User Manual
LonWorks TP/FT-10
Option module for PolluStat

1. Use of the option module

The LonWorks TP/FT-10 option module is used to connect the PolluStat heat meter to LonWorks network using TP/FT-10 channel.

Picture 1: LonWorks module

The module is based on LonWorks 2.0 technology on Echelon FT 5000 Smart Transceiver chip. No credits charge in OpenLNS CT and LonMaker/LNS Turbo Edition applications during commissioning the modules. The module is compliant to ISO/IEC 14908-1 (EN14908-1, CEA-709.1) and ISO/IEC 14908-2 (EN14908-2, CEA-709.3) standard.

1.1. Power supply

The LonWorks module should be powered by AC or DC (polarity insensitive) SELV power supply only.

SELV Power Supply Voltage	12-24 V AC/DC ±10%
Power Consumption	max. 0.1 W
Typical Supply Current	6 mA @12 V DC

1.2. Communication interface

Connection to LonWorks network is realized by using Free Topology Twisted Pair TP/FT-10 interface.

Data Communications Type	Differential Manchester encoding
Network Polarity	Polarity insensitive
Transmission Speed	78 kilobits per second
Galvanic Isolation between Network and Option Module	277 VRMS (0-60 Hz)
Number of LonWorks Devices per Segment	Up to 64
Power-down Network Protection	High impedance when module is unpowered

1.3. Environmental requirements

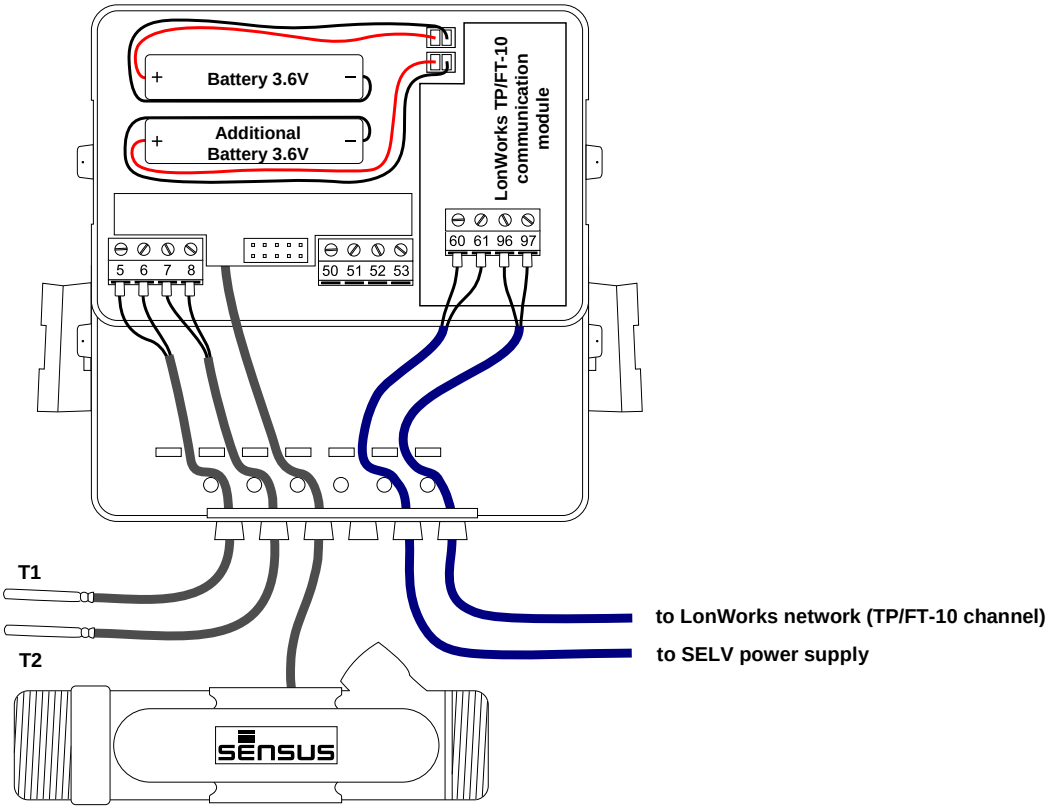
Operating Temperature (ambient)	+5 to +50°C
Storage Temperature	-10 to +65°C
Operating and Storage Humidity	25 to 90 % RH @50°C, non-condensing

