Remote customer information outputs of Linky smart meters used by Enedis in the generalised deployment phase

Identification: **Enedis-NOI-CPT_54E_En**
Version: **3**
No. of pages: **38**

Version	Application date	Type of change	Cancels and replaces
1	15/10/14	Creation	
2	01/02/17	Enedis' new corporate name taken into account	ERDF-NOI-CPT_54E
3	01/06/18	Clarification about the filter for calculating maximum power and the determination of excess output Clarification of the marking of remote information receivers	

Summary / Notification

This specification document is necessary for the development of equipment connected to Linky smart meters via the remote information output or TIC:

- it concerns Linky smart meters intended for use throughout the entire territory concerned by the "Linky generalised deployment" phase,
- it describes the technical and functional characteristics of the remote customer information outputs of these meters,
- if necessary, it recommends the specific characteristics of the devices (i.e. remote information receivers) connected to this remote information,
- it does not cover use of the information collected on the meter by the remote information receivers (customer information, charging management, enquiries, etc.).

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SA with Executive and Supervisory Boards
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Commercial Register of Nanterre 444 608 442

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1. Reference documents

[1] Document entitled “Remote customer information outputs of electronic meters used by Enedis”, reference “Enedis-NOI-CPT_02E”, available on the Enedis website.

[2] NF EN 62056-3-1, Electricity metering data exchange – The DLMS/COSEM suite - Part 3-1: Use of local area networks on twisted pairs with carrier signalling:

- this standard is used as a reference for the remote information signals transmitted by the meter, the characteristics of which correspond to the signals of secondary station transmitters, however, it may be supplemented or amended by this document which takes precedence;
- this standard does not describe the remote information receivers.

2. General information

2.1. Purpose of this document

This document is intended for the manufacturers of electrical or electronic equipment connected to the remote information output of Linky smart meters in the generalised deployment phase.

The purpose of the document is to provide all the information that is necessary to develop this equipment and ensure that the link to the meter operates correctly:

- the document describes the technical and functional characteristics of the remote customer information outputs on the meters;
- where necessary, it recommends the specific characteristics of devices (i.e. remote information receiver) connected to this remote information.

This equipment may have various different purposes: customer information, charging management, enquiries, etc.
The document is not intended to cover the service aspects provided by the equipment in any way.
However, to facilitate the analysis of any malfunctions, we recommend clearly separating the way in which the equipment processes the information into two sections:

- reception and understanding of information transmitted by the meter,
- the service provided once this information has been collected.

In the rest of the document, in order to well define the scope of the equipment that is limited to receiving remote information signals, the equipment connected to the meter is referred to as "**remote information receivers**".

Furthermore, to facilitate the diagnosis of any malfunctions that may occur on the equipment in operation (meter connected to a manager), Enedis proposes marking the remote information receivers with a "Linky ready making". The requirements for marking remote information inputs are described in Annex A.

2.2. Which meters are covered?

This document only covers Linky smart meters which meet the specifications of the generalised deployment phase.

The meters can be identified by their serial number which is encoded as a secondary station identifier (ADS) in line with the EURIDIS standard.

The meters' serial number is encoded with 12 digital characters which have the following definition:

- manufacturer code 2 characters,
- year of manufacture 2 characters,
- **type of device 2 characters,**
- device serial number 6 characters.

The meters concerned by this document can be identified by 2 characters which represent the type of device. These values have the following meanings:

61: Linky G3 60 A single-phase meter, generalised deployment phase – high arrival
62: Linky G1 90 A single-phase meter, generalised deployment phase – low arrival
63: Linky G1 60 A three-phase meter, generalised deployment phase – low arrival
64: Linky G3 60 A single-phase meter, generalised deployment phase – low arrival
70: Linky G3 60 A single-phase meter, development phase
71: Linky G3 60 A three-phase meter, development phase
75: Linky G3 90 A single-phase meter, generalised deployment phase – low arrival
76: Linky G3 60 A three-phase meter, generalised deployment phase – low arrival

3. General description of remote customer information (TIC)

3.1. Using the TIC

Electronic metering devices (particularly the Linky smart meter – the subject of this document) offer increasing tariff options and processing possibilities.
To enable network users to benefit from these processing possibilities, the meter offers high-performance information interfaces such as a multi-screen display, programmable output contacts and a digital information output. This digital information output is currently called the “remote customer information output” or “remote information or just “TIC”.

The remote information output gives network users the possibility of being informed in real time of their electricity consumption and enables them to monitor the tariffs. It continuously displays the parameters which are updated by the meter.
The output is of the standard asynchronous type and the information is transmitted cyclically in series on the line. When transmitted, each item of data is preceded by a label enabling it to be identified. The set of data transmitted depends on the meter and the way it is programmed. Information groups which are not needed for the programmed operating mode are not transmitted.

3.2. Main characteristics of the TIC output

The remote information output is wired under the customer terminal box cover:

- it is composed of 2 circuits: a power circuit and a signal circuit,
- the power circuit makes a power supply (TIC power) available for the remote information receivers on a 50 kHz carrier,
- the information signals are of the “amplitude modulation” type on a 50 kHz carrier,
- the connection is realised via a terminal block with three spring-loaded terminals (allowing tool-free connection with rigid pins),
- the power supply is available in both TIC modes (historical TIC and standard TIC mode),
- In general, the characteristics of the signals and equipment making up the remote information bus are derived from the EURIDIS standard (see document [2]). However, adaptations are sometimes necessary for this particular remote information application.

Therefore, for any parameters that differ to those in the standard, this document takes precedence over the standard.

3.3. TIC operating modes

The remote customer information output can operate in two different ways:

- **historical**: in this mode, the Linky smart meter makes it possible to use the same information frames as those used on old residential electronic meters (see document [1]);

  however, to obtain optimum information in this information mode, the meter’s tariffs must be configured according to the same logic as that used for historical contracts;
- **standard**: this new mode appeared with Linky smart meters. It is faster than historical mode and contains different information with specific formatting.

The information transmitted on the frames in historical and standard mode is described in paragraphs 6.1 and 6.2.

Transitions between the modes are performed by Enedis which programmes the meter.
When they leave the factory, Linky smart meters are initialised in historical mode.

The TIC operating mode can be checked via two other interfaces:

- by reading the distributor’s communication interfaces (PLC or EURIDIS),
- by viewing the display.

However, this display setting can be decided upon when programming the meter (EURIDIS or PLC).

The parameters displayed by the meter are validated by authorised bodies and are not left to the initiative of Enedis.

4. Characteristics of the TIC power supply circuit

The TIC power supply circuit is accessed via terminals I1 and A.
This circuit is made available to customers to power a remote information receiver connected to the meter (e.g. a radio module).

The TIC power supply circuit has the following characteristics:

- **empty**: if no load is connected to the TIC power supply output, the voltage at the power supply terminals is 13 Vrms max;
- **charging**: the characteristics of the TIC power supply are defined in the table below:

Table 1 - characteristics of the TIC power supply circuit

	Levels
Power supplied	130 mW minimum
Voltage	6 Vrms ± 10% at 50 kHz *(max. 12 V peak, taking any signal distortions into account)*
Protection	The output must be protected from short circuits. Mains voltage resistance (230 V 50 Hz) is required (in the event of unintentional connection of the customer installation).

In addition to these requirements, the output impedance of the TIC power supply circuit at 50 kHz is purely resistive.

To ensure the above characteristics of the TIC power supply, Linky smart meters are tested on purely resistive loads between 225 and 335 ohms; the power supplied must always be greater than 130 mW.

5. Characteristics of the information circuit

5.1. Operation as a remote information bus

5.1.1. Principle of a remote information bus

This section reiterates the electrical characteristics for a remote information bus that would allow several remote information receivers to operate in parallel.
The characteristics of the remote information bus comply with the characteristics of EURIDIS buses (see document [2]).

5.1.2. Characteristics of the remote information bus

The information circuit is accessed via terminals I1 and I2. The signals can be transmitted on a wire bus.
The specifications in this paragraph apply to the information bus and do not concern the TIC power supply circuit.

To ensure its correct operation and compliance with the electrical characteristics, the information bus must not exceed 500 m in length (any topology).
The connection terminals of the customer information bus are galvanically isolated from the transmitting electronics inside the meters. The internal electronics of the receiving devices are galvanically isolated from the bus so that several receivers can be connected to the same bus at the same time. The purpose of this requirement is to prevent common mode currents from transiting between receivers.
The connection cable is an internal telephone cable of the type:

- single twisted pair with aluminium sheath and drain wire,
- solid-core braided copper wire, diameter 0.5 mm,
- PVC insulation.

Its electrical characteristics are:

- continuous loop resistance at 20°C: 176 to 192 Ω/km.

Its characteristics at 50 kHz between -15°C and +45°C are:

- loop resistance: 154 to 220 Ω/km,
- inductance of loop: 500 to 800 µH/km,
- mutual capacity: 80 to 130 nF/km,
- capacity loss factor: 5% maximum,
- unbalanced capacity, conductor/screen: 5% maximum,
- characteristic impedance: 74 to 115 Ω,
- linear phase shift at 50 kHz: 150 degrees/km maximum.

The above characteristics are provided for a symmetrical source insulated from the cable sheath with impedances Z and Z' greater than 1000 Ω at 50 kHz (see figure 1).

