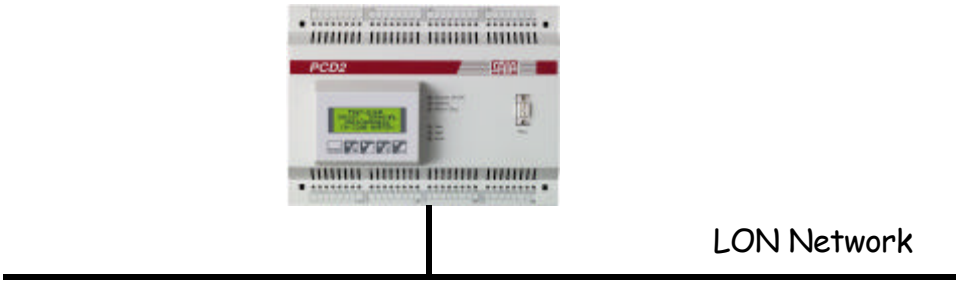
# OPERATING MANUAL
# Enertronic Control System 2
# with LON communication

Lennox chillers in the Egologic and Seconscrew ranges connected to a LONworks network

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## CONTENTS

# 1. PREFACE

This operating manual describes the features of the Enertronic Control System 2 with regard to LON communication. It explains to the user how the Enertronic Control System is built up in terms of hardware and how LON communication takes place.

Be sure to use this document in conjunction with the operating manual of the Enertronic Control System 2 for the Ecologic and Seconscrew ranges. (Document No. 8EC910005, revision C.)

This operating manual describes first of all the hardware needed for the Enertronic Control System 2 using LON communication. Next the physical link to the LON network is described. Then the variables communicated across the LON network are highlighted. Some technical data are shown at the end of the document.

TO DETERMINE THE RELEVANT FUNCTIONALITY FOR YOUR APPLICATION, THIS USER MANUAL MUST BE CONSULTED IN CONJUNCTION WITH THE USER INSTRUCTIONS SPECIFIC TO YOUR LENNOX CHILLER.

FOR ALL GUIDELINES PERTAINING TO SAFETY, USE AND MAINTENANCE AND WARRANTY, REFERENCE SHOULD ALSO BE MADE TO THE USER INSTRUCTIONS APPLYING TO YOUR SPECIFIC LENNOX CHILLER.

# 2. HARDWARE

The hardware configuration for chillers using LON communication is the same for all machine versions. This implies that both the single circuit machine and the double circuit machine have the same hardware.

## 2.1. Hardware configuration

Figure 1 gives an overview of LON communication based control.

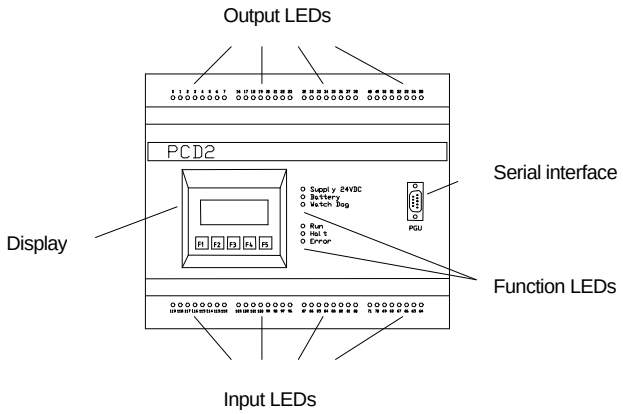


Figure 1, LON communication based control

**! NOTE:**

Removing the cover without cutting off the power may provoke damage to the hardware.

## 2.2. Inputs and outputs of ECS control using LON communication

The inputs and outputs of the control system are detailed in the operating manual for the Enertronic Control System 2 for the Ecologic and Seconscrew ranges. (Document No. 8EC910005, revision C.)

Please observe what is highlighted in section 3.6 (Inputs and outputs for double-circuit version equipped with scroll compressors) and section 3.7 (Inputs and outputs for double circuit version equipped with screw-type compressors). For a single circuit machine the inputs and outputs of circuit 2 are not used.