2. Safety instructions

- The installation, electrical connection and commissioning the module should be made by qualified specialists only.
- The LonWorks option modules may only be used for the PolluStat meter, otherwise the modules or the heat meter could be damaged.
- The included lithium battery and the meter battery must not be recharged, short-circuited, put in contact with water or exposed to temperatures of more than 80°C.
- Batteries and module waste may only be disposed at suitable collection centers for professional waste disposal.
- The communication modules are delivered in the form of circuit board. Is highly recommended that normal static precautions be taken in handling and assembly of this module to prevent damage and/or degradation which may be induced by ESD. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure.

3. Installation the option module in the LonWorks network

3.1. Connection diagram



Picture 2: electrical connection diagram

Table 1: Number markers on the screw connector clamps

Calculator:

clamp no.	description
5	temperature sensor T1 (warmer pipe/supply pipe)
6	temperature sensor T1 (warmer pipe/supply pipe)
7	temperature sensor T2 (colder pipe/return pipe)
8	temperature sensor T2 (colder pipe/return pipe)
50	GND for 2nd additional pulse input or output
51	2nd additional pulse input or output (In / Out2) (Volume output on TEST mode)
52	GND for 1st additional pulse input or output
53	1st additional pulse input or output (In / Out1) (Energy output on TEST mode)

LonWorks module:

clamp no.	Description
60	12-24 V AC/DC SELV power supply
61	12-24 V AC/DC SELV power supply
96	LonWorks TP/FT-10 channel interface
97	LonWorks TP/FT-10 channel interface

The pairs of clamps 60, 61 (for connect SELV power supply) and 96, 97 (for connect to LonWorks network based on TP/FT-10 channel) are polarity insensitive.

3.2. Network topology and channel length

The maximum wiring length for channel segment depends on the network topology and cable type. The maximum wire length values for channel could be increased by using the TP/FT-10 repeaters to connect two channel segments.

Table 2: Free Topology

Recommended cable type	Maximum wire length with no repeaters in meters	Maximum device-to-device distance in meters
TIA 568A Category 5 cable	450	250
J-Y(St)Y 2x2x0.8 cable	500	320
Level IV cable	500	400
Belden 8471 or equivalent cable	500	400
Belden 85102 or equivalent cable	500	500

Table 3: Doubly-terminated Bus Topology

Recommended cable type	Maximum wire length with no repeaters in meters	Maximum stub length in meters
TIA 568A Category 5 cable	900	3
J-Y(St)Y 2x2x0.8 cable	900	3
Level IV cable	1400	3
Belden 8471 or equivalent cable	2700	3
Belden 85102 or equivalent cable	2700	3

Use only the dedicated terminators - one terminator in free topology and two terminators on both ends of network channel in bus topology. In case of any question, please contact technical support.

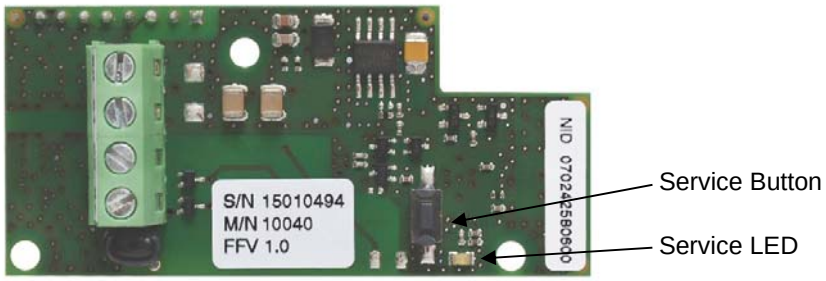
3.3. Integration in the LonWorks network

It is recommended that the process of integration of the LonWorks option module (setting the logical address and state of device as Configured and Online or defining the bindings between the network variables of another LonWorks devices) was performed by trained personnel, using dedicated tools, such as Echelon OpenLNS Commissioning Tool software or other LonWorks platform based on Echelon LonWorks Network Services (OpenLNS) or fully compliant the ISO/IEC 14908 (EN14908-1, CEA-709) standards.

