



## Operating and Installation Manual

### EASYLAB Expansion module EM-LON

LonWorks interface for EASYLAB  
TCU3 controllers and TAM adapter modules



**TROX<sup>®</sup> TECHNIK**  
The art of handling air

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# 1 General information

This manual describes the EM-LON expansion module that supplements EASYLAB TCU3 controllers and TAM adapter modules with a LonWorks-FTT-10A interface.

To ensure complete functioning of the expansion module it is essential to read this operating and installation manual before starting any work, and to comply with it. The manual must be given to the facilities manager when handing over the system. The facilities manager must include the manual with the system documentation.

The manufacturer does not accept any liability for any malfunction or damage resulting from non-compliance with these instructions or non-compliance with relevant statutory regulations.

## Other applicable documentation

In addition to this manual, the following documents apply:

- Control Systems catalogue
  - EASYLAB EM-LON expansion module
  - EASYLAB TCU3 controller
- Project-specific wiring documents

## Symbols used in this manual



### Danger!

Designates danger to life and limb due to electrical voltage.



### Warning!

Designates danger to life and limb.



### Important!

Designates danger that can cause minor personal injury or damage to property.

## 2 Safety and correct use

### General information regarding safety

Only skilled qualified personnel are allowed to perform the described work on the expansion module. Only skilled qualified electricians are allowed to work on the electrical system.

For all work performed on EASYLAB components, the following regulations and guidelines must be complied with. This applies in particular to the following German country specific regulations or as appropriate in the country where the installation is taking place:

- Equipment and Product Safety Laws (GPSG)
- Industrial Health and Safety Regulations (BetrSichV)
- Accident Prevention Regulations (BGV A1, BGV A3)

### General safety measures

#### • Large temperature differences

Condensation can damage the electronics beyond repair. If the expansion module has been kept in an unheated area, wait at least two hours before switching on the supply voltage for commissioning.

#### • Electrostatic charge

Electrostatic charge can damage the electronics. For this reason, first touch an equipotentially bonded metal surface, e.g. a water pipe, for electrical earthing before you remove the unit from its protective wrapping. Avoid skin contact with any components or printed circuits on the expansion module or the main PCB.

#### • Installing the PCB

Tighten the mounting screws and distance pieces only hand-tight to avoid damage to the PCB or to the fixing points in the casing.

#### • Foreign matter and liquids

If liquid gets onto the PCB or inside the expansion module, let the expansion module completely dry before commissioning. Remove foreign matter, if any.

If the device emits a smell or smoke, have it checked by the manufacturer.

### Correct use

The EM-LON expansion module provides a LonWorks interface for EASYLAB base components.

- Use the expansion module only for an EASYLAB TCU3 controller or a TAM adapter module.
- Use the expansion module only within the ranges given in the technical data.
- When used on a room controller or adapter module with active room management function (RMF) the expansion module provides data for the entire room.
- When used on a fume cupboard controller, room controller or adapter module the expansion module provides access to the data of the controller.
- Observe the technical data of the expansion module.

### Incorrect use

Do not use the expansion module outdoors, in wet areas, or in potentially explosive atmospheres.

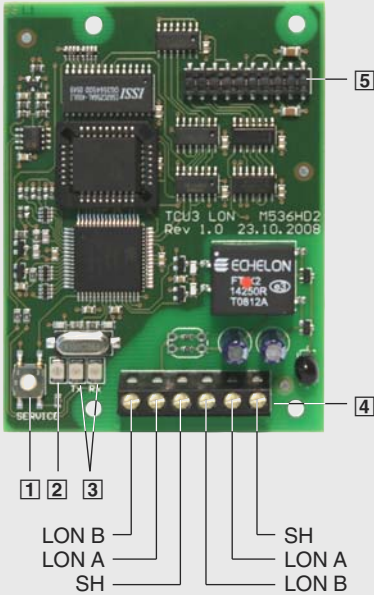
### Residual risks

Failure of the LonWorks interface does not affect the control function of the volume flow controller but does affect data exchange with the central BMS. Additional safety measures are required for safety-relevant applications.

