	Electric system not operate due to self power supply OFF
67	43	4107	Electric system not operate due to overlord
68	44	4108	Electric system not operate due to overcurrent relay 51C

LTX-VCI Code		Mitsubishi Codes	
Decimal	**Hex**	**Numeric Code**	**Fault Description**
69	45	4109	Electric system not operate due to overcurrent relay 51F
70	46	4110	Electric system not operate due to high voltage part
71	47	4111	Electric system not operate due to bus current
72	48	4112	Electric system not operate due to coil overheat 49
73	49	4113	Electric system not operate due to heater overheat
74	4A	4114	Electric system not operate due to fan controller abnormality
75	4B	4115	Electric system not operate due to power supply synchronism abnormality
76	4C	4116	Electric system not operate due to motor abnormality
77	4D	4117	Compressor self protection function operated
78	4E	4118	Faulty reverse phase detecting circuit
79	4F	4119	Open connectors of two or more
80	50	4124	Open connector (49C)
81	51	420*	Inverter abnormality
82	52	421*	Inverter overcurrent shut-off
83	53	422*	Inverter bus voltage insufficiency
84	54	423*	Inverter radiating thermostat abnormality
85	55	424*	Inverter overcurrent protection
86	56	425*	Inverter IPM abnormality
87	57	430*	Inverter abnormality allowance
88	58	431*	Inverter overcurrent shut-off allowance
89	59	432*	Inverter bus voltage insufficiency allowance
90	5A	433*	Inverter radiating thermostat abnormality allowance
91	5B	434*	Inverter overcurrent protection abnormality allowance
92	5C	435*	Inverter IPM abnormality allowance
93	5D	50*0	Sensor trouble
94	5E	51**	Temperature sensor trouble - Sensor No.: **
95	5F	52**	Pressure sensor trouble - Sensor No.: **
96	60	53**	Current sensor trouble - Sensor No.: **
97	61	54**	Humidity sensor trouble - Sensor No.: **
98	62	55**	Gas sensor trouble - Sensor No.: **
99	63	56**	Air speed sensor trouble - Senser No.: **
100	64	57**	Limit switch trouble - Switch no.: **
101	65	58**	Sensor trouble - Sensor No.: **
102	66	59**	Other sensors trouble - Sensor No.: **
103	67	6000	System abnormality
104	68	6101	System not operate due to abnormality - With response frame
105	69	6102	No answer back
106	6A	6500	Communication error
107	6B	6600	Communication error - Address duplicate
108	6C	6601	Communication error - Polarity unsettled
109	6D	6602	Communication error - Transmission processor hardware error
110	6E	6603	Communication error - Transmission line busy
111	6F	6604	Communication error - No ACK(06H)
112	70	6605	Communication error - No response frame
113	71	6606	Communication error - Transmission processor
114	72	6607	Communication error - No ACK return
115	73	6608	Communication error - No return of response frame
116	74	6609	Communication error
117	75	6610	Communication error
118	76	6700	Communication error - K-transmission abnormality
119	77	6701	Communication error - K-transmission error
120	78	6702	Communication error - K-address duplicate
121	79	6750	Communication error - K abnormality code PO
122	7A	6751	K abnormality - Room temperature thermistor abnormality
123	7B	6752	K abnormality - Indoor coil thermistor abnormality,Condensation temperature sensor abnormality
124	7C	6753	K abnormality - Transmit/receive error
125	7D	6754	K abnormality - Drain sensor abnormality, Float switch function
126	7E	6755	K abnormality - Drain pump abnormality
127	7F	6756	K abnormality - Coil frost/overheat protection
128	80	6757	K abnormality - System error
129	81	6758	K abnormality - Outdoor unit trouble, Indoor/outdoor communication error
130	82	6761	K abnormality - Room temperature thermistor abnormality
131	83	6762	K abnormality - Indoor coil thermistor abnormality, Condensation temperature sensor abnormality
132	84	6763	K abnormality - Transmit/receive error