## 2.3. LON interface hardware

The connections for the LON bus are located under the cover of the PCD. The hardware of the LON interface is made up of a single PCB inserted into the main PCB of the PCD. It provides the connections for the LON bus, the function LEDs and the service pin.

### 2.3.1. Connections for the LON bus

Figure 2 shows how to connect the interface to the LON network.

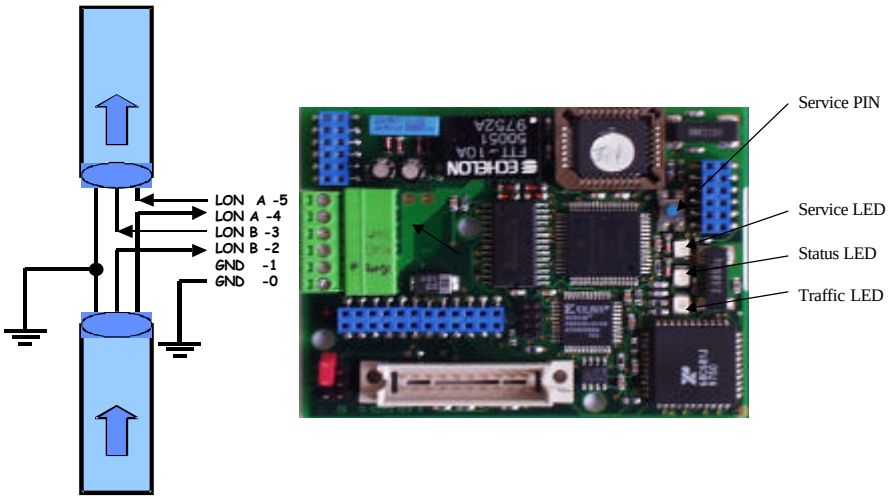


Figure 2: Connecting hardware to the LON network

**! NOTE:**

When carrying out work on the control system be sure to take adequate measure to avoid damage caused by electrostatic discharges.

**! NOTE:**

Removing the cover without cutting off the power may provoke damage to the hardware.

### 2.3.2. Service pin

Pressing the "service pin" enables you to log on a node ( or subscriber) to the LONworks network. Then the neuron ID and the Program ID are written to the network. The service pin is located under the cover. (See figure 2.)

### 2.3.3. Function LEDs

The function LEDs are located under the cover (see Figure 2). Three LEDs display the system status. The three LEDs have the following functions.

- Service LED: shows the status of the neuron chip
- Status LED: shows the PCD driver information
- Traffic LED: shows the data traffic information.

In normal service, the service LED and the status LED will not light up. For each message despatched, the traffic LED will light up for at least 100 ms. If the traffic LED shows a steady light, this means that at least 10 messages per second are being transferred.

**! NOTE:**

When carrying out work on the control system be sure to take adequate measure to avoid damage caused by electrostatic discharges.

# 3. Functionality

Adding LON communication to the Enertronic Control System does not have any impact on the performance of the control. The user instructions mentioned earlier apply integrally. Below you will find additional information on LON communication.

## 3.1. SNVT list

The table below summarises the SNVTs used with associated characteristics.

