EU-type examination certificate

Number **T12924** revision 2
Project number 4088689

Issued by

NMi Certin B.V.,
designated and notified by the Netherlands to perform tasks with respect to conformity asssessment procedures mentioned in article 17 of Directive 2014/32/EU, after having established that the measuring instrument meets the applicable requirements of Directive 2014/32/EU, to:

Manufacturer

Lovato Electric S.P.A
Via Don E. Mazza, 12
24020 GORLE (Bergamo),
Italy

Measuring instrument

A static **Active Electrical Energy Meter integrated in an EV Charging System**

Type	:	DMED4
Manufacturer's mark or name	:	Lovato Electric S.P.A.
Reference voltage	:	120 … 1500 V DC
Reference current	:	30 A (DMED40xxx150) 80 A (DMED40xxx400) 120 A (DMED40xxx600)
Destined for the measurement of	:	DC active energy in a - single-phase two-wire network
Accuracy class	:	B or A
Environment classes	:	M1 / E2
Temperature range	:	-40 °C / +70 °C

Further properties are described in the annexes:
– Description T12924 revision 2;
– Documentation folder T12924-3.

Valid until

5 December 2034

Initially issued

5 December 2024

Remark

This revision replaces the earlier versions, including its documentation folder.

Issuing Authority

NMi Certin B.V., Notified Body number 0122
1 May 2026

Certification Board

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Description

1 General information about the instrument

All properties of the static active electrical energy meter, whether mentioned or not, shall not be in conflict with the legislation.

1.1 Essential parts

Description	Document	Remarks
measuring sensor - Shunt 100 µOHM - Shunt 50 µOHM - Shunt 25 µOHM	 12924/0-07 12924/0-08 12924/0-09	
printed circuit board - Power board ○ DMED403 ○ DMED404 - Measure board - Display board - Remote display ○ DMED4DC1 ○ DMED4DC2	 12924/0-11, 12924/0-16, 12924/1-02 12924/0-12, 12924/0-17, 12924/1-03 12924/0-13, 12924/0-18, 12924/1-04 12924/0-14, 12924/0-19 12924/0-15, 12924/0-20 12924/0-15, 12924/1-05	All parts of the printed circuit boards are essential, except the components which are related to parts as described in paragraph 1.4 or 1.6.

1.2 Essential characteristics

1.2.1 See EU-type examination certificate T12924 revision 2 and the characteristics mentioned below.

1.2.2 Approved meter types : DMED4
An explanation of all type designations is presented in document no. 12924/0-02 and 12924/1-01.

1.2.3 Meter constant : 1000 or 500 or 300 imp./kWh

1.2.4 Number of registers : 1.8.0 (Active Import Energy); 2.8.0 (Active Export Energy); 62.8.0 (Last Charge Cycle Energy; 62.8.0.1 (Last Charge Exported Energy)

1.2.5 Error messages : An overview of all error messages is provided in document 12924/0-10.

1.2.6 Export energy : the meter is capable of measuring energy in 2 directions.

1.2.7 Software specification (refer to WELMEC 7.2):

- Software type P;
- Risk Class C;
- Extensions L and T apply to all variants, while extension D applies only to DMED404. Extensions O and S are not applicable.

Software version	Identification number (checksum)	Remarks
00 01	2CDA0729 D97F47B3	Measure Board
00 01	83FDFB7E 3A3B0CCA	Power Board (DMED404 type only)
00 02	311A4F7B AC750275	Remote Display Unit – DMED4DC1
01	3C99A696	Remote Display Unit – DMED4DC2

The software version is displayed at start-up and in the display sequence.

1.2.8 Data communication

The following communication port is used for legally relevant data.

- RS485
- Ethernet

Transmission of measurement data is according to Welmec 7.2 extension T.

The measurement dataset comprises at least the following information:

- Active import (1.8.0) and Active Export (2.8.0) with unit
- Cable loss parameter
- Tariff
- Meter serial number
- Meter type
- Signature

The public key is visible as a QR code on the front of the meter on the nameplate. Additionally, it can also be read through the MODBUS protocol.