# 3 Product description

## Product overview and technical data

### Product overview



- 1 Service pin push button
- 2 Service pin push button indicator light
- 3 Indicator lights for LonWorks communication  
TX: Sending data  
RX: Receiving data
- 4 Terminals for LON FTT-10A network
- 5 Plug base for connection with the EASYLAB main PCB

### Technical data

<b>Supply voltage</b>	5 V DC from the TCU3 controller or TAM adapter module
<b>Communication</b>	LonWorks transceiver FTT-10A (Free Topology, Twisted Pair)
<b>Acceptable temperature range</b>	for storage: -10°C to +70 °C for operation: 0°C to +50 °C
<b>Permissible humidity for storage and operation</b>	<90 % non-condensing
<b>Protection level</b>	IP 20
<b>Dimensions</b>	B x H x T 65 x 15 x 90 mm
<b>Connection to LonWorks network</b>	6 terminals for cable cross sections of 0.12 – 1.5 mm <sup>2</sup> (LON A, LON B and shielding, two of each)
<b>Operation and display</b>	Service pin push button and three indicator lights

## 3 Product description

## 4 Transport, storage and packaging

### Functional description

The EM-LON expansion module supplements the EASYLAB base components (TCU3 controller or TAM adapter module) with a LonWorks interface for the purpose of linking rooms or individual volume flow controllers to the central BMS.

The PCB contains terminals for the LonWorks network and a service pin push button with indicator light. The PCB can be fitted to the TCU3 or TAM main PCB using a header.

To simplify diagnosis during commissioning the expansion module is equipped with two additional indicator lights that indicate data traffic on the LonWorks interface.

Standard network variables are used for the communication within the LonWorks infrastructure. These variables ensure unambiguous data exchange between the nodes. For commissioning, it is necessary to link the network variables between the nodes (binding). Project software is used to link the outputs of a node to the inputs of other nodes.

### Delivery check

Check delivered items immediately after arrival for transport damage and completeness. In case of any damage or an incomplete shipment, inform the shipping company and your TROX contact person immediately.

A complete shipment includes:

- PCB
- 20-pin header
- Fixing material (4 distance pieces and 4 screws)
- Operating and installation manual

### Transport on site

- If possible, take the expansion module in the transport packaging up to the installation location.
- Do not remove the protective wrapping until just before installation.

### Storage

If you need to store the expansion module temporarily, make sure that the following conditions apply:

- Leave the unit in its packaging and do not expose it to the effects of weather.

Store the unit in a dry place and away from direct sunlight.

- Temperature:  $-10^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
Maximum humidity: 90% (non-condensing)

### Packaging

Properly dispose of packaging material.