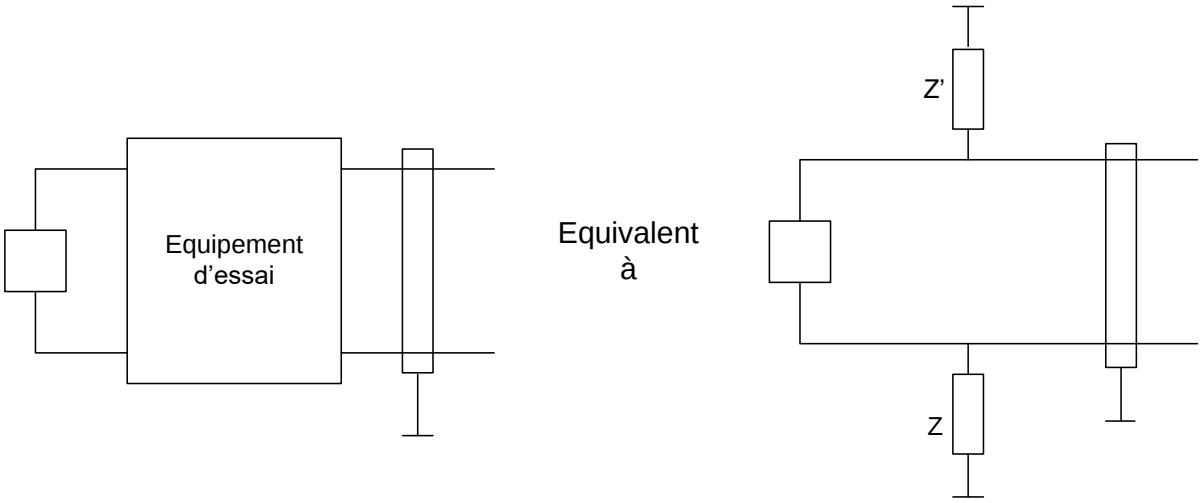


Figure 1 - Bus impedance

5.1.3. Connecting the information bus

The drain wire must be connected at one point to earth, if this exists, or to an equivalent potential reference. No impedance (except the cable itself) below 1000 Ω at 50 kHz must be connected between the bus cables and the sheath or earth cable.

If using cables slightly outside the above specifications:

- in the case of a cable with a higher linear resistance or capacitor, the maximum bus length must be reduced. The maximum bus length changes roughly inversely in proportion to the value of the linear resistance or capacitor;
- a cable with a lower linear resistance or capacitor can lead to overvoltages on the inputs of a receiver placed on an empty and very long bus. This problem can be resolved by placing a damping resistor (330 Ω to 1000 Ω; 0.25 W) between the bus lines near the end opposite the transmitter, the value of which depends on the overvoltage ratio. A capacitor with 47 nF and a suitable breakdown voltage must be placed in series with this resistor so that unintentional connections to the electrical network can be tolerated.

5.2. Characteristics of TIC signals in historical mode

The characteristics of signals in this mode are the same as those of old residential electronic meters. They are described in full in document [1].

However, to achieve a common physical interface between TIC historical mode and TIC standard mode, the requirements concerning signal levels in standard mode can also be applied to historical mode. The parameters concerned by this less stringent requirement are identified in the following paragraphs by the explicit note: "also applicable in historical mode".

The table below has been added to ensure perfect interpretation of the frames. It shows the format of an information group in historical mode to clearly highlight the differences in relation to standard mode, in particular, the calculation of CRC.

Table 2 - historical information mode

Format of an information group in historical mode						
< LF > (0x0 A)	Label	< SP > (0x20)	Data	< SP > (0x20)	Checksum	< CR > (0x0 D)
	Zone monitored by the checksum					

5.3. Characteristics of TIC signals in standard mode

5.3.1. Signal characteristics

The table below shows the main characteristics of signals in standard mode:

Table 3 - Signal characteristics

Transmission	**Binary with carrier modulation at 50 kHz ± 3%**
Transmission	**Unidirectional**
Bit times	**Equal for bits "0" and "1"**
Encoding logic	**Negative: if the carrier is present, the bit is set to "0", and if the carrier is absent, the bit is set to "1".**
Transmission rate	**9600 baud ± 1%**

5.3.2. General requirements for information circuit signals

The signals on the information circuit are shown in figure 2 and are characterised by the following parameters:

a) Vevh1 is the maximum level of the envelope for the transmission of a "1",

b) Vevl0 is the minimum level of the envelope for the transmission of a "0",

c) Vevh0 is the maximum level of the envelope for the transmission of a "0",

d) Tev1 is the minimum guaranteed time during which the envelope is below Vevh1,

e) Tev0 is the minimum guaranteed time during which the envelope is between Vevl0 and Vevh0,

f) Vevl0 and Vevh0 are not the extreme values of the envelope, but rather the "low" and "high" limits guaranteeing correct operation,

g) during the Tev0 period, the level of the envelope must not vary by more than 20%,

h) during the time intervals between Tev0 and Tev1, the increasing or decreasing evolution of the envelope is of the exponential or damped-sinusoid type with the addition of low frequency transients,

i) the rate of harmonic distortion during continuous transmission of the carrier over a resistance of 100 Ω is less than 15% (also applicable to the historical mode),

j) all voltages are specified in peak values.

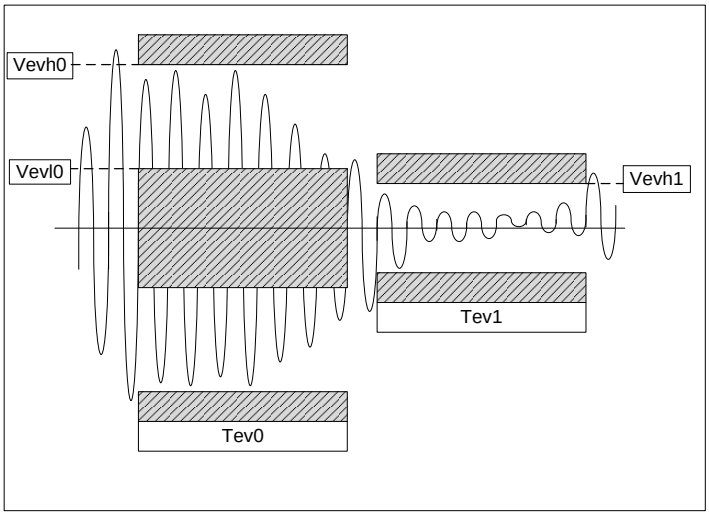


Figure 2 - Characteristics of the carrier envelope

5.3.3. Requirements specific to the information transmitter (the meter)

The TIC transmitters are defined in the particular specifications for the meters. The physical characteristics of the TIC output are the same as those of the EURIDIS output (IEC standard 62056-31 - see document [2]) unless they are modified by this document:

- consequently, the requirements for a TIC transmitter are derived from the requirements for EURIDIS secondary station transmitters;
- however, some adaptations are necessary to operate a remote information circuit (more magnetic coupling, for example). In these cases, the adaptations are described in this document and replace the corresponding characteristics of the EURIDIS standard.

The signal transmitted on the bus meets the general requirements of sections 5.3.1 and 5.3.2, in the entire temperature range, where:

a) Tev1 = Tev0 = 60 µs to 9600 baud,

If both terminals for connecting to the information bus are in open circuit, the following condition must be observed:

b) Vevh0 = 25 V,

For the specified impedance conditions, the levels at the bus connection terminals, must meet the conditions below: As both of the information bus connection terminals are connected to a resistor of between 100 Ω and 2 kΩ instead of to the bus, the following conditions must be observed:

c) Vevl0 = 1.2 V,
d) Vevh0 = 5 V, --> also applicable in historical mode,
e) Vevh1 = 0.2 V,

As the information bus connection terminals are connected to a capacitor of 31.8 nF instead of to the bus, and as the signal is measured at the terminals of a resistor of 1 Ω, connected in series with the capacitor, and multiplied by 100:

f) Vevl0 = 1.5 V,
g) Vevh0 = 5 V, --> also applicable in historical mode,
h) Vevh1 = 0.2 V,

Note: measuring these voltages via a capacitor may give rise to an abnormal amplification of the low-frequency transients.
In addition, as both bus terminals are connected to a resistor of 100 Ω or a capacitor of 31.8 nF:

i) the interference signals cause by switching from transmission mode to blocked mode and vice versa, must not, under any circumstances, exceed 0.75 V peak (during the time intervals that elapse between Tev0 and Tev1),

j) the level of noise emitted at the bus outputs, under all conditions, and in the [1 kHz; 1 Mhz] frequency band, must not exceed 50 mV after the transients have decayed to zero (at least during the Tev0 and Tev1 intervals),

Furthermore:

k) the transmission circuits must be able to withstand a permanent short circuit and accidental connection to the maximum rated voltage at the metering point,

l) the short-circuit current must not be destructive for the components of the transmission circuits (no requirement concerning the value of the short-circuit current). It must be consistent with the particular specifications for the equipment, in particular the TIC-specific consumption (also applies to historical mode),

m) the common mode capacity between the terminals of the consumer information bus and the device's other terminals is less than 15 pF.

5.3.4. Special requirements for an information receiver

A device receiving signals from the information bus is considered to be compatible with the TIC transmitters as long as it is able to interpret the messages transmitted under the conditions described above (section 5.3.3).

Carrying out conformity tests makes it possible to avoid incompatibilities between the equipment and makes it easier to identify the responsibilities of the different equipment in the event of a failure of the relationship between a meter and a receiver via the TIC link.

We also recommend equipping these receivers with an indicator light that specifically indicates that the data has been received. Section 9.3 of this annex describes in detail the expected behaviour of the indicator light under the device's different operating circumstances (starting phase, waiting for signals, no signal, incorrect signals, etc.).

Carrying out conformity tests makes it possible to avoid incompatibilities between the equipment and makes it easier to identify the different equipment in the event of a failure of the relationship between a meter and a receiver via the remote customer information link. Enedis proposes following a marking procedure for remote customer information receivers. This procedure ensures that these devices comply with the characteristics specified in this document. Details of the marking procedure can be obtained on request by sending an email to linky-tech-tic@enedis.fr. In addition, integrating the topological constraints of consumer information networks makes it possible to describe the input characteristics and the sensitivity levels that the manager receivers must take into account to ensure this compatibility.

Thus, (without any position constraints) the requirements in this section allow between 1 and 5 managers to be connected on the same consumer information bus as long as it complies with the characteristics of section 5.1.