The integration of the LonWorks module should be performed using the eXternal Interface File (XIF File) which describe the LonMark device interface of module (like network variables used by the option module) in format supported by the network integration tool. The XIF File and the LonMark Resource Files used to integrate the option module in the LonWorks network are available to download from **sensus.com** website.

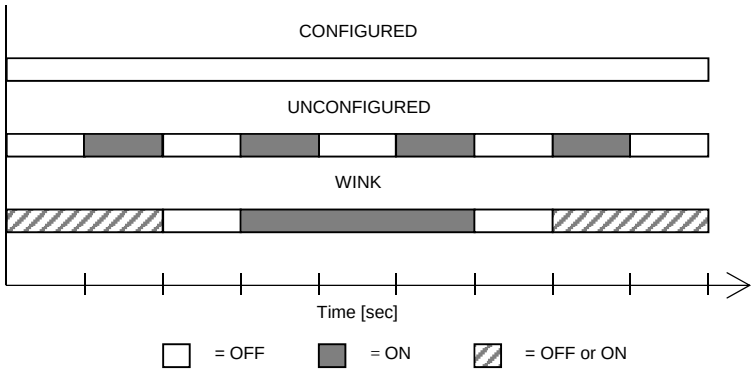
3.4. Service LED and Service Button functionality

The placement of the Service LED and Service Button (called also Service Pin) is shown on the picture below.



Picture 3: Service Button and Service LED placement on the LonWorks option module

Standard Service LED signalization is described on the picture below. If other, please contact technical support.



Picture 4: Service LED signalization

Short press of the Service Button send to the network Service message.
Press longer than 15 seconds to reset the Update Rate parameter to default value 10 minutes.

3.5. Firmware Update

The option module firmware update can be done by user. Downloading the firmware to device is performed by dedicated software run on Microsoft Windows operating system or by using the option Load application image and attach an Image file path to the Echelon OpenLNS Commissioning Tool during the module commissioning process (option Commission… when you right-click on the device shape).
The newest Application Image File for the option module in distribute on demand after request with the serial numbers of devices to which they relate only. In case of any question, please contact technical support.

