Appendix for

LTI inverters

WebdynSun

The monitoring gateway for your solar installation

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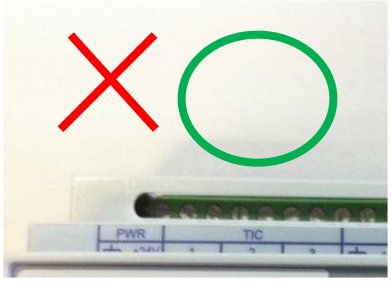
1 Connecting the gateway to LTI inverters via the Ethernet bus

This chapter describes the method of connecting the WebdynSun to the Ethernet communications bus for communication with LTI inverters.
LTI inverters upload their data onto a local FTP server, from which the WebdynSun gateway can collect the available information.

Access to the FTP servers is via an Ethernet connection available on the WebdynSun gateway via the RJ45 socket labelled LAN:



It is advisable to use Category 5 cables:

To connect several local FTP servers, it's a good idea to use a switch or hub, as in the installation described below.
This accessory is not always necessary. In fact, some LTI inverter models can concentrate their data on a single local FTP server.

If the gateway uses the LAN connection to upload files to the FTP server, a slot must be reserved on the switch or hub for the upstream Internet link (e.g. via an ADSL box).

The gateway can handle a maximum of 100 LTI inverters.

2 Discovering the LTI inverter network and the file DAQ.ini

Because of the type of Ethernet connection, the LTI protocol does not allow for automatic discovery of the inverter network.

The DAQ.ini file must be built manually.

First of all, it is necessary to know the addresses of the local FTP servers.
The address of an LTI local FTP server is generally initialised to 192.168.31.240 or 192.168.36.240

> ⚠ **The addresses of the local FTP servers must be consistent with the address of the WebdynSun gateway, and if appropriate, with the address of the Internet router or ADSL box.**
> **In other words, they must be in the same address space**.

The DAQ.ini file is built up by listing the available inverters using the variables "INV_SN[x]" (IP address of FTP server) and "INV_FileDefName[x]" (name of the associated definition file), with x in the range 0 to (no. of inverters)-1. See the example below.

```
INV_SN[0]=192.168.36.36
INV_FileDefName[0]=IDSite_LTI.ini
INV_SN[1]=192.168.36.154
INV_FileDefName[0]=IDSite_LTI.ini
```

The LTI protocol definition file is generic, and suitable for all the types of LTI inverter in use (see next chapter for its contents).

3 Definition files for LTI inverter families

Filename format:
*IDSite*_LTI.ini
IDSite: site identification number.

This file **is not uploaded by the gateway.** It must be copied into the directory /DEF/INV of the remote FTP server, and its name supplied in the DAQ.ini file shown in the previous chapter.

```
1;0;1;0;address;-;1;0;4
2;0;2;0;SN;-;1;0;4
3;0;3;0;interval;s;1;0;4
4;0;4;0;U_AC;V;1;0;4
5;0;5;0;I_AC;A;1;0;4
6;0;6;0;P_AC;W;1;0;4
7;0;7;0;U_DC;V;1;0;4
8;0;8;0;I_DC;A;1;0;4
9;0;9;0;E_INT;kWh;1;0;4
10;0;10;0;E_DAY;kWh;1;0;4
11;0;11;0;E_TOTAL;kWh;1;0;4
12;0;12;0;T_CH;°C;1;0;4
13;0;13;0;T_TR;°C;1;0;4
14;0;14;0;T_HS;°C;1;0;4
15;0;15;0;PC;%;1;0;4
16;0;16;0;COS_PHI;-;1;0;4
17;1;3;0;Word 1;-;1;0;8
18;1;4;0;Word 2;-;1;0;8
19;1;5;0;Word 3;-;1;0;8
20;1;6;0;Word 4;-;1;0;8
21;2;1;0;StringBox No.;-;1;0;0
22;2;3;0;StringBox Interval;s;1;0;0
23;2;4;0;I1;A;1;0;0
24;2;5;0;I2;A;1;0;0
25;2;6;0;I3;A;1;0;0
26;2;7;0;I4;A;1;0;0
27;2;8;0;I5;A;1;0;0
28;2;9;0;I6;A;1;0;0
29;2;10;0;I7;A;1;0;0
30;2;11;0;I8;A;1;0;0
31;2;12;0;I9;A;1;0;0
32;2;13;0;I10;A;1;0;0
33;2;14;0;I11;A;1;0;0
34;2;15;0;I12;A;1;0;0
35;2;16;0;I13;A;1;0;0
36;2;17;0;I14;A;1;0;0
37;2;18;0;I15;A;1;0;0
38;2;19;0;T;°C;1;0;0
39;2;20;0;A_IN1;W/m2 or m/s;1;0;0
40;3;1;0;interval;s;1;0;0
41;3;2;0;E_Z_EVU;kWh;1;0;0
42;3;3;0;G_M0;W/m2;1;0;0
43;3;4;0;T_M0;°C;1;0;0
44;3;5;0;T_U0;°C;1;0;0
```

This file covers all the variables from the inverter, with:

Index;*Original directory code*;*Index into file*;Not used;*Name*;*Units*;*A*;*B*;***Action*;*Filter***

> ⚠ **It is not necessary to understand the fields "**Original directory code**" or "**Index into file**" to be able to operate the WebdynSun. These fields enable the gateway to find the variable using the information from the LTI protocol.**
> **These are the only fields that must under no circumstances be modified.**

The action to be applied to each variable is specified in the field "Action". Here is the list of the possible actions under the LTI protocol.