1.2.9 Cable loss compensation

The meter is provided with cable loss compensation. The parameters for cable loss compensation can only be set during commissioning of the meter for an EVCS application only. This parameter has a range of 0 – 50 mΩ. The default setting of the parameter is 0.
Any change to the cable loss parameter creates an event in the event logger. the event records the old value along with the new set value.

The following formula is used for the compensation due to cable loss:

$$P_{MEAS} = I_{MEAS} \times (V_{MEAS} - I_{MEAS} \times R_P)$$

with:

P_{MEAS}	Compensated power
I_{MEAS}	Measured current
V_{MEAS}	Measured voltage
R_P	cable resistance

1.2.10 Logbook:
The DMED4 records all events that affect the metrological chain, such as, but not limited to, the modification of the compensation value of the charging cable and the fatal errors. Each event is recorded together with the date and time it occurs. The maximum number of recordable events is 40000. See documentation no: 12924/2-02.

1.3 Essential shapes

1.3.1 The nameplate bears at least, good legible, the information as mentioned in the regulations on energy meters. An example of the markings is shown in document no. 12924/0-03.

1.3.2 Sealing: see chapter 2.

1.3.3 The registration observation is executed by means of a LED.

1.4 Conditional parts

1.4.1 Terminal block
The connection for the current terminals is with lug or busbar. The connections to the terminal block with 1 nut (M10). can be made through different combinations. The recommended busbar dimensions are 1x40x10mm, 1x40x5mm, or 2x40x5mm based on the type of connection used. See document no. 12924/0-07.

1.4.2 Housing
The meter has got a dustproof housing, which has sufficient tensile strength. The cover is made of synthetic material. An example of housing is presented in document no. 12924/0-01. The meter must be installed inside an enclosure IP51 (indoor) or IP54 (outdoor).

1.4.3 Terminal cover
The terminal cover of the meter and the remote display is made of synthetic material that can be sealed independently. An example of the terminal covers, and their sealing locations is presented in document no. 12924/0-01, and 12924/0-07.

1.4.4 Register
The quantity of measured energy is presented by means of a display with a resolution of at least 0,01 kWh with at least 9 elements. The way of presentation is described in document no. 12924/0-08.

1.4.5 Remote display (Optional)
The meter can be equipped with a remote display. The display is equipped with a maximum of 4 connection ports that can support up to 4 devices at once. The connections can be made through RS485 serial port or ethernet port. A permanent pairing procedure establishes a unique link between the legally relevant remote display and the energy meter connected via serial communication or Ethernet. This pairing functions as a digital seal, preventing the connection from being altered or reassigned, similar to a physical seal on connection cables.

This procedure can only be performed once; after that, it will no longer be possible to connect energy meters other than those used during the procedure. An example of the remote display and procedure is presented in document no. 12924/0-01 and 12924/2-01.

1.4.6 RS485 communication interface
The meter and the remote display is equipped with RS485 serial port. This serial port is used for communication of legally relevant information with other parts of an EV charging system.

1.4.7 Ethernet communication interface (Optional)
The meter (DMED404 variant) and the remote display can be equipped with ethernet port. The ethernet port can be used for communication of legally relevant information with other parts of an EV charging system.

1.4.8 Clock and time
To start a new charge session, the internal clock of the meter must be synchronized by writing an UTC timestamp value on Modbus register 4080h. The synchronization stays valid for 24 hours after which a new synchronization is required. The status of the clock and time can be checked at Modbus register 4201h.

1.5 Conditional characteristics

1.5.1 Maximum current:

DMED40xxx600	smaller than or equal to 600 A, and at least 5 times higher than the reference current.
DMED40xxx400	smaller than or equal to 400 A, and at least 5 times higher than the reference current.
DMED40xxx150	smaller than or equal to 150 A, and at least 5 times higher than the reference current.

1.5.2 Minimum current:

DMED40xxx600	6 A
DMED40xxx400	4 A
DMED40xxx150	1,5 A

1.6 Non-essential parts

1.6.1 Pulse output

2 Seals

There are two metrological seals present on the side of the meter. There are also 2 installation seals on the terminal block. The meter cannot be opened without breaking these seals.
The remote display also has one metrological seal on the side of the display. The remote display unit cannot be opened without breaking this seal.