4. Network variable list

Designation	Functional Block	Network Variable	Network Variable or Configuration Properties Type	Data Value Range	Unit
Node Request	NodeObject	nviRequest	SNVT_obj_request	-	-
Node Status		nvoStatus	SNVT_obj_status	-	-
FTP – File Transfer Request		nviFileReq	SNVT_file_req	-	-
FTP – File Position		nviFilePos	SNVT_file_pos	-	-
FTP – File Transfer Status		nvoFileStat	SNVT_file_status	-	-
Node Location		-	SCPTlocation	ASCII	-
Heating Energy	IntegralValues	nvoHeatEnergy	SNVT_reg_val_ts	Int32	kWh, MWh, MJ, GJ
Heating Energy (Float)		nvoHeatEnergyF	SNVT_elec_whr_f	IEEE754	Wh
Cooling Energy		nvoCoolEnergy	SNVT_reg_val_ts	Int32	kWh, MWh, MJ, GJ
Cooling Energy (Float)		nvoCoolEnergyF	SNVT_elec_whr_f	IEEE754	Wh
Volume		nvoVolume	SNVT_reg_val_ts	Int32	l (dm^3), m^3
Volume (Float)		nvoVolumeF	SNVT_vol_f	IEEE754	l (dm^3)
Power	InstantValues	nvoPower	SNVT_reg_val_ts	Int32	W, kW, MW
Power (Float)		nvoPowerF	SNVT_power_f	IEEE754	W
Flow Rate		nvoFlowRate	SNVT_reg_val_ts	Int32	l/h
Flow Rate (Float)		nvoFlowRateF	SNVT_flow_f	IEEE754	l/s
Flow Rate (Fixed)		nvoFlowRateP	SNVT_flow_p	Int16	m^3/h
Forward temperature		nvoForwardTemp	SNVT_reg_val_ts	Int32	°C
Forward temperature (Float)		nvoForwardTempF	SNVT_temp_f	IEEE754	°C
Forward temperature (Fixed)		nvoForwardTempP	SNVT_temp_p	Int16	°C
Return temperature		nvoReturnTemp	SNVT_reg_val_ts	Int32	°C
Return temperature (Float)		nvoReturnTempF	SNVT_temp_f	IEEE754	°C
Return temperature (Fixed)		nvoReturnTempP	SNVT_temp_p	Int16	°C
Temperature difference		nvoTempDiff	SNVT_reg_val_ts	Int32	°C
Temperature difference (Float)		nvoTempDiffF	SNVT_temp_f	IEEE754	°C
Temperature difference (Fixed)		nvoTempDiffP	SNVT_temp_diff_p	Int16	°C
Tariff Energy 1	TariffEnergy[0]	nvoTariffEnergy_1	SNVT_reg_val_ts	Int32	kWh, MWh, MJ, GJ
Tariff Energy 1 (Float)		nvoTariffEnergyF_1	SNVT_elec_whr_f	IEEE754	Wh
Tariff Energy 2	TariffEnergy [1]	nvoTariffEnergy_2	SNVT_reg_val_ts	Int32	kWh, MWh, MJ, GJ
Tariff Energy 2 (Float)		nvoTariffEnergyF_2	SNVT_elec_whr_f	IEEE754	Wh
Pulse Input Volume 1	PulseInputVolume [0]	nvoPulseVolume_1	SNVT_reg_val_ts	Int32	l (dm^3), m^3
Pulse Input Volume 1 (Float)		nvoPulseVolumeF_1	SNVT_vol_f	IEEE754	l (dm^3)
Pulse Input Volume 2	PulseInputVolume [1]	nvoPulseVolume_2	SNVT_reg_val_ts	Int32	l (dm^3), m^3
Pulse Input Volume 2 (Float)		nvoPulseVolumeF_2	SNVT_vol_f	IEEE754	l (dm^3)

Designation	Functional Block	Network Variable	Network Variable or Configuration Properties Type	Data Value Range	Unit
Error Code	-	nvoErrorCode	SNVT_state_64	64 bits	-
Error Message	-	nvoErrorMessage	SNVT_str_asc	ASCII	-
Heat Meter Serial Number	-	nvoSerialNumber	SNVT_str_asc	ASCII	-
Update Rate Data from Meter	-	nciUpdateRate	SCPTupdateRate	UInt16	100ms
Module Neuron ID	-	nroNeuronID	SNVT_str_asc	ASCII	-
Module Serial Number	-	nroModulSerialNo	SNVT_str_asc	ASCII	-
Module Model Number	-	nroModelNumber	SNVT_str_asc	ASCII	-
Firmware Version	-	nroFirmwareVer	SNVT_str_asc	ASCII	-

Network variable prefix meaning:

- nviXxxxxxxxxxxxx - Input Network Variable
- nvoXxxxxxxxxxxxx - Output Network Variable
- nciXxxxxxxxxxxxx - Input Configuration Network Variable (stored in non-volatile memory)
- nroXxxxxxxxxxxxx - Output Network Variable (read only data, stored in non-volatile memory)

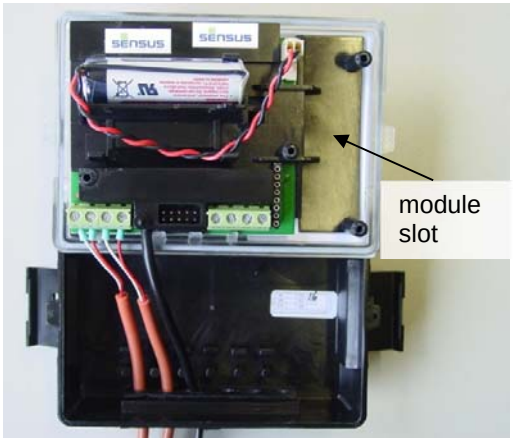
More details about data decoding you find in LonMark SNVT Master List and LonMark SCPT Master List documents.