- ***Action=0***: Variable not collected.
- ***Action=4***: Instantaneous value.
- ***Action=8***: Variable treated as an alarm.

Note 1: As the values collected are already averages, and the inverters have no variables of the "parameter" type (see next chapter, "Availability of variables"), the "Action" codes 1 and 2 are not used.

Note 2: The variables involving "string monitoring" and "weather data" are rarely used, while they are present in the definition file, their default "Action" code is 0 (variable not collected).

Note 3: If the "Action" defined is not consistent with the variable type, it is ignored.

4 Availability of collected LTI variables

The tree structure of the local FTP server includes the directories "MC_Portal_Data", "MC_Portal_Info", "MC_Portal_Meter" and "MC_Portal_String". Each of these directories is regularly examined in turn. If one or more files are present in one of these directories, they are processed and deleted after processing.

> ⚠ **Although the data are regularly stored by the LTI inverters, these only provide the stored data in the form of a file once per hour.**

Note: Relatively old files may be present in the various directories. It is therefore advisable to pay special attention to the timestamp at the beginning of each line of the data file uploaded by the WebdynSun gateway.

The timestamps included in the names of the uploaded files always correspond to the time when the collected files were processed.

5 Status variables

The status variables correspond to index values 17 to 20 in the model definition file. The details of these variables are shown below:

Word 1: Status word with special messages
Word 2: Fault word with “global” failures (for the whole installation)
Word 3: Fault word with failures on the master PV device
Word 4: Fault word with failures on the PSU inverter on the master PV device

Here are the possible codes for the status variables extracted from LTI documentation:

Word 1: special overall messages for the whole installation

	MSB															LSB
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Description					Low tension distribution installation: Power switch on STOP	Power reduction activated	Electricity supplier power limitation level 4	Electricity supplier power limitation level 3	Electricity supplier power limitation level 2	Electricity supplier power limitation level 1	Forecast data (screen) reinitialised.	Yield values reinitialised.	Fault list reinitialised.	Factory reset.	Parameter modified.	PVmaster ready.

Word 2: overall fault word for the whole installation

	MSB															LSB
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Description								Power switch monitored	Protection against external decoupling	Fuse NH 2 monitored	Fuse NH 1 monitored.	Earth leakage circuit breaker	Low tension distribution installation: tension surge	Tension fault on sector L3	Tension fault on sector L2	Tension fault on sector L1

Word 3: fault word for the PVmaster and Instance units

	MSB															LSB
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Description				Fault: no confirmation	Fault: main AC switch not activated	Fault: servo system	Collective inverter fault	Insulation monitoring fault	Tension surge monitoring fault	Inverter heat sink overheating fault	Inverter internal overheating fault	Self-inductance overheating fault	Transformer overheating fault	Mains frequency fault	Internal bus error	Fault status

Word 4: inverter fault word for the PVmaster and Instance units

	MSB															LSB
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Description					Inverter fault: DC tension out of range	Inverter fault: bus communications	Inverter fault: 12t error	Inverter fault: Synchronisation	Inverter fault: Mains tension	Inverter fault: Network frequency	Inverter fault: heat sink overheating	Inverter fault: internal overheating	Inverter fault: PTC overheating	Inverter fault: current surge	Inverter fault: DC tension surge	Inverter fault: DC tension low

6 LTI inverter parameter files

There are no parameter files for this protocol.

7 LTI inverter alarm files

An alarm is generated, then transmitted to the remote server in the form of a file on the FTP server (*IDSite*_AL_*YYMMDD_hhmmss*.csv.gz).
The data stored is also uploaded at the same time as an alarm.

N.B. See chapter 5: Status variables, for an explanation of the alarm codes.

Alarm of the LTI type:
This type of alarm is raised on a change in the status of a variable defined as an alarm in the associated definition file.

Date–Time	Type	Field 1	Field 2	Field 3	Field 4

Where:

Date–Time	Timestamp when alarm triggered, in format YY/MM/DD-hh:mm:ss
Type	INV: Alarm type is LTI
Field 1	*IDsite*_INV_*family*.ini: Name of reference definition file
Field 2	Serial number of the triggering LTI inverter
Field 3	1 to N: Index of the triggering data item in the associated definition file
Field 4	Status of the trigger item: 0 to n => Code corresponding to status messages or to messages indicating inverter malfunction.

Example:

27/06/11-10:04:51;INV;*IDSite*_LTI.ini;192.168.36.240;17;4096

Mechanism for censoring alarms

For status variables configured as alarms, it is possible to specify, in the definition file, which values are to be censored, i.e. for which an alarm report should not be uploaded, even though the action code is 8.

This mechanism means that an alarm is not uploaded if the value taken by a variable with an action code of 8 has been declared in the list of values to be ignored.

If the status variable does not describe values but a bit field, as is the case for this protocol, the list of values to be ignored contains the bit values to be ignored. For example, bits 0 to 15 for variables “Word 1” to “Word 4”.

The list of values to be ignored is specific to each variable declared in the definition file with the action code Alarm (8). The field “Filter” (see Chapter 3: Definition files for LTI inverter families) is used to define the values to be censored.
The values to be censored are separated by the pipe symbol “|”.

Example with the variable “Word 2”:

This variable is handles as a bit field. In other words, every bit corresponds to a different item of information.

If in the “Filter” field for variable 18 we enter the character string “0|3”:

18;1;5;0;Word 2;-;1;0;8;0|5

Bits 0 (Tension fault on sector L1) and 3 (Low tension distribution installation: tension surge) will be ignored when “Word 2” changes state. In other words, if only these bits change in value, no alarm will be uploaded.

8 LTI inverter command files

It is not possible to send command files to LTI inverters.