# 5 LonWorks network variables

## Overview of data points for EM-LON LonWorks interface, firmware version 1.0

Name of variable	Data type	FH	RR	TAM	RR RMF	TAM RMF	Meaning
nviManOverride	SNVT_hvac_overid	x <sup>1</sup>			x	x	Operating mode default setting for controller or room
nviMode	SNVT_state	x <sup>1</sup>			x	x	Operating mode default setting for controller or room
nviOccCmd	SNVT_occupancy	x <sup>1</sup>			x	x	Operating mode default setting for controller or room
nviManOP_Disable	SNVT_switch	x <sup>1</sup>			x	x	Enabling/disabling manual control
nviVolOffset_T	SNVT_switch				x	x	Signalling of flow rate setpoint change for temp. control
nviVolOffset_P	SNVT_switch				x	x	Signalling of flow rate setpoint change for diff. pressure control
nviPressSetSel	SNVT_switch				x	x	Switching between differential pressure setpoint values 1 and 2
nvoManOverride	SNVT_hvac_overid	x	x		x		Current operating mode for a single controller
nvoManOverride_R	SNVT_hvac_overid				x	x	Current operating mode for the room
nvoMode	SNVT_state	x	x		x		Current operating mode for a single controller
nvoMode_R	SNVT_state				x	x	Current operating mode for the room
nvoOccCmd	SNVT_occupancy	x	x		x		Current operating mode for a single controller
nvoOccCmd_R	SNVT_occupancy				x	x	Current operating mode for the room
nvoVolflowSet	SNVT_flow	x	x		x		Volume flow rate setpoint value for the controller
nvoVolflowAct	SNVT_flow	x	x		x		Volume flow rate actual value for the controller
nvoVolTotalExh	SNVT_flow	x	x	x	x	x	Total extract air for the room
nvoVolTotalSup	SNVT_flow	x	x	x	x	x	Total supply air for the room
nvoPressSet	SNVT_press_p				x	x	Differential pressure setpoint value for the room
nvoPressAct	SNVT_press_p				x	x	Differential pressure actual value for the room
nvoLocalAlarm	SNVT_switch	x	x	x	x	x	Single controller alarm
nvoSummaryAlarm	SNVT_switch				x	x	Consolidated alarm for the room
nvoPressAlarm	SNVT_switch				x	x	Differential pressure alarm
nvoVelocitySet	SNVT_speed_mil	x					Face velocity actual value
nvoVelocityAct	SNVT_Count	x					Face velocity setpoint value
nvoSwitchPos	SNVT_switch	x					Sash position (stage 1,2,3)
nvoWireSensorPos	SNVT_switch	x					Sash position (sash opening %)
nvoDampPos	SNVT_switch	x	x		x		Damper blade position of single controller
nvoDampPosMax_FH	SNVT_switch	x	x	x	x	x	Evaluated damper blade position for fume cupboards – max
nvoDampPosMin_FH	SNVT_switch	x	x	x	x	x	Evaluated damper blade position for fume cupboards – min
nvoDampPosMax_RE	SNVT_switch	x	x	x	x	x	Evaluated damper blade position, extract air – max
nvoDampPosMin_RE	SNVT_switch	x	x	x	x	x	Evaluated damper blade position, extract air – min
nvoDampPosMax_TE	SNVT_switch	x	x	x	x	x	Evaluated damper blade position, total extract air – max
nvoDampPosMin_TE	SNVT_switch	x	x	x	x	x	Evaluated damper blade position, total extract air – min
nvoDampPosMax_RS	SNVT_switch	x	x	x	x	x	Evaluated damper blade position, supply air – max
nvoDampPosMin_RS	SNVT_switch	x	x	x	x	x	Evaluated damper blade position, supply air – min

FH: Fume cupboard controller

RR: Room controller for supply air or extract air

TAM: Adapter module

RR RMF: Room controller with active room management function

TAM RMF: Adapter module with active room management function

<sup>1</sup> only for individually selected operating mode (stand-alone operation)

## 5 LonWorks network variables

### Overview of additional data points for EM-LON LonWorks interface firmware version 2.0, and TCU firmware version 3.0

Name of variable	Data type	FH	RR	TAM	RR RMF	TAM RMF	Meaning
nviSunblinder	SNVT_switch				x	x	Control input signal for sun protection/blinds
nviVolfloExh	SNVT_flow	x	x	x	x	x	Connection of an extract air flow
nviVolfloSuph	SNVT_flow	x	x	x	x	x	Connection of a supply air flow
nvoSystemDevices	SNVT_count	x	x	x	x	x	Number of EASYLAB controllers
nvoStateDIO	SNVT_state	x	x	x	x	x	State of the digital inputs and outputs (TCU3)