To comply with this context, the manager receiver must operate correctly with an input signal that checks the following characteristics:

a) Tev1 = Tev0 = 50 µs at 9600 baud,

The values below are obtained with a generator, the internal impedance of which is negligible compared to the input impedance of the receiver:

b) Vevh1 = 0.4 V,
c) Vevl0 = 0.8 V,
d) Vevh0 = 5 V,

Note: in cases where TIC is used in buses, special attention must be paid to the design of the bus and the receivers. The receiver input signal levels could be higher than the specified levels in direct connection (LC circuits).

In addition, the receiver must be insensitive to:

e) a permanent sinusoidal signal with a frequency in the [1 kHz; 1 MHz] range and a peak value equal to 0.1 V,

f) a harmonic distortion of 50%,

g) a 20 V pulse with a duration of 5 µs.

The 50 kHz input impedance of the manager receiver has a resistive component in parallel with a reactive component.

For signals up to 5 V peak, the following values must be observed, regardless of whether or not the manager is energised:

h) resistive parallel component: between 500 and 2000 Ω,
reactive parallel component: > 2000 Ω, if inductive,
> 10 kΩ, if capacitive.

i) in the event of a malfunction in the receiving electronics, the manager's input impedance must remain higher than 200 Ω.

In addition, the physical implementation of the manager makes it possible to check the following point:

j) the common-mode capacity between the connection terminals of the consumer information bus and the device's other terminals is less than 15 pF,

k) robustness with a permanent application of 230 V, 50 Hz: the TIC circuits are close to the dry contact and share the same space, which leads to a risk of unintentional connection of the 230 V:

- the Linky meter is insensitive to a permanent connection of 230 V, 50 Hz on its TIC circuits,
- the remote information receiver (excluding RT-type customer equipment in compliance with the volume specified in section 8.3 with a single pin connection directly on the TIC terminal block) must not cause any damage to the meter circuits (remote information and power supply) if a permanent signal of 230 V, 50 Hz is applied to the corresponding inputs.

Note: the 20 V pulse test (see paragraph (g), above) takes into account the interference signals on the bus which are due both to switching on the network (rising through the capacitors between the network and the bus or through the devices connected to the bus) and to switching of the TIC transmitter.

5.3.5. Physical layer

Transmission type

The information output is of the asynchronous type as defined in standard IEC 62056-21, clause 5.1.

Baud rate:

9600 +/- 1%

Character format

Each character is transmitted in a coherent set of 10 bits which have the following form:

- one start bit corresponding to a logic "0",
- 7 bits to represent the ASCII character,
- 1 parity bit, even parity,
- one stop bit corresponding to a logic "1".

During transmission, the bits are transmitted with the Least Significant bit (LSB.) first, and the Most Significant bit (MSB.) last.

Table 4 - Character format

Start bit	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	parity bit	stop bit

When transmitting an information group, the characters are transmitted in the direction of reading (from left to right).

5.3.6. Link layer

Principles of frames

The meter transmits frames made up of several information groups.

The frames are transmitted continuously, one after the other:

- between the end of one frame and the start of the next, there is a period without transmission. This lasts between 16.7 and 33.4 ms,
- similarly, the period between two successive information groups of the same frame must not exceed 33.4 ms.

Frame format

A frame is made up of three parts:

- the “Start TeXt” STX (0x02) character indicates the start of the frame,
- the body of the frame is made up of several information groups,
- the “End TeXt” ETX (0x03) character indicates the end of the frame.

Table 5 - Frame format

STX	Data set	Data set	….	Data set	ETX

The frames have a length that depends on the type of contract chosen, and contain all the information in the meter's memories that can help with energy management.

The transmitted information is described in section 6.

Format of the information groups

An information group is made up of 7 parts or 9 parts (if there is a time stamp) which are described below:

- a “Line Feed” LF (0x0 A) character indicating the start of the group,
- The label field, the length of which is less than or equal to eight characters,
- a “Horizontal Tab” HT (0x09) character which separates the “label” field from the “data” field,
- the “data” field, the length of which is variable,
- a “Horizontal Tab” HT (0x09) character which separates the “data” field from the “checksum” field,
- the “checksum” field, the calculation of which is provided below,
- a “Carriage Return” CR (0x0 D) character, indicating the end of the information group,
- the information group may include a time stamp. This is inserted between the label field and the data field with an additional “Horizontal Tab” HT (0x09) separator.

Note: in standard mode, the character separating the “Horizontal Tab” HT (0x09) fields, is different to the “Space” SP (0x20) character separator in historical mode. This arrangement allows the “Space” character to be used for the data.

Table 6 - Information systematically time-stamped by the meter

Format of a group containing time-stamped data								
< LF > (0x0 A)	Label	< HT > (0x09)	Time stamp	< HT > (0x09)	Data	< HT > (0x09)	Checksum	< CR > (0x0D)
	Zone monitored by the checksum							

Table 7 - Information without time stamp

Format of a group containing non-time-stamped data						
< LF > (0x0 A)	Label	< HT > (0x09)	Data	< HT > (0x09)	Checksum	< CR > (0x0D)
	Zone monitored by the checksum					

The order of data transmission in the frame is that which follows from reading the tables in section 6 from top to bottom.

The **checksum** is calculated for all the characters from the start of the **Label** field to the end of the Data field, including the < HT > characters.

The principle for the **Checksum** calculation is as follows:

- calculation of the sum "S1" of all the characters from the start of the "**Label**" field up to the delimiter (included) between the "**Data**" and "**Checksum**") fields;
- this subtracted sum is truncated to 6 bits (this is done using an ET logic with 0x3F);
- to obtain the **checksum** result, the previous S2 result is added to 0x20.

In summary:

Checksum = (S1 & 0x3F) + 0x20

The result will always be a printable ASCII character between 0x20 and 0x5F.

5.3.7. Application layer

The data transmitted depends on the type of contract chosen and is described in section below.
Section 6 also specifies the data format and the principles of data consistency within the same frame.

6. Description of remote information frames

6.1. Remote information frames in historical mode

In this mode, the frames are identical to the older electronic meters used before Linky. However, to ensure that the information is as complete as possible, the meter must be configured with a historical contract.
Certain data in historical mode is not available in Linky meters. This includes the cases of subscribed intensity, maximum intensities and tariff zone (A, C, D, E, Y). In these cases, other information is used instead.

Specifications about the information transmitted by the meter can be found in document [1].

This section recaps the information transmitted by single-phase and three-phase meters. It specifies the restrictions that may apply if the meter is configured with a contract containing new offers ("non-historical contract" in the table).
In the tables, the information is described with its label and the number of associated data characters. The unit is indicated for information purposes; it is implicit and is not included in the transmitted characters.

6.1.1. Single-phase meters (60 A and 90 A)

Description	Label	Number of characters	Unit	Single-phase Linky meter	
				historical contract	Non-historical contract
Meter's address	*ADCO*	12		ADS	
Chosen tariff option	*OPTARIF*	4		According to contract	"BASE"
Subscribed intensity	*ISOUSC*	2	A	PREF (in VA)/200 V	
Base index option	*BASE*	9	Wh	Supplier 1 index	Totaliser index
Off-peak hours index option Off-peak hours Peak hours	 *HCHC* *HCHP*	 9 9	 Wh Wh	 Supplier 1 index Supplier 2 index	 NOT TRANSMITTED
Peak day curtailment (EJP) index option Normal times Mobile Peak Times	 *EJPHN* *EJPHPM*	 9 9	 Wh Wh	 Supplier 1 index Supplier 2 index	 NOT TRANSMITTED
Tempo index option Off-peak hours, Blue Days Peak hours, Blue Days Off-peak hours, White Days Peak hours, White Days Off-peak hours, Red Days Peak hours, Red Days	 *BBRHCJB* *BBRHPJB* *BBRHCJW* *BBRHPJW* *BBRHCJR* *BBRHPJR*	 9 9 9 9 9 9	 Wh Wh Wh Wh Wh Wh	 Supplier 1 index Supplier 2 index Supplier 3 index Supplier 4 index Supplier 5 index Supplier 6 index	 NOT TRANSMITTED
Notification of Start of EJP (30 min)	*PEJP*	2	min	"30", with EJP notification	NOT TRANSMITTED
Current Tariff period	*PTEC*	4		According to contract and tariff	"TH.."
Tomorrow's colour	*DEMAIN*	4		According to notification, in Tempo	NOT TRANSMITTED
Instantaneous Intensity	*IINST*	3	A	Effective current (in A)	
Subscribed Power Exceedance Notification	*ADPS*	3	A	Effective current, if IINST > RI	
Maximum intensity called	*IMAX*	3	A	90 (in A)	
Apparent power	*PAPP*	5	VA	S (in VA), rounded up to the nearest ten	
Peak hours Off-peak hours	*HHPHC*	1		"A"	
Meter status word	*MOTDETAT*	6		"000000"	

The maximum intensity "IMAX" is always equal to 90 A in the case of this single-phase meter.
Exceedance of the subscribed power (ADPS) is monitored by comparing the instantaneous effective intensity with the reference current (derived from the reference power). The reference intensity is calculated as follows: RI = reference P in VA/200 V.