| Name | Type | I/O | Function | Unit |
|---|---|---|---|---|
| Twi | SNVT_count_f | output | Water inlet temperature | °C |
| Twu | SNVT_count_f | output | Water outlet temperature | °C |
| Tamb | SNVT_count_f | output | Ambient temperature | °C |
| perc_cm1 | SNVT_count_f | output | Actual capacity circuit 1 | % |
| perc_cm2 | SNVT_count_f | output | Actual capacity circuit 2 | % |
| diag_c1 | SNVT_count_f | output | Diagnosis register of circuit 1 | - |
| diag_c2 | SNVT_count_f | output | Diagnosis register of circuit 2 | - |
| diag_alg | SNVT_count_f | output | General diagnosis register | - |
| Ps_c1 | SNVT_count_f | output | Suction pressure circuit 1 | Bar |
| Pd_c1 | SNVT_count_f | output | Discharge pressure circuit 1 | Bar |
| Ps_c2 | SNVT_count_f | output | Suction pressure circuit 2 | Bar |
| Pd_c2 | SNVT_count_f | output | Discharge pressure circuit 2 | Bar |
| Set_adj | SNVT_count_f | input | Setpoint adjustment | K |
| Set_act | SNVT_count_f | Output | Actual setpoint | °C |
| Sc | SNVT_switch | Input | Release of chiller | - |
| Hours_c1 | SNVT_count | Output | Hour counter circuit 1 | Hours |
| Hours_c2 | SNVT_count | Output | Hour counter circuit 2 | Hours |
| Starts_c1 | SNVT_count | Output | Starts circuit 1 | - |
| Starts_c1 | SNVT_count | Output | Starts circuit 2 | - |
| Fi | SNVT_switch | Output | Failure indication | - |
| Pll | SNVT_switch | Input | Activates peak load limiting | - |
| Sec_setp | SNVT_switch | Input | Activates second setpoint | - |

### 3.1.1. Communication

Every 5 seconds, the control system refreshes one output value. If the refreshment results in a change of the relevant value, the new value will be written to the network. This way each output value will be changed anyhow every 85 seconds. An exception is failure indication. A failure indication is communicated to the network right after the control system has generated the indication.

#### 3.1.2. Diagnosis registers

The diagnosis functions of the Enertronic Control System generates a two-digit indication. These indications are explained in the operating manual cited before.

#### 3.1.3. Setpoint adjustment

Setpoint adjustment is used to indicate a temperature difference in Kelvin from the standard setpoint. (As a rule, 6°C.) This input variable has an immediate impact on the PCD software.

#### 3.1.4. Release of chiller

Releasing the chiller requires two conditions to be fulfilled. The first condition is that the start command must be given through input 80. The second condition is that the start command (Sc) must be given via the LON network. This release occurs by setting the SNVT "SC" to 1. If it is set to 0, the release conditions ceases to exist. The control systems responds with a 10-second delay.

#### 3.1.5. Peak load limiting and second setpoint

Peak load limiting is activated by setting SNVT "PII" to 1. Setting SNVT "Sec_setp" to 1 activates the second setpoint. Both are deactivated if they are set to 0. You will find an explanation of the two options in the operating manual cited before.

### 3.2. Neuron ID

Each node in the LON network has its own identification code, the neuron ID. The neuron chip storing the neuron ID is located on the function module under the cover. Lennox can read out the neuron ID and supply it on demand.

### 3.3. Program ID

The ECS software can be used to allocate a so-called "program identification to the PCD. The program identification Lennox allocated to the node is " **nodes**".

### 3.4. XIF file

An XIF file, also known as eXternal Interface File, describes a network interface. An XIF file contains information about such variables as SNVT type, variable name, input or output, etc. An XIF file can be used by a Lonworks tool. A Lonworks tool is adopted to configure the network. An XIF file can be supplied on demand.

## 4. General technical data

| Reference | Specification |
|---|---|
| LON processor/ neuron chip | LON 3150 |
| Neuron chip firmware | Version 2 or higher |
| Network options | FTT_10A |
| Network variables supported | All SNVT types |
| Special variables supported | Explizit message up to 50 characters |
| Protection of the transceiver with “Spark gaps | VDE(EN132400, IEC384-12) rel.2 UL1414 and CSA C22.2 No.0;1) |

## 5. Glossary

| | |
|---|---|
| FTT | **F**ree **T**opology **T**ransceiver, transmitter/receiver allowing free network topology |
| LON | **L**ocal **O**perating **N**etwork |
| LonMark Association | organisation responsible for definition, registration and monitoring |
| LON Talk | protocol used by devices linked to the network for communication purposes |
| LON Work | technology standard for shared network use (by several partners) |
| Neuron C | application program in chip |
| Neuron chip | special LON processor with a unique identification code (neuron ID) |
| Node | subscriber linked to LON network |
| SNVT | **S**tandard **N**etwork **V**ariable **T**ype |
| XIF file | e**X**ternal **I**nterface **F**ile |