LTX-VCI Code		Mitsubishi Codes	
Decimal	**Hex**	**Numeric Code**	**Fault Description**
133	85	6764	K abnormality - Drain sensor abnormality
134	86	6765	K abnormality - Drain pomp abnormality
135	87	6766	K abnormality - Coil frost/overheat protection
136	88	6767	K abnormality - Outdoor unit trouble - Indoor/outdoor communication error
137	89	6771	K abnormality - High pressure abnormality,Low pressure abnormality
138	8A	6772	K abnormality - Inner thermostat function, Discharge temperature abnormality, Shell thermostat function, Overcurrent protection
139	8B	6773	K abnormality - Radiator plate thermostat function
140	8C	6774	K abnormality - Outdoor thermistor abnormality
141	8D	6775	K abnormality - Pressure sensor abnormality, Inddor/outdoor communication error
142	8E	6776	K abnormality - Overcurrent shut-off
143	8F	6777	K abnormality - System error
144	90	6778	K abnormality - Normal
145	91	6779	K abnormality - Refrigerant overcharge,Abnormal voltage,Abnormal CT sensor
146	92	6800	Communication error - Other communication errors
147	93	6801	Communication error - V-control communication error
148	94	6810	Communication error - UR communication error
149	95	6811	Communication error - UR communication synchronism not recover
150	96	6812	Communication error - UR communication hardware error
151	97	6813	Communication error - UR communication status bit detection error
152	98	6820	Other communication errors
153	99		LTX Comms error
154	9A	6821	Other communication errors - Transmission line busy
155	9B	6822	Other communication errors - No communication ACK
156	9C	6823	Other communication errors - No response command
157	9D	6824	Other communication errors - Receive data error
158	9E	6831	Remote controller communication/indoor unit receiving trouble
159	9F	6832	Remote controller communication/indoor unit transmitting trouble
160	A0	6833	Remote controller communication/indoor unit transmitting trouble
161	A1	6834	Remote controller communication/indoor unit receiving trouble
162	A2	6840	Indoor/outdoor communication/unit receiving trouble
163	A3	6841	Indoor/outdoor communication/outdoor unit transmitting trouble
164	A4	6842	Indoor/outdoor communication/indoor unit transmitting trouble
165	A5	6843	Indoor/outdoor communication/unit receiving trouble
166	A6	6844	Excessive number of indoor units connected
167	A7	6845	Erroneous connection of indoor/outdoor units
168	A8	6846	Excessively long pick up time
169	A9	6850	BMS-Main IF communication / Main IF receiving trouble
170	AA	6851	Main IF- Sub IF communication trouble
171	AB	6852	I/F system error
172	AC	7000	System abnormality
173	AD	7100	System abnormality - Total capacity error
174	AE	7101	System abnormality - Capacity code error
175	AF	7102	System abnormality - Connecting unit number excess
176	B0	7103	System abnormality - Piping length setting error
177	B1	7104	System abnormality - Floor height setting error
178	B2	7105	System abnormality - Address setting over 254
179	B3	7106	System abnormality - Attribute setting error
180	B4	7107	System abnormality - Distributor setting error
181	B5	7108	System abnormality - Ref. system setting error
182	B6	7109	System abnormality - Connection setting error
183	B7	7110	System abnormality - Connection data unsettled
184	B8	7111	System abnormality - I/O connection equipment not connected
185	B9	7112	System abnormality - I/O type setting error
186	BA	7113	System abnormality - Equipment unsettled
187	BB	7130	Combination trouble
188	BC	7200	System abnormality - Numeric values unsettled
189	BD	7201	System abnormality - Numeric values unsettled
153	99		LTX Comms error
201	C9		Unknown Fault Code
255	FF		NO fault

2 LonWorks Engineering



2.1 LTX-VCI Functional Profile

The LTX-VCI functional profile is shown above. The following table gives a summary for each network variable.

NV Index	Name	In/Out	Type	Description
0	nvi00Request	In	SNVT_obj_request	
1	nvo00Status	Out	SNVT_obj_status	
2	nvoFileDirectory	Out	SNVT_address	File pointer to configuration data
3	nvoErrorLog	Out		Debug NV
4	nciDbgMsw	In		Debug config NV
5-8	nviQuery[4]	In	unsigned int	Indoor data query index
9-12	nviClearance[4]	In	unsigned int	Fault clearance command
13-16	nviUnitSettings[4]	Out	UNVT_Unit_Settings	Unit settings data
17-20	nvoIndoorData[4]	Out	UNVT_Indoor_Data	Indoor unit data
21-24	nvoIndoorDataEx2[4]	Out	UNVT_Indoor_Data_e2	Indoor unit data (extended)

2.2 Application Network Variables

*network input UNVT_Unit_Settings **nviUnitSettings***

User defined data structure with the following fields

```
typedef struct {
        unsigned int    unit_number;
        SNVT_hvac_mode  hvac_mode;
        SNVT_temp_p     setpoint;
        unsigned int    on_off;
        unsigned int    fan_speed;
        unsigned int    louver;
        unsigned int    filter_reset;
        unsigned int    priority_c_o;
        unsigned int    operation_ban;
} UNVT_Unit_Settings;
```

Valid values for these fields are as follows

Field	Valid Values
unit_number	1..64
hvac_mode	{AUTO=0, HEAT=1, COOL=3, FAN ONLY=9}
setpoint	18.00-29.00 Degrees Centigrade
on_off	{OFF=0, ON=1}
fan_speed	{AUTO=0, LOW=1, MEDIUM=2, HIGH=3}
louver	{OFF=0, ON=1}
filter_reset	{NORMAL=0, RESET=1}
priority_c_o	{REMOTE=0, CENTRE=1}
operation_ban	{NONE=0, PRESENT=1}

This data structure contains the complete operation commands for a single air-conditioning unit, addressed by the field `.unit_number`.