6.1.2. Three-phase meters

A long frame consists of the following groups:

Description	Label	Number of characters	Unit	Three-phase Linky meter	
				historical contract	Non-historical contract
Meter's address	*ADCO*	12		ADS	
Chosen tariff option	*OPTARIF*	4		According to contract	"BASE"
Subscribed intensity	*ISOUSC*	2	A	1/3 PREF (in VA)/200 V	
Base index option	*BASE*	9	Wh	Supplier 1 index	Totaliser index
Off-peak hours index option Off-peak hours Peak hours	 *HCHC* *HCHP*	 9 9	 Wh Wh	 Supplier 1 index Supplier 2 index	NOT TRANSMITTED
Peak day curtailment (EJP) index option Normal times Mobile Peak Times	 *EJPHN* *EJPHPM*	 9 9	 Wh Wh	 Supplier 1 index Supplier 2 index	NOT TRANSMITTED
Tempo index option Off-peak hours, Blue Days Peak hours, Blue Days Off-peak hours, White Days Peak hours, White Days Off-peak hours, Red Days Peak hours, Red Days	 *BBRHCJB* *BBRHPJB* *BBRHCJW* *BBRHPJW* *BBRHCJR* *BBRHPJR*	 9 9 9 9 9 9	 Wh Wh Wh Wh Wh Wh	 Supplier 1 index Supplier 2 index Supplier 3 index Supplier 4 index Supplier 5 index Supplier 6 index	NOT TRANSMITTED
Notification of Start of EJP (30 min)	*PEJP*	2	min	"30", with EJP notification	NOT TRANSMITTED
Current Tariff period	*PTEC*	4		According to contract and tariff	"TH.."
Tomorrow's colour	*DEMAIN*	4		According to notification, in Tempo	NOT TRANSMITTED
Instantaneous intensity for the 3 phases, 1, 2 and 3	*IINST1* *IINST2* *IINST3*	3 3 3	A A A	Phase 1 effective current (in A) Phase 2 effective current (in A) Phase 3 effective current (in A)	
Maximum intensity per phase 1, 2 and 3	*IMAX1* *IMAX2* *IMAX3*	3 3 3	A A A	60 (in A) 60 (in A) 60 (in A)	
Maximum three-phase intensity reached	*PMAX*	5	W	Smax (in VA) of day n-1	
Extracted apparent three-phase power	*PAPP*	5	VA	S (in VA), rounded up to the nearest ten	
Peak hours Off-peak hours	*HHPHC*	1		"A"	
Meter Status word	*MOTDETAT*	6		"000000"	
Presence of potential	*PPOT*	2		"0X", where the X reflects phase breaks according to the following rule: absence of phase n ⇒ bit n = 1	

The maximum intensity “IMAX” of a phase is always equal to 60 A for a three-phase meter.

Exceedance of the subscribed power (ADPS) is monitored phase-by-phase by comparing the instantaneous effective intensity with the reference intensity (derived from the reference power). The reference intensity is calculated as follows: RI = reference P in VA/200 V/3 phases.

For three-phase meters, there are two types of frame: long frames and short frames. Short frames are transmitted if the instantaneous effective intensity of at least one of the three phases is greater than the setting intensity.

Short frames consist of the following groups:

Description	Label	Number of characters	Unit	Three-phase Linky meter	
				historical contract	Non-historical contract
Notification of Exceedance of setting intensity phase-by-phase	*ADIR1* *ADIR2* *ADIR3*	3 3 3	A A A	Phase 1 effective current Phase 2 effective current Phase 3 effective current	
Meter’s address	*ADCO*	12		ADS	
Instantaneous intensity for the 3 phases, 1, 2 and 3	*IINST1* *IINST2* *IINST3*	3 3 3	A A A	Phase 1 effective current Phase 2 effective current Phase 3 effective current	

If the setting intensity is exceeded on (at least) one of the phases for one minute and during the minute following the the disappearance of the last case of exceedance, cycles of 20 short frames followed by one long frame are transmitted.

6.2. Remote information frames in standard mode

This new standard mode appeared with Linky smart meters. The information made available by the meter is described in full in this section.

6.2.1. Application layer

6.2.1.1. Time stamp format

The format used for time stamps is *SYYMMDDhhmmss*, i.e. Season, Year, Month, Day, hour, minute, second.

Example:

25 December 2008, at 10.35 p.m. and 18s is encoded as follows:

H081225223518

The *H* signifies winter time (standard time).

14 July 2009, at 7.45 a.m. and 53s is encoded as follows:

E090714074553

The *E* signifies summer time (DST).

In the case of a time stamp obtained with a real-time clock in degraded mode (i.e. case of a meter which has exceeded the power reserve of its clock and it has not been possible to resynchronise its clock by programming it), the season information is encoded with a lower case letter.

Season character	< Space >	H	E	h	e
Meaning	Not applicable	Winter time	Summer time	Winter time	Summer time
		Non-degraded mode		Degraded mode	

In some cases, the season character is not applicable, and is replaced by the “Space” character (ASCII 0x20 character). This concerns information groups at the start and end of mobile peak times.

6.2.1.2. Data format

The “data” field contains printable ASCII characters, i.e. between 0x20 and 0x7E. Its size is set for each group. The data unit is never specified as it is implicit.
The digital values are completed with leading zeros. For example, in XXX format, 3 is transmitted as follows: 003.

6.2.1.3. Influence of the meter’s operating mode

The meter has two different operating modes: consumer mode and producer mode.
In producer mode, the frames are longer than in consumer mode because additional groups are transmitted.

6.2.1.4. Influence of the number of phases

In the case of a single-phase meter, the groups relating to phases 2 and 3 are never transmitted.
In addition, in certain cases (for example: a totaliser information group exists), the group relating to phase 1 is not transmitted by single-phase meters.
In order to fully clarify this issue, the table below specifies, in the “Three-phase only” column, the data groups which are only transmitted by three-phase meters.

6.2.1.5. Consistency of data in a frame

For the sake of data consistency, the meter must ensure that the information transmitted on the TIC is well-synchronised and up-to-date.
Thus, for each information group, the data supplied must not be older than a period corresponding to the transmission time for a complete frame (remote information cycle time).

6.2.2. List of data supplied

The frames are permanently transmitted and comprise the list of the following data:

Data supplied	Label	Time stamp	Number of data characters	Data unit	Three-phase only	Producer only
Meter’s secondary address	*ADSC*		12	None		
TIC version	*VTIC*		2	None		
Current date and time	*DATE*	√	0	None		
Name of supplier’s tariff calendar	*NGTF*		16	None		
Current supplier’s tariff label	*LTARF*		16	None		
Total extracted active energy	*EAST*		9	Wh		

Data supplied	Label	Time stamp	Number of data characters	Data unit	Three-phase only	Producer only
Supplier extracted active energy, index 01	*EASF01*		9	Wh		
Supplier extracted active energy, index 02	*EASF02*		9	Wh		
Supplier extracted active energy, index 03	*EASF03*		9	Wh		
Supplier extracted active energy, index 04	*EASF04*		9	Wh		
Supplier extracted active energy, index 05	*EASF05*		9	Wh		
Supplier extracted active energy, index 06	*EASF06*		9	Wh		
Supplier extracted active energy, index 07	*EASF07*		9	Wh		
Supplier extracted active energy, index 08	*EASF08*		9	Wh		
Supplier extracted active energy, index 09	*EASF09*		9	Wh		
Supplier extracted active energy, index 10	*EASF10*		9	Wh		
Distributor extracted active energy, index 01	*EASD01*		9	Wh		
Distributor extracted active energy, index 02	*EASD02*		9	Wh		
Distributor extracted active energy, index 03	*EASD03*		9	Wh		
Distributor extracted active energy, index 04	*EASD04*		9	Wh		
Total injected active energy	*EAIT*		9	Wh		√
Total Q1 reactive energy	*ERQ1*		9	VArh		√
Total Q2 reactive energy	*ERQ2*		9	VArh		√
Total Q3 reactive energy	*ERQ3*		9	VArh		√
Total Q4 reactive energy	*ERQ4*		9	VArh		√
Effective current, phase 1	*IRMS1*		3	A		
Effective current, phase 2	*IRMS2*		3	A	√	
Effective current, phase 3	*IRMS3*		3	A	√	
Effective voltage, phase 1	*URMS1*		3	V		
Effective voltage, phase 2	*URMS2*		3	V	√	
Effective voltage, phase 3	*URMS3*		3	V	√	
App. reference power (PREF)	*PREF*		2	kVA		
App. breaking capacity (PCOUP)	*PCOUP*		2	kVA		

Data supplied	Label	Time stamp	Number of data characters	Data unit	Three-phase only	Producer only
Extracted instantaneous app. power	*SINSTS*		5	VA		
Extracted instantaneous app. power phase 1	*SINSTS1*		5	VA	√	
Extracted instantaneous app. power phase 2	*SINSTS2*		5	VA	√	
Extracted instantaneous app. power phase 3	*SINSTS3*		5	VA	√	
Extracted max. app. power n	*SMAXSN*	√	5	VA		
Extracted max. app. power n phase 1	*SMAXSN1*	√	5	VA	√	
Extracted max. app. power n phase 2	*SMAXSN2*	√	5	VA	√	
Extracted max. app. power n phase 3	*SMAXSN3*	√	5	VA	√	
Extracted max. app. power n-1	*SMAXSN-1*	√	5	VA		
Extracted max. app. power n-1 phase 1	*SMAXSN1-1*	√	5	VA	√	
Extracted max. app. power n-1 phase 2	*SMAXSN2-1*	√	5	VA	√	
Extracted max. app. power n-1 phase 3	*SMAXSN3-1*	√	5	VA	√	
Injected instantaneous app. power	*SINSTI*		5	VA		√
Injected max. app. power n	*SMAXIN*	√	5	VA		√
Injected max. app. power n-1	*SMAXIN-1*	√	5	VA		√
Point n of the extracted active load curve	*CCASN*	√	5	W		
Point n-1 of the extracted active load curve	*CCASN-1*	√	5	W		
Point n of the injected active load curve	*CCAIN*	√	5	W		√
Point n-1 of the injected active load curve	*CCAIN-1*	√	5	W		√
Mean voltage ph. 1	*UMOY1*	√	3	V		
Mean voltage ph. 2	*UMOY2*	√	3	V	√	
Mean voltage ph. 3	*UMOY3*	√	3	V	√	
Status Register	*STGE*		8	None		
Start of Mobile 1 Peak Time	*DPM1*	√	2	None		
End of Mobile 1 Peak Time	*FPM1*	√	2	None		
Start of Mobile 2 Peak Time	*DPM2*	√	2	None		

Data supplied	Label	Time stamp	Number of data characters	Data unit	Three-phase only	Producer only
End of Mobile 2 Peak Time	*FPM2*	√	2	None		
Start of Mobile 3 Peak Time	*DPM3*	√	2	None		
End of Mobile 3 Peak Time	*FPM3*	√	2	None		
Short message	*MSG1*		32	None		
Ultra-short message	*MSG2*		16	None		
PRM	*PRM*		14	None		
Relay	*RELAIS*		3	None		
Current tariff index number	*NTARF*		2	None		
Number of current day in supplier's calendar	*NJOURF*		2	None		
Number of next day in supplier's calendar	*NJOURF+1*		2	None		
Profile of the next day in the supplier's calendar	*PJOURF+1*		98	None		
Profile of the next peak day	*PPOINTE*		98	None		

All the energy registers are systematically transmitted, even those that are not used in current contracts.