### Overview of additional data points for EM-LON LonWorks interface firmware version 2.0, and TCU firmware version 4.0

Name of variable	Data type	FH	RR	TAM	RR RMF	TAM RMF	Meaning
nviSC_LockHP	SNVT_switch	x					Automatic sash device Close and lock sash - HighPrio
nvoSC_LockHP	SNVT_switch	x					Automatic sash device Feedback, sash has been locked - HighPrio
nviSC_SetPos	SNVT_switch	x					Automatic sash device Default setting from central BMS: Close sash
nvoSC_GetPos	SNVT_switch	x					Automatic sash device Position status
nvoSC_Alarm	SNVT_switch	x					Automatic sash device Alarm



# 5 LonWorks network variables

## Virtual functions

▶ nviManOP_Disable		nvoDampPos	▶
▶ nviManOverride		nvoDampPosMax_FH	▶
▶ nviMode		nvoDampPosMax_RE	▶
▶ nviOccCmd		nvoDampPosMax_RS	▶
▶ nviPressSetSel		nvoDampPosMax_TE	▶
▶ nviVolOffset_P		nvoDampPosMin_FH	▶
▶ nviVolOffset_T		nvoDampPosMin_RE	▶
▶ nviSunblinder	} X	nvoDampPosMin_RS	▶
▶ nviVolflowExh		nvoDampPosMin_TE	▶
▶ nviVolflowSup		nvoLocalAlarm	▶
▶ nviSC_LockHP		nvoManOverride	▶
▶ nviSC_SetPos		nvoMode	▶
		nvoOccCmd	▶
		nvoManOverride_R	▶
		nvoMode_R	▶
		nvoOccCmd_R	▶
		nvoPressAct	▶
		nvoPressAlarm	▶
		nvoPressSet	▶
		nvoSummaryAlarm	▶
		nvoSwitchPos	▶
		nvoVelocityAct	▶
		nvoVelocitySet	▶
		nvoVolflowAct	▶
		nvoVolflowSet	▶
		nvoVolTotalExh	▶
		nvoVolTotalSup	▶
		nvoWireSensorPos	▶
	} X	▶ nvoSystemDevices	▶
		▶ nvoStateDIO	▶
		▶ nvoSC_LockHP	▶
		▶ nvoSC_GetPos	▶
		▶ nvoSC_Alarm	▶

Variables of firmware versions 1.0 and 2.0

The variables marked 'X' are available for firmware version 2.0 and higher.

## 6 Installation

For installation, wiring, and commissioning observe the recognised technical regulations, especially safety and accident prevention regulations.

For any wiring work follow the national and local regulations and guidelines for electrical installation.



### Danger!

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage during operation.

- Only skilled qualified electricians are allowed to work on the electrical system.
- Switch off the power supply before working on any electrical equipment.



### Important!

Danger of injury from the metal pins of the pin header.

Wear electrician gloves for protection.

### Installation

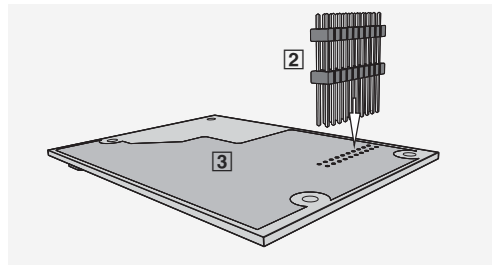
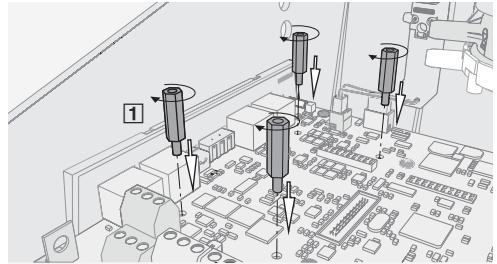
The expansion module is to be fitted into the casing of a TCU3 controller or TAM adapter module.

#### Step 1

Screw the four distance pieces **1** into the corresponding openings in the TCU3 or TAM main PCB and tighten them (hand-tight only).