An example of the sealing is presented in document no. 12924/0-09.

3 Conditions for conformity assessment according to module D or F

The influence factors for temperature, frequency and voltage, which are necessary to perform the conformity assessment according to module D or F, are presented in Annex 1, belonging to this EU-type examination certificate.
Based on the WELMEC 11.1, section 2.4.6, the sum of the square values is presented

Annex 1

Influence factors for temperature, frequency and voltage

During the type approval examination the influence factors for temperature, frequency and voltage are determined per load point. The values depicted in the table below present the root sum square values per load point, determined via the following formula:

$$\delta e(T,U,f) = \sqrt{\delta e^2(T,I,\cos\phi) + \delta e^2(U,I,\cos\phi)}$$

with:

- $\delta e(T, I, \cos\varphi)$ = the additional percentage error due to the variation of the temperature at a certain load;
- $\delta e(U, I, \cos\varphi)$ = the additional percentage error due to the variation of the voltage at the same load;

Uref: 1500 V DC, 600 A

Current	Power factor	Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	NA	0,4	0,4	0,4	0,3	0,0	0,3	0,4	0,5
Itr	NA	0,1	0,3	0,2	0,1	0,1	0,3	0,6	0,6
10 Itr	NA	0,2	0,1	0,2	0,1	0,0	0,0	0,1	0,2
Imax	NA	0,2	0,2	0,1	0,1	0,0	0,0	0,1	0,2

Uref: 120 VDC, 600 A

Current	Power factor	Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	NA	0,2	0,2	0,2	0,1	0,0	0,2	0,3	0,7
Itr	NA	0,6	0,2	0,2	0,1	0,0	0,1	0,1	0,6
10 Itr	NA	0,1	0,1	0,1	0,0	0,0	0,1	0,1	0,3
Imax	NA	0,1	0,1	0,1	0,0	0,0	0,0	0,2	0,3

Annex 1

Uref: 1500 V DC, 400 A

Current	Power factor	Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	NA	0,4	0,3	0,1	0,1	0,0	0,2	0,3	0,5
Itr	NA	0,3	0,3	0,2	0,1	0,0	0,1	0,2	0,3
10 Itr	NA	0,2	0,1	0,1	0,1	0,0	0,1	0,1	0,2
Imax	NA	0,3	0,2	0,2	0,1	0,1	0,1	0,1	0,2

Uref: 120 V DC, 400 A

Current	Power factor	Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	NA	0,4	0,3	0,3	0,1	0,1	0,1	0,3	0,5
Itr	NA	0,3	0,3	0,1	0,1	0,0	0,1	0,2	0,4
10 Itr	NA	0,1	0,1	0,1	0,1	0,0	0,1	0,1	0,3
Imax	NA	0,2	0,2	0,1	0,1	0,0	0,1	0,1	0,3

Annex 1

Uref: 1500 V DC, 150 A

Current	Power factor	Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	NA	0,2	0,3	0,2	0,2	0,0	0,3	0,2	0,2
Itr	NA	0,2	0,2	0,1	0,2	0,0	0,2	0,1	0,3
10 Itr	NA	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,4
Imax	NA	0,1	0,1	0,1	0,1	0,0	0,0	0,1	0,5

Uref: 120 V DC, 150 A

Current	Power factor	Error -40°C [%]	Error -25°C [%]	Error -10°C [%]	Error +5°C [%]	Error +23°C [%]	Error +40°C [%]	Error +55°C [%]	Error +70°C [%]
Imin	NA	0,2	0,2	0,1	0,1	0,1	0,1	0,2	0,4
Itr	NA	0,2	0,2	0,2	0,1	0,0	0,1	0,1	0,4
10 Itr	NA	0,1	0,1	0,1	0,1	0,0	0,0	0,0	0,5
Imax	NA	0,1	0,1	0,1	0,1	0,0	0,0	0,1	0,5