6.2.3. Clarifications about the format of certain data

6.2.3.1. Meter's secondary address

This is the meter's EURIDIS secondary address which also corresponds to its serial number (see section 2.2 above).

6.2.3.2. TIC version

This is the version of the TIC specification. This data will be updated when the definition of the standard mode changes. In the current specification, the TIC version is "02".

6.2.3.3. Current date and time

For this group, the information is contained in the "time stamp" zone.
The "data" zone is empty (all the < HT > separation characters are present in the information group).

6.2.3.4. Name of supplier's tariff calendar

The data transmitted corresponds to the name of the supplier's tariff offer.
Technically, this is carried by a programmable COSEM object of the meter: the first 16 bytes of attribute 2 "*name_calendar_active*" of the "*ProviderActivitycalendar*" object. If this data item does not exist, the label and data item are not transmitted on the TIC.

6.2.3.5. Current supplier's tariff label

The data transmitted corresponds to the name of the active tariff in the supplier's tariff calendar.
Technically, the data transmitted corresponds to the data programmed on the "*DisplayConfigurationActive"* object. If this data item does not exist in the "*DisplayConfigurationActive"* object, the label and data item are not transmitted on the TIC.

6.2.3.6. Energy

All the energy information (EAST, EASFxx, EASDxx, EAIT and ERQx) directly supplies the corresponding indexes.

6.2.3.7. Effective current

The TIC retransmits the effective currents (for each phase) corresponding to the following definition:
The effective voltages and currents are calculated phase-by-phase based on the following general formulas:

$$V_{eff} = \sqrt{\frac{1}{T}\int_{t_0}^{t_0+T} v_{inst}^2(t).dt} \qquad I_{eff} = \sqrt{\frac{1}{T}\int_{t_0}^{t_0+T} i_{inst}^2(t).dt}$$

Where v_{inst} and i_{inst} are the instantaneous values of the voltage and current.

To avoid the effects of transient events, effective voltages and currents are calculated every second. The integration period for the previous formulas (T) is then 1 second.
In the rest of the document:

- The values for current and voltage, which are supplemented by the attribute “instantaneous” or “effective” correspond to this calculation of the effective value for 1 second;
- certain objects may be indexed Phase 1, 2 or 3:
  - **in single-phase systems**: only phase 1 is concerned;
  - **in three-phase systems**: the phase numbers are physically defined according to their connection on the power terminal block (1 to 3 from the left to the right of the network inputs).

6.2.3.8. Effective voltage

The TIC retransmits the effective voltages (for each phase) corresponding to the following definition:

6.2.3.9. Reference power and breaking capacity

The reference power corresponds to the power subscribed to in the supply contract. The breaking power is generally identical to the reference power and corresponds to the power threshold granted to the customer and is controlled by the switchgear. In the case of particular contractual events, the breaking power may be different to the reference power.

The purpose of the breaking capacity is to monitor the contractual power. For this purpose, the power consumption measured by the meter is filtered by a calculation identical to that of the maximum apparent power. The result of this calculation is compared to a threshold which depends on the breaking capacity. This function’s complete process is described in detail in section 7.

6.2.3.10. Extracted and injected instantaneous apparent power

The TIC retransmits the extracted instantaneous apparent power (in total and for each phase) and the injected instantaneous apparent power (total only) corresponding to the following definition:
The following quantities are calculated every second, phase-by-phase. Their direction of transit is monitored at the same time. The table also defines the aggregate values.

	Phase 1	Phase 2	Phase 3	Three-phase aggregation
Active power	$P_1 = \int v_1.i_1$	$P_2 = \int v_2.i_2$	$P_3 = \int v_3.i_3$	$P = P_1 + P_2 + P_3$
Reactive power	$Q_1 = V_{1fond}.I_{1fond}.\sin\phi_1$	$Q_2 = V_{2fond}.I_{2fond}.\sin\phi_2$	$Q_3 = V_{3fond}.I_{3fond}.\sin\phi_3$	$Q = Q_1 + Q_2 + Q_3$
Extracted apparent power	$S_1 = V_{1eff} \times I_{1eff}$	$S_2 = V_{2eff} \times I_{2eff}$	$S_3 = V_{3eff} \times I_{3eff}$	See paragraph below
Injected apparent power	$S_1 = V_{1eff} \times I_{1eff}$	$S_2 = V_{2eff} \times I_{2eff}$	$S_3 = V_{3eff} \times I_{3eff}$	See paragraph below

Where V_{fond} = measurement of the voltage at the fundamental frequency of 50 Hz (the harmonics are not taken into account), (unit: V rms) and I_{fond} = measurement of intensity at the fundamental frequency of 50 Hz (the harmonics are not taken into account) (unit: A rms).

Extracted apparent power and injected apparent power are defined. The direction of the apparent power is defined by the direction of transit of the active energy, i.e.:

- in one phase, or in single-phase, S is extracted if $P \geq 0$; otherwise S is injected;
- in three-phase, Stri is extracted if $P = (P1+P2+P3) \geq 0$; otherwise Stri is injected.

For the three-phase meter, the (extracted or injected) three-phase apparent power is calculated by taking the absolute value of the sum of the apparent powers of the phases. The apparent power of a phase has a minus symbol if this phase is in “injection mode”.
This information is used on the remote information and on the display (exceedance and apparent power indicator).
In remote information mode, only the groups corresponding to the meter’s configuration (consumer/producer – single phase/three-phase) are transmitted.

6.2.3.11. Extracted and injected maximum apparent power

The extracted maximum apparent power (in total and for each phase) and the injected maximum apparent power (total only) are determined on a daily basis.
The apparent power measured by the meter is filtered (the calculation filter, which is also used to monitor power, is described in section 7). The maximum power for one day D corresponds to the maximum value of the result at the output of this filter realised during this same day D:

- an “n” indexed power is the value of the current day corresponding to the last historical value since the start of the day and up to the point in time when the frame is transmitted;
- an “n-1” indexed power is the historical value the day before the current day.

Only the groups corresponding to the meter’s configuration (consumer/producer – single-phase/three-phase) are transmitted.
The extracted maximum apparent power which reflects the power monitoring function, can be used to define the breaking capacity to be subscribed to by the customer.

6.2.3.12. Extracted and injected load curve points

The TIC must supply the last 2 points (“n” and “n-1”) of the load curves corresponding to the last two complete periods. The meter has 10 seconds to update the load curve points at the end of an integration period. If a point is not available, its information group is not transmitted.
In particular:

- if the load curve is stopped (contractual reason), the corresponding information groups are no longer transmitted on the TIC;
- if the meter is in “consumer” mode, only the extraction load curve is transmitted on the TIC.

6.2.3.13. Average voltage

In standard mode, the TIC retransmits the average voltage (for each of the phases).
This average voltage is calculated over a programmable timeframe which corresponds to the regulations in force (10 min on the date on which this document was published).

6.2.3.14. Status register

The content of the status register retranscribe, in the encoded format shown below, the meter's operating status at the time the frame was transmitted. It is transmitted in the form of 8 ASCII characters ("0" to "9" and "A" to "F") with the high byte is at the high end. It corresponds to the following definition:

Relevant functions	Statuses	associated bit in the status register
Dry contact	0 = closed 1 = open	bit 0
Switching device	0 = closed 1 = open upon excess output 2 = open upon overvoltage 3 = open upon load shedding 4 = open upon command from PLC or Euridis 5 = open upon overheating with a current value above the maximum switching current 6 = open upon overheating with a current value below the maximum switching current	bits 1 (LSB) to 3 (MSB)
Condition of the distributor's terminal box cover	0 = closed 1 = open	bit 4
Not used	Always at 0	bit 5
Overvoltage on one phase	0 = no overvoltage 1 = overvoltage Setting this bit to 1 may cause an alarm to be sent to the concentrator depending on the "*AlarmFilter*" register.	bit 6
Reference power exceeded	0 = not exceeded 1 = exceedance currently in progress	bit 7
Producer/consumer mode	0 = consumer 1 = producer	bit 8
Direction of active energy	0 = positive active energy 1 = negative active energy	bit 9
Current tariff on supply contract	0 = energy distributed on Index 1 1 = energy distributed on Index 2 2 = energy distributed on Index 3 3 = energy distributed on Index 4 4 = energy distributed on Index 5 5 = energy distributed on Index 6 6 = energy distributed on Index 7	bits 10 (LSB) to 13 (MSB)