---

*network input unsigned int **nviQuery***

Range is between 1 and 64 and corresponds to the current unit address being queried, actual valid range of queries is determined by the selected device VCI mode and the ranges specified by *Node:UCPTMinUnitNum* and *Node:UCPTMaxUnitNum.*

---

*network input unsigned int **nviClearance***

Propagates a global unit reset command to the attached A/C interface where such functionality is available.

---

*network output UNVT_Indoor_Data **nvoIndoorData***

User defined data structure with the following fields

```
typedef struct {
        unsigned int    unit_number;
        SNVT_hvac_mode  hvac_mode;
        SNVT_temp_p     setpoint;
        unsigned int    on_off;
        unsigned int    fan_speed;
        unsigned int    louver;
        unsigned int    filter_state;
        SNVT_temp_p     indoor_temp;
        SNVT_temp_p     heat_exch_temp;
        unsigned int    unit_fault;
} UNVT_Indoor_Data;
```

Valid values for these fields are as follows

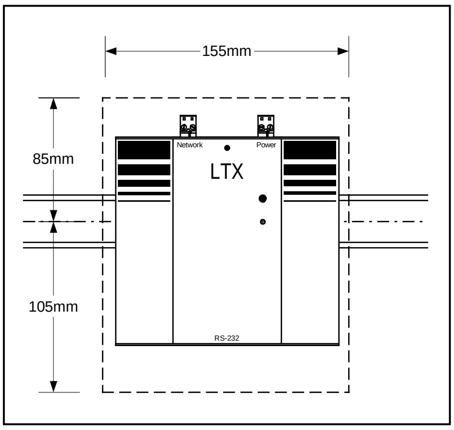
Field	Valid Values
unit_number	1..16
hvac_mode	{AUTO=0, HEAT=1, COOL=3, FAN ONLY=9}
setpoint	18.00-29.00 Degrees Centigrade
on_off	{OFF=0, ON=1}
fan_speed	{AUTO=0, LOW=1, MEDIUM=2, HIGH=3}
louver	{OFF=0, ON=1}
filter_state	{OK=0,DIRTY=1}
indoor_temp	-255.00..255.00
heat_exch_temp	-255.00..255.00
unit_fault	1..255, 0 indicates no unit

The data is returned from the indoor unit and indicates its current operating state.

2.3 Configuration Parameters

User modifiable configuration parameters are discussed in the engineering section of this datasheet. All other configuration parameters should not be modified unless specific instructions are provided in a device information sheet.

3 Installation Instructions



The LTX is installed as follows

1) Mount the LTX on a standard symmetric DIN rail. A clearance of 85mm above and 105mm below the DIN rail centreline should be allowed and 155mm horizontal clearance. See the figure to the right.

2) Connect the LTX Power connector (black) to a 1.5VA 24Vdc supply. The connection is polarity independent. Do not power the device up.

3) Connect the LonWorks network to the LTX connector labelled ‘Network’ (orange) using unshielded twisted pair; the connection is polarity independent. Multiple devices can be daisy-chained.

4) Daisy-chain the LonWorks connection from the LTX to a pair of screw-terminals mounted on the DIN rail adjacent to the LTX. This is for engineering purposes and allows easy access to the network.

5) Add a network terminator to the LonWorks network if specified.

4 Technical Specification

Electrical

Supply	24V DC
Power	1.5VA
Processor	Echelon 3150
Clock Speed	10 MHz
External Memory	32kb PROM, 24kb SRAM
LON Network	FTT-10A Transceiver, Free topology network

Mechanical

Dimensions	H138 x W146 x D38 without DIN clip H144 x W146 x D48 with DIN clip
Mounting	Quick release standard DIN rail
Clearance around DIN rail	Minimum 85mm above and 105mm below DIN rail centreline
Casing Material	Casing – Powder coated 18 gauge steel to RAL 3020
Weight	250g
Power and LON Connectors	Two part rising clamp 0.5mm" to 2.5mm" cross sectional area cable

Environmental

Temperature Storage Operation	 -10oC to 50oC 0oC to 50oC
Humidity	0-90% RH non-condensing
Protection	IP30
EMC Emissions **EMC Immunity**	EN50081-1 EN50082-1

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