5. Error codes meaning and error messages list

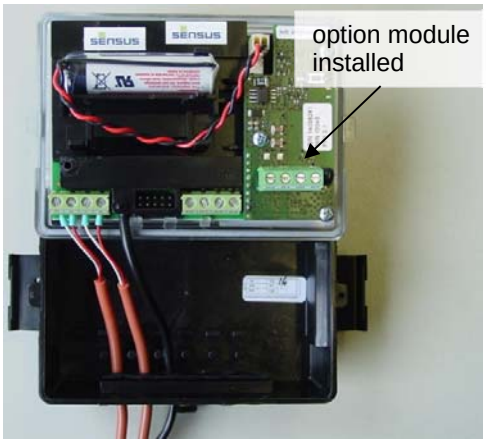
Designation	nvoErrorCode bit is set	nvoErrorMessage	Error code indicates on the LCD *<Er ####>*
No error	none (all bits are cleared)	No error	0000
Hardware status flag Er02	bit2	Hardware status flag Er02	8000
Hardware status flag Er03	bit3	Hardware status flag Er03	8000
End of battery life time	bit4	End of battery life time	1000
Hardware status flag Er05	bit5	Hardware status flag Er05	0008
Hardware status flag Er06	bit6	Hardware status flag Er06	0008
Flow sensor is empty > Air in the ultrasonic flow sensor	bit10	Flow sensor is empty	0001
Reverse direction of the flow	bit11	Wrong direction of the flow	0002
Temperature sensor 1 error > Short circuit or sensor not connected	bit16	Temp. sensor 1 short circuit	0080
Temperature 1 < 0ºC	bit18	Temperature 1 < 0ºC	00C0
Temperature 1 > 180ºC	bit19	Temperature 1 > 180ºC	0080
Temperature sensor 2 error > Short circuit or sensor not connected	bit20	Temp. sensor 2 short circuit	0800
Temperature 2 < 0ºC	bit22	Temperature 2 < 0ºC	0C00
Temperature 2 > 180ºC	bit23	Temperature 2 > 180ºC	0800
Hardware status flag Er30	bit24	Hardware status flag Er30	0880
Temperature difference < 3ºC	bit26	Temperature difference < 3ºC	4000
Temperature difference > 150ºC	bit27	Temperature difference > 150ºC	2000
Flow rate grater 1,2qs	bit28	Flow rate grater 1,2qs	0004
Hardware status flag Er35	bit29	Hardware status flag Er35	8000
Hardware status flag Er37	bit31	Hardware status flag Er37	8000
Wrong connection between communication module and heat meter > Check the connection with the heat meter	bit32	No data update from heat meter	-

6. Installation the option module in the calculators

The option module would be installed on the right side in the opened meter.

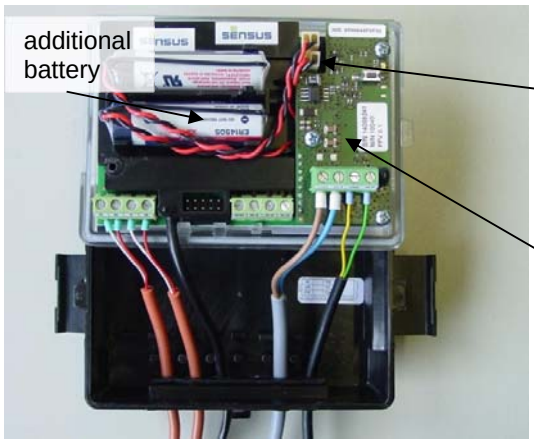


Picture 5: slot for option modules



Picture 6: installed option module

- Remove the user seal from the housing
- Open the housing cover by opening the black housing latches on the right and left side
- Put the option module into the designated contact sockets
- The contact pins must not be bent
- Mount the fixing screws
- Install the additional battery into the second battery holder and plug in the connector to the second battery connector
- Route the connecting cable through an available cable fitting and make a pull relief. Then connect the wires to the respective terminals
- Close the lid and seal the housing with a user seal



Picture 7: finally installed option module

7. Option module firmware changes list

Firmware version	Description
1.0	Initial version.

Edition: 001-1503 (030-0002-01A)
Subject to changes without notice

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