Relevant functions	Statuses	associated bit in the status register
	7 = energy distributed on Index 8 8 = energy distributed on Index 9 9 = energy distributed on Index 10	
Current tariff on distributor contract	0 = energy distributed on Index 1 1 = energy distributed on Index 2 2 = energy distributed on Index 3 3 = energy distributed on Index 4	bits 14 (LSB) to 15 (MSB)
Degraded mode of clock (loss of time stamp by internal clock)	0 = clock correct 1 = clock in degraded mode	bit 16
Status of remote information output	0 = historical mode 1 = standard mode	bit 17
Not used	Not used	bit 18
Status of Euridis communication output	00 = disabled 01 = enabled without security 11 = enabled with security (Binary notation)	bits 19 (LSB) to 20 (MSB)
PLC status	00 = New/Unlock 01 = New/Lock 10 = Registered (Binary notation)	bits 21 (LSB) to 22 (MSB)
PLC synchronisation	0= meter not synchronised 1= meter synchronised	bit 23
Colour of the day for Tempo historical contract For a Tempo contract, the 0 value is not accepted For the other contracts, the value is set to 0 (no notification)	0 = No notification 1 = Blue 2 = White 3 = Red	bits 24 (LSB) to 25 (MSB)
Colour of the next day for Tempo historical contract For the other contracts, the value is set to 0 (no notification)	0 = No notification 1 = Blue 2 = White 3 = Red	bits 26 (LSB) to 27 (MSB)
Mobile peak times notification	0 = no notification in progress 1 = PM1 notification in progress 2 = PM2 notification in progress 3 = PM3 notification in progress	bits 28 (LSB) to 29 (MSB) (Tempo contract and EJP included)
Mobile peak time (PM)	0 = No mobile peak time 1 = PM 1 in progress 2 = PM 2 in progress 3 = PM 3 in progress	bits 30 (LSB) to 31 (MSB) (Tempo contract and EJP included)

6.2.3.15. Start of mobile peak time and end of mobile peak time

The meter transmits information concerning the engagement of the mobile peak times that it is aware of. The contract can define 3 different profiles for mobile peak days (PM1, PM2 and PM3). If several identical commands exist at the same time for the same mobile peak time, the information transmitted corresponds to the first chronological action.

6.2.3.16. Short message

In standard mode, the TIC retransmits the short message with 32 characters.

6.2.3.17. Ultra-short message

In standard mode, the TIC retransmits the ultra-short message with 16 characters. The content of the ultra-short message is transmitted in the current frame when it is taken into account by the meter (it is transmitted once and inserted after the short message).

6.2.3.18. PRM

In standard mode, the TIC retransmits the measurement reference point (PRM).

6.2.3.19. Relay

The data transmitted corresponds to the status of 8 relays, 1 of which is real and 7 of which are virtual.
The data is expressed as a 3-character decimal with the following logic:

Relay no.	1 (real)	2	3	4	5	6	7	8
Bit no.	1	2	3	4	5	6	7	8

The bit is 0 if the contract is open and 1 if the contact is closed.*

Example:

Relay no.	1	2	3	4	5	6	7	8	Decimal value supplied on the TIC
Status	0	0	1	1	0	0	0	1	140
Status	1	0	0	0	0	0	0	0	001

6.2.3.20. Current tariff index number

The information corresponds to the number of the current tariff index and must be consistent with the status register information, bits 10 to 13.

6.2.3.21. Number of current day and next day

The number of the (current or next) day is derived from the supplier's tariff grid, taking special days into account.
The contract can define 10 different day profiles (declared by the supplier), numbered from 0 to 9.
Technically, the data transmitted corresponds to the day_id element of the current (or next) day in the attribute "*day_profile_table_active*".

Comments:

1. this information does not take the mobile peak periods (which appear in the “Start and End of mobile peak time” information) into account ,
2. the profile number of the day and the next day is updated daily starting with the first frame transmitted after 00:00.

6.2.3.22. Profile of the next day in the supplier’s calendar

Technically, the day’s profile is extracted from attribute 5 “*day_profile_table_active*” in the *“ProviderActivityCalendar*” object. For this item of data, this involves using the part of the definition of the day’s profile, for which the day_id element corresponds to the “*NJOUR+1*” information in the same frame.
This characters for this object (listed below) are transcribed into the TIC data format.
The information data consists of a sequence of 11 data blocks corresponding to the 11 possible time slots in the description of a day profile. The blocks are separated from each other by a space. Each data block is made up of 8 symbolic characters “HHMMSSSS” which correspond to:

- HHMM: hour and minute of the “start_time” field;
- SSSS: value derived from the “script_selector” corresponding to the actions in the time slot (see below): This is a string of 4 characters with hexadecimal coding in sets of 4 bits, from the most significant bit to the least significant bit;
- If the day profile contains less than 11 time slots, to ensure a constant data size, the “not used” slots take the “NONUTILE” (NOT USED) pad value.

Description of “SSSS” actions related to a time slot

An action is of the long-unsigned type (16 bits).

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Dry contact management		Not used			Management of 7 virtual contacts from no. 1 to no. 7							Distribution index number			

Distribution index number:

bit 3	bit2	bit1	bit0	Distribution index
0	0	0	0	No action, the tariff remains unchanged
0	0	0	1	Supply tariff index 1
0	0	1	0	Supply tariff index 2
0	0	1	1	Supply tariff index 3
0	1	0	0	Supply tariff index 4
0	1	0	1	Supply tariff index 5
0	1	1	0	Supply tariff index 6
0	1	1	1	Supply tariff index 7
1	0	0	0	Supply tariff index 8
1	0	0	1	Supply tariff index 9
1	0	1	0	Supply tariff index 10
1	0	1	1	No action, the tariff remains unchanged
1	1	0	0	No action, the tariff remains unchanged
1	1	0	1	No action, the tariff remains unchanged
1	1	1	0	No action, the tariff remains unchanged
1	1	1	1	No action, the tariff remains unchanged

Dry contact management:

bit 15	bit14	Dry contact management
0	0	The dry contact remains in its position (no manoeuvre)
0	1	If the contract is a Tempo contract, the dry contact and virtual contact no. 1 positions are defined by the Tempo Dry Contact Configuration; If the contract is not a Tempo contract, the dry contact remains in position (no manoeuvre).
1	0	The Dry contact changes to the open position and remains in the open position
1	1	The Dry contact changes to the closed position and remains in the closed position

Management of 7 virtual contacts from no. 1 to no. 7:

Bits no. 4 to 10 indicate the status of the 7 virtual contacts.
The table below shows the relationship between the 7 virtual contacts and the bit numbers:

Bit no.	Information
4	Virtual contact no. 1
5	Virtual contact no. 2
6	Virtual contact no. 3
….	
10	Virtual contact no. 7

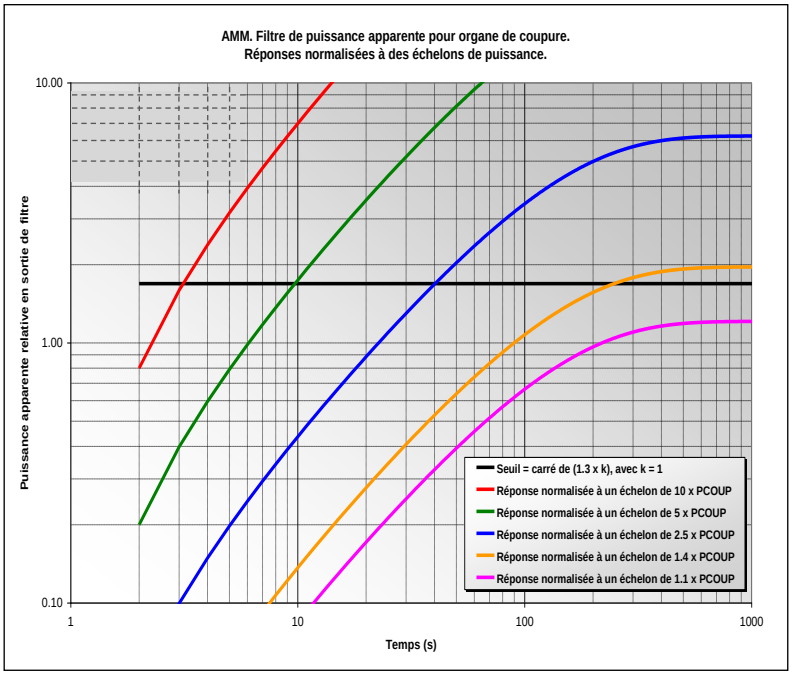
6.2.3.23. Profile of the next peak day

The profile of the next peak day is transmitted as soon as at least one of the “DPM1” (or “DPM2” or “DPM3”) information items appears on the same frame. This information is transmitted between the time that the information appears and until the effective start time of this mobile peak time (corresponding to the time stamp conveyed by the “DPM1” (or “DPM2” or “DPM3”) information item.
If several mobile peak time items of information exist at the same time (for example: DPM1 and DPM2 are in the same frame), the profile of the next peak day corresponds to the mobile peak time that has not started and for which the time stamp (conveyed by the “DPM1” (or “DPM2” or “DPM3”) information item) is the closest in the future.
When this mobile peak time starts, the next non-started mobile peak time with the closest time stamp in the future is transmitted.

The profile of the next peak day is extracted from the “value” attribute 2 in the “PeakDayProfileN1Setup” object (or “PeakDayProfileN2Setup” or “PeakDayProfileN3Setup”). The data item from this information group is defined in exactly the same way as the data from the “*PJOURF+1*” information item (see above).

7. Power monitoring by the meter’s switching device

The (instantaneous) apparent power measured by the meter is filtered according to the dynamic shown in detail in the graph below (low-pass recursive filter). The resulting value is used to detect excess output (extraction only) and the Max. apparent power calculation.



Regardless of the meter’s mode (producer or consumer), the extracted and injected apparent power quantities, measured in total or phase-by-phase, are re-evaluated every second.

In a single-phase meter, 2 apparent powers are calculated: total injected + total extracted. In a three-phase meter, 5 apparent powers are calculated: total injected + total extracted + extracted over each of the 3 phases.

For excess output detection, only the extracted apparent power is taken into account; at each moment, the filter output is compared to a threshold described in the previous diagram.
As soon as the threshold is reached or exceeded by the filter outlet, the meter is in excess output which causes the switching device to open.
In the case of a three-phase meter, excess output is calculated independently on each of the phases. Exceedance is considered to have occurred as soon as the apparent power on one of the phases exceeds the excess output control threshold.