#### Step 2

Take the pin header **2** and push it from below through the EM-LON PCB **3** just far enough such that the pins protrude slightly on the upper side.




## 6 Installation

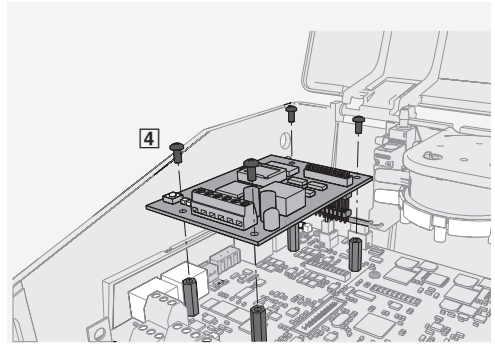
### Step 3

Take the EM-LON PCB with the upside up and position it on the TCU3 or TAM main PCB such that the pin header is exactly above the corresponding plug-in base, and the holes for the distance pieces are above the distance pieces. Then press the PCB onto the distance pieces.

- In case the positions do not exactly line up, check whether the pin header is still correctly positioned. Repeat step 2.
- If the pins have been pushed too far through the PCB (step 2), the electrical connection may not work properly. Repeat step 2.

### Step 4

Fix the PCB using the four fixing screws . Tighten the screws only hand-tight.



# 7 Wiring

For installation, wiring, and commissioning observe the recognised technical regulations, especially safety and accident prevention regulations.

For any wiring work follow the national and local regulations and guidelines for electrical installation.



## Danger!

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage during operation.

- Only skilled qualified electricians are allowed to work on the electrical system.
- Switch off the power supply before working on any electrical equipment.

## Making connections

The EM-LON PCB has terminals for two bus cables of a LonWorks network. Depending on the network topology, controllers at the end of a chain may be connected to one bus, controllers at other positions in the chain may be connected to two buses.

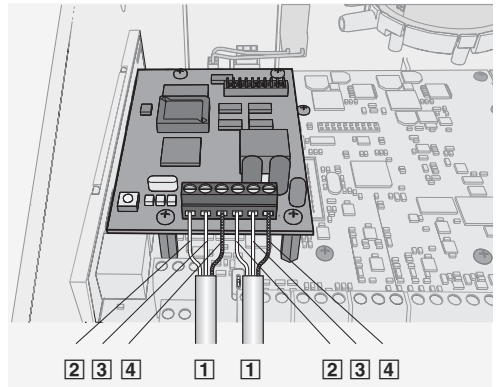
Strip the insulation from at least two wires of the bus cable, insert the bare wires into the terminals and tighten the screws.

- Fix the bus cable to the casing using the wire clamping bracket.
- Connect the shield of shielded cables to the SH terminals. Within a chain (channel) connect the shield only at one point with the earth. Earthing the shield at every controller will lead to interferential voltages.
- To avoid reflections at the end of a chain (channel) use a terminator.

## Recommended bus cables

Bus cables to TIA 568A, category 5

- Belden 8471 or 85102
- Cables to DOCSIS specification level IV
- JY(St)Y 2x2x0.8 (use only twisted pair for LON-A and LON-B)



- 1 Bus
- 2 LON-B
- 3 LON-A
- 4 SH (shield)

# 8 Commissioning

## 9 Maintenance

### Commissioning

Commissioning the LonWorks interface requires detailed technical knowledge and special software, e.g. Echelon LonMaker. The installation should only be carried out by qualified experts.

#### 1. Commissioning

Press the service pin push button and download the software for the EASYLAB LonWorks node. The software for the EM-LON expansion module is available for download on our website.

#### 2. Binding

Create the logical bindings for the network variables to be transferred by the EM-LON expansion module. As an alternative, use polling.

#### 3. Configuration

If necessary, adjust the configuration for `nciMaxSendTime` or `nciConfig_Occ`.

### Maintenance

The EM-LON expansion module is maintenance-free.