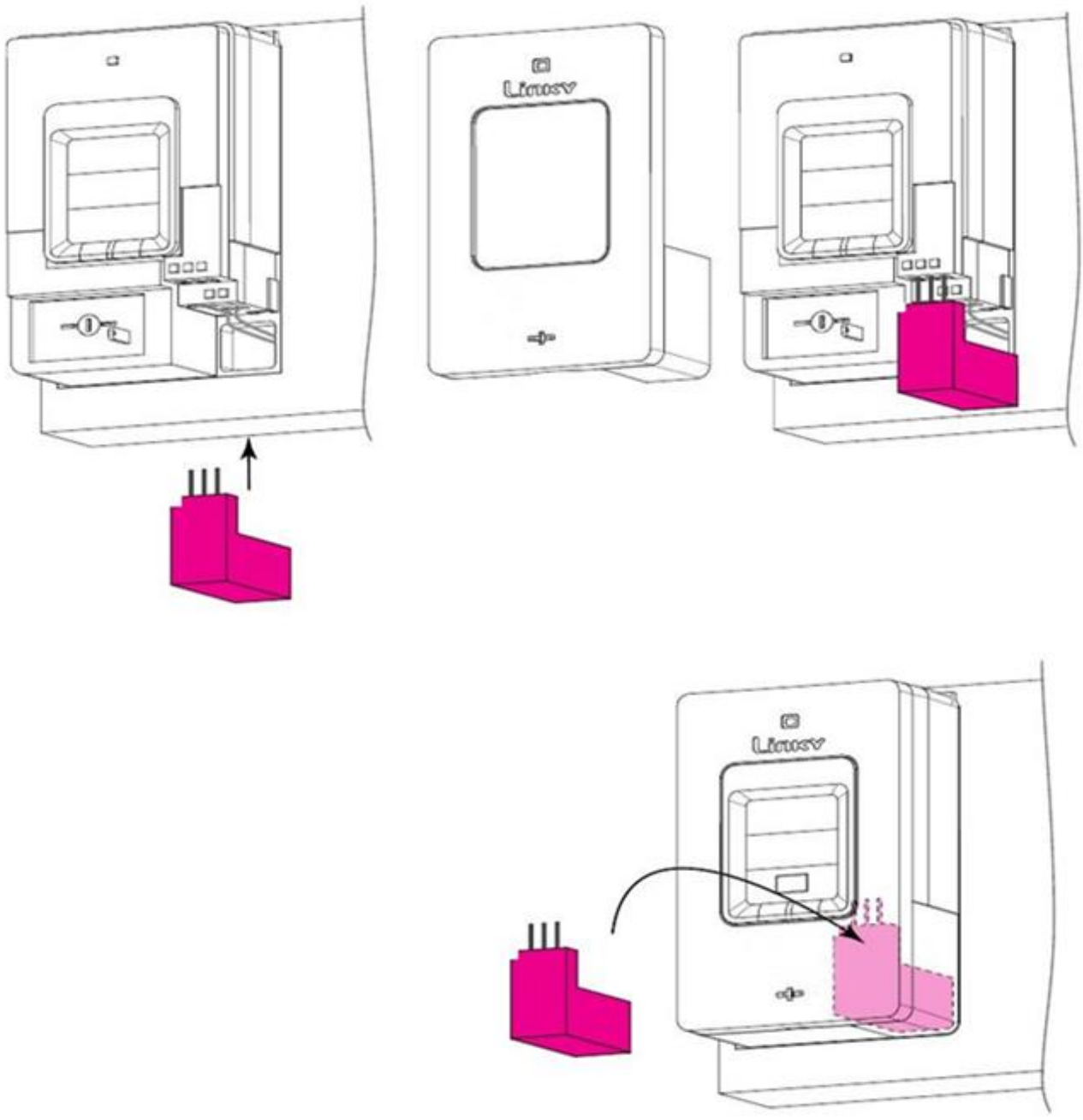
The parameters used in the Linky smart meter have been defined in accordance with the thermal protection curves of circuit breakers: at an equivalent power setting, the switching device must provide the customer with power that is at least equivalent to that authorised by an average circuit breaker in good working order.

With the parameters retained by the single-phase Linky meter, the tripping times of the switching device can be deduced from the graph above.
The following table provides a comparison of the tripping time of a circuit breaker and the Linky meter's switching device:

Tripping time			
Intensity applied (Ir = circuit breaker's setting intensity)	**1.1 Ir**	**1.4 Ir**	**2.5 Ir**
Standard NF C 62-411	∞	**2 to 900 s**	**0.5 to 40 s**
Connection circuit breaker	∞	**< 100 s**	**< 20 s**
Applied power	**1.1 P_{COUP}**	**1.4 P_{COUP}**	**2.5 P_{COUP}**
Digital filter chosen for Linky	∞	**250 s**	**40 s**

8. Volume of meter available under the customer terminal box cover

8.1. Principle of installing RT-type (Radio Transmitter) equipment under the customer terminal box cover



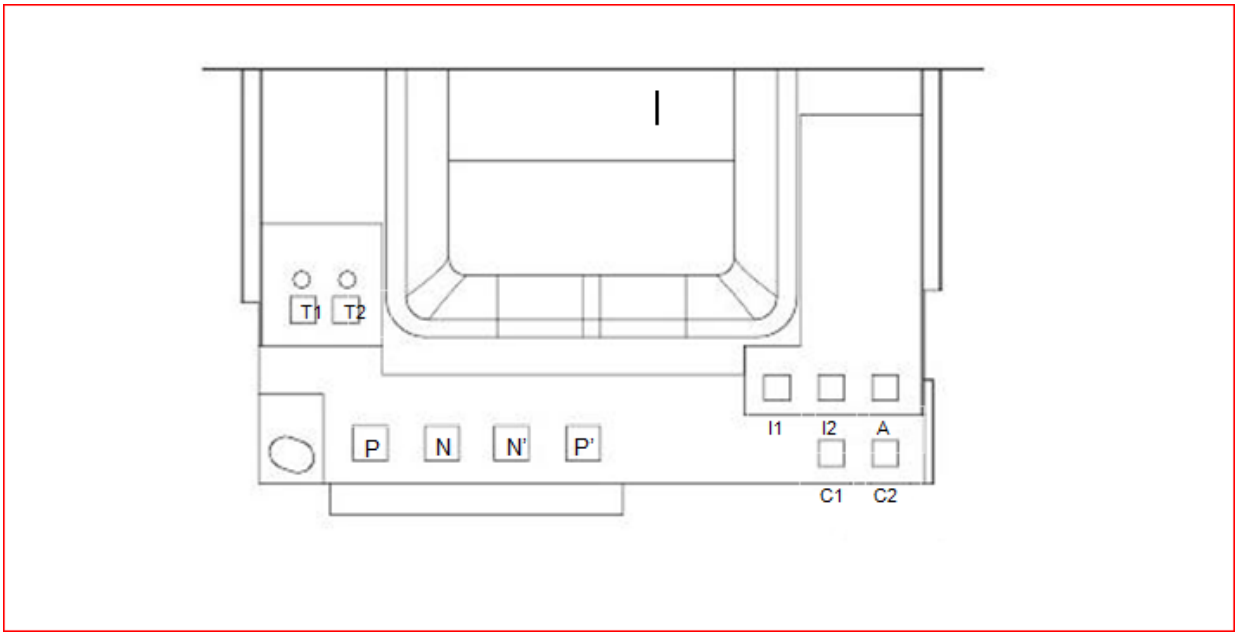
Note (three-phase meter):

The three-phase meter has a customer space in the top section. This meter is less constrained in terms of volume than the single-phase meter. However, the three-phase meter has to accommodate equipment adapted to the single-phase meter under its cover. The three-phase meter must comply with the following minimum conditions:

- the direction of the TIC terminals defined for the single-phase meter,
- an identical volume to that of the single-phase meter in front of the TIC terminal block.

8.2. Identifying a meter's terminals

Diagram of the single-phase meter's terminals:

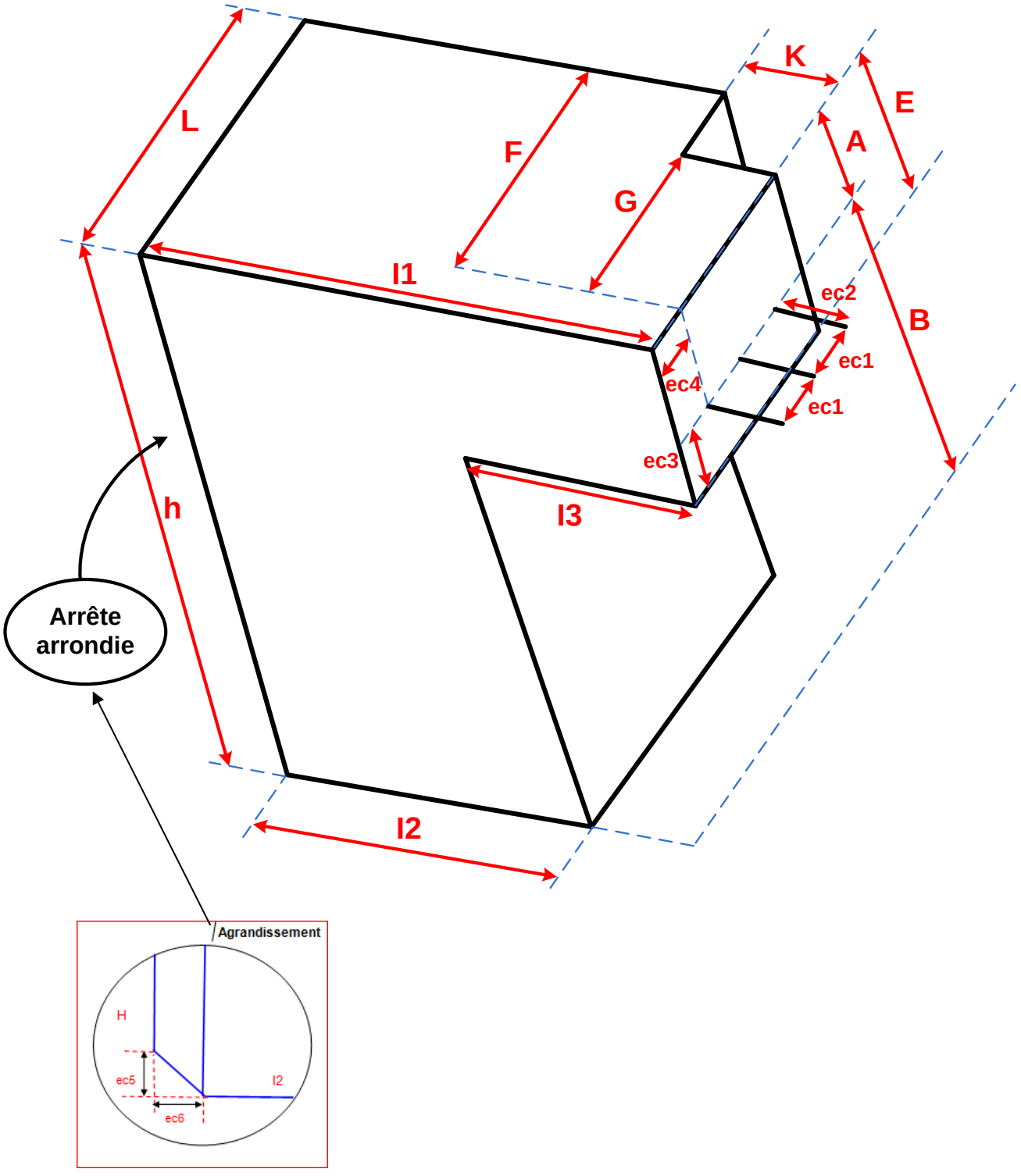


Identifying the terminals on the customer terminal block:

- TIC terminal:
  - power supply circuit ➔ terminals I1 and A,
  - power supply circuit ➔ terminals I1 and I2,
- dry contact terminal:
  - contact circuit ➔ terminals C1 and C2.

Terminal dimensions:
The (power supply and signal) terminals and the dry contact terminals of the TIC terminal block allow the connection of a conductor with a diameter between 0.4 and 1.4 mm.

8.3. 3D view of the customer's RT-type (Radio Transmitter) equipment



8.4. Maximum dimensions for the customer RT-type (Radio Transmitter) equipment

The dimensions of the space made available by the meter under the customer terminal box covers are as follows:

Dimensions in (mm)															
I1	I2	I3	A	B	h=B+A	F	L=F+ec4	G	K	ec1	ec2	ec3	ec4	E=A+ec3	ec5 and ec6
49.5	27	22.5	9.7	48.3	58	24.5	30	16.2	9	5.08 ±0.1	15 +1/-0	7	5.5	16.7	5

ec2 corresponds to the length of the pins ensuring that the terminals are held in place in the best possible way.
ec5 and ec6 are bevelled which ensures that the equipment fits beneath the rounded edge of the meter (the diagonal of this angle matches the maximum diameter of the curve).

9. Annex A – Marking remote customer information inputs - Principle, use and functional characteristics (regulatory)

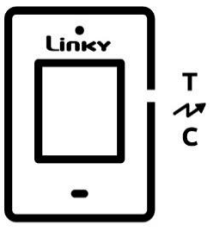
9.1. Marking remote customer information inputs

To facilitate the identification of the responsibilities of the different items of equipment in the event of a failure of the relationship between a metering device and a receiving device caused by the remote customer information link, Enedis has set up a "marking" process for remote customer information receiving devices. This process is similar to the marking of equipment which complies with the provisions described in this annex.
This marking process is intended to guarantee that a person using the receiving device, or their representative, can make sure, on site, that the device is correctly receiving the information transmitted by the Linky meter's remote customer information output, and that it is being correctly supplied with power, if the device is using the power supply provided by the remote customer information output.
Marking does not in any way influence the ability of the device in question to correctly use the information received, nor does it influence this marked device's overall quality or suitability for use, these concepts being the responsibility of the receiving device manufacturer.
The principle involves:

- separating the data reception functions and user functions (such as storage, display or energy management processes) in the devices;
- characterising, by means of an indicator light on the receiving device, the quality of reception by the device of the data frames transmitted by the meter and the quality of the power supply provided by the meter if it is used.

The operation of the indicator light is described in the following sections.
The "marking" is granted by Enedis to a device type after a recognised laboratory has verified its compliance with the specified characteristics in accordance with the verification method described in this section. This verification will be carried out on equipment that is representative of the equipment supplied by the manufacturer to the user (pre-series, series, etc.).

The figure below represents the "marking" logo chosen by Enedis:

Linky Ready ® marking	

High-definition file(s) of the logos will be supplied to the manufacturers following the marking of their equipment.

9.2. Devices in question (requirement applicable from 01/07/2018)

The process of "marking" the remote customer information inputs applies to all receiving devices using the remote customer information link of a Linky metering device. The main applications such as load-shedding devices, energy managers or displays can be cited as examples.
The characteristics of the remote customer information outputs of the various different metering devices concerned are described in the previous sections of this document.

9.3. Indicator light general operating principle (requirement applicable from 01/07/2018)

The indicator light must make it possible to ensure, on site, that the device is correctly receiving the information delivered by the Linky meter's remote customer information output, and to ensure the high quality of the power supply provided by the meter where this is used.
This indicator light is referred to as the "Meter Link Status" in the rest of the document.
The "Meter Link Status" indicator light must be visible on the front of the device. If other indicator lights are also present, it must be possible to clearly identify the "Meter Link Status" indicator light by means of a distinct position or colour. It has been requested that the indicator light be placed next to the "Remote customer information" marking logo.
Information about the operation of the indicator light and the instructions described in the section "9.4" "Using the indicator light" must be brought to the attention of the device user (in the device's operating instructions).
The indicator light indicates any anomalies detected by the device related to the reception of the remote information frames and to decoding them (compliance with the protocol) and to the power supply of the remote customer information where this is used.
The indicator light's general operating principle is as follows:

- slow flashing if the information frames received are correct;
- fast flashing if any faulty signals or incorrect information frames are received or if no information signal is received by the device;
- switches off if the device is out of order or not powered up.

9.4. Using the indicator light

If a malfunction is suspected in the installation operating the remote customer information signals transmitted by the meter, device users must refer to the information provided by the "Meter Link Status" indicator light to **determine whether they need to call upon the services of Enedis or their installer in order to resolve the problem**.
The procedure is as follows:

- if the indicator light is flashing slowly, device users should contact their installer (as the remote customer information signals are being correctly received and decoded by the device, and the power supply is not faulty, metering and connection of the receiver to the device are not affected);
- if the indicator light is flashing quickly, device users can call upon the services of Enedis, the staff of which will use the tools at their disposal to determine whether the meter is faulty or whether there is a problem with the cable connection to the meter. They will also check whether the device is suitable for metering and for its configuration;
- If the indicator light has switched off:
    - if it is only the information circuit of the Linky meter's TIC output that is being used by the remote information receiver, device users must call their installer (device out of order or not powered up);
- if the information circuit and the power supply circuit of the Linky meter's TIC output are being used and are connected to the remote information receiver, there may either be a fault in the power supply to the meter's TIC output or a malfunction in the device: device users may call upon the services of Enedis, the staff of which will determine, using the tools at their disposal, whether it is the metering function that is at fault or whether there is a problem related to the cable connection to the meter. They will also check whether the device is suitable for metering and for its configuration.

9.4.1. Operation of the indicator light

This section specifies the expected behaviour of the "Meter Link Status" indicator light in all operating situations.
The indicator light can be in three different states: off, fast flashing, slow flashing.
The requested flashing frequency for the indicator light's **slow** flashing state must be 1/3 Hz, the indicator light lights up for 0.1 s (-0 s/+0.1 s) and switches off for 2.9 s (±0.1s).
The requested flashing frequency for the indicator light's **fast** flashing state must be 1 Hz, the indicator light lights up for 0.1 s (-0 s/+0.1 s) and switches off for 0.9 s (±0.1s).

The decision of the receiving device as to the state of the indicator light must be effective at the end of reception of the relevant frame. The device then sets the indicator light's state to slow flashing or fast flashing.

This state must remain unchanged until the next decision.
Consequently, when the indicator light is in the fast flashing state, this state should be maintained until the next complete reception of a correct frame. Similarly, when the indicator light is in the slow flashing state, this state should be maintained until the next complete reception of an incorrect frame.

Clarifications about the operation of the receiving device during its start-up phase and in the absence of signals.
When the unit is switched on (or when the voltage returns after a prolonged absence) and throughout the duration of the device's start-up phase, the “Meter Link Status” indicator light can be set to different states (off, slow flashing or fast flashing). We recommend using the fast flashing state to indicate that the device is being powered correctly by the Linky smart meter.
At the end of the start-up period and while waiting to fully receive the first frame, the device should set the indicator light to the fast flashing state.

If a frame is received, the device sets the indicator light according to the state of the received frame. If a correct frame is not received (faulty connection or break in the connection, or transmitter fault) for a limited period of time equal to 10 seconds (plus or minus one second), the device should set the indicator light to the fast flashing state. After a frame has been received and while waiting for a new frame to be received (within the 10-second time limit), the device should keep the indicator light in the same state that it was in at the end of the last reception.

Information about the approximate duration of the start-up phase and the state of the indicator light during this start-up phase must be communicated to the device user (in the device’s user manual).

9.4.2. Malfunction modes of the receiving device

The technology used and the principle chosen to produce the “Meter Link Status” indicator light must ensure that the receiving device complies with the following malfunction modes:

- if one or more of the components used for the indicator light are malfunctioning: the indicator light is switched off;
- if the device is not supplied with power, or if the internal power supply is malfunctioning: the indicator light is switched off.