LEROY SOMER

3872 en - 09.2006 / a


# UNIDRIVE SP

## Winding-unwinding solution with cell

### Quick start commissioning guide

# UNIDRIVE SP

## Cell winding-unwinding solution

**•Incorrect operational procedures may cause serious body injuries or material damages. This guide may be used only by qualified personnel able to comply with the safety precautions related to electronic drives. See the installation and the commissioning manual that may be found on the CD ROM supplied together with the variable speed drive.**

# UNIDRIVE SP

## Contents

# UNIDRIVE SP

## Cell winding-unwinding solution

## 1 - GENERAL INFORMATION

The SP EDL CEL option module is pre-programmed with winding/unwinding function controlled by linear speed.
It comprises :
- a UNIDRIVE SP variable speed drive,
- a SM-EDL CEL module.

**Note :** If the Winding-unwinding solution is managed by a field bus, see the entire manual that may be found on the CD Rom supplied together with the drive.

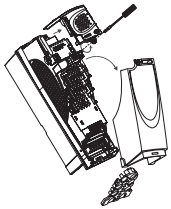
**Operating principle :**
The principle consists in managing or in receiving a line speed reference and in measuring the coil radius by means of an external cell. This allows the drawing up of a speed reference for the motor, taking into account the ratio of the mahine drive.
The system operates in open loop ( ) and in closed loop ( or ), for synchronous or asynchronous motorisations with all types of encoders.
The coil driving may be axial or tangential. For tangential driving, the motorisation will be located on the coil blank or on the bench grinder blank.

## 2 - SM MODULE INSTALLATION

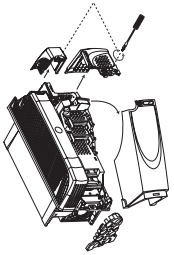
**• The drive must be powered down.**

### 2.1 - Access to terminal blocks

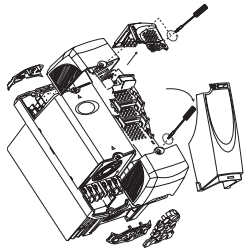
• Size 1



•Size 2

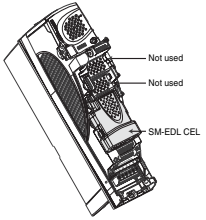


•Size 3 or 4



**CAUTION :**
**Dismantle the internal RFI filter on a drive of size 3 or 4, fed with power by a mains supply without earthing (IT conditions). If an external RFI filter is used or an additional motor earth protection is used, it is not necessary to remove the internal filter.**

### 2.2 - Module installation




- Install the SM-EDL CEL module in the lowest possible location and press gently on the module until hearing a click.
- If necessary, to dismantle a module, press at the same time on both sides of the module and remove it.

# UNIDRIVE SP

## Cell winding-unwinding solution

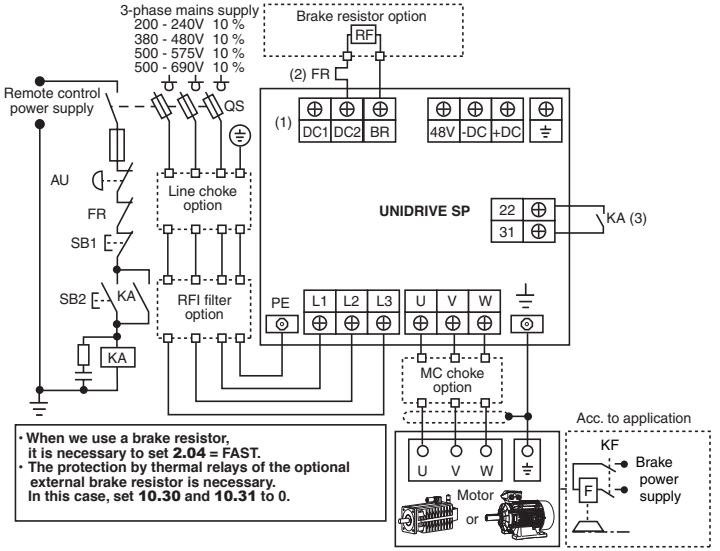
## 3 - CONNECTIONS

### 3.1 - Power connection

Power supply for an AC 3-phase mains supply, applicable to the safety standard EN 954-1 Categ. B or 1.

**CAUTION :**

**Before making the power connection, be aware of the location of the drive terminal blocks (different depending on their size). If necessary, see section D of the manual supplied together with the drive.**




(1) For size 1, a single terminal block (48V, -DC, +DC, BR). Connect the resistor between +DC and BR.
(2) The thermal relay is not necessary for the resistors that may be integrated into the heater.
(3) Terminal 31 : safety input/disabling.
When this input is open, it disables the drive. Its conception is so that even in case of failure of one or many components, the absence of the torque on the motor shaft should be guaranteed with a very high level of integrity.

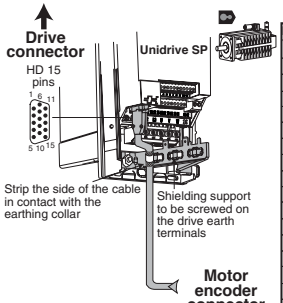
**⚠ • For detailed instructions or for schemas according to the safety standard EN 954-1 category 2 or 3, see section D of the installation and commissioning manual that may be found on the CD ROM.**

# UNIDRIVE SP

## Cell winding-unwinding solution

## 3.2 - Encoder connection

| Drive HD 15 | ▣ and ▣ modes | | | | |
|---|---|---|---|---|---|
| | Incremental | Sincos | Sincos - hiperface link | Sincos - EndAt or SSI link | EndAt or SSI |
| 1 | ▣ : B or F<br>▣ : A or F | Cos | Cos | Cos | - |
| 2 | ▣ : B\ or F\<br>▣ : A\ or F\ | CosRef | CosRef | CosRef | - |
| 3 | ▣ : A or D or R<br>▣ : B or D or R | Sin | Sin | Sin | - |
| 4 | ▣ : A\ or D\ or R\<br>▣ : B\ or D\ or R\ | SinRef | SinRef | SinRef | - |
| 5 | C or O or Z | - | Data | Data | Data |
| 6 | C\ or O\ or Z\ | - | Data\ | Data\ | Data\ |
| 7 | ▣ : U | - | - | - | - |
| 8 | ▣ : U\ | - | - | - | - |
| 9 | ▣ : V | - | - | - | - |
| 10 | ▣ : V\ | - | - | - | - |
| 11 | ▣ : W | - | - | Clock | Clock |
| 12 | ▣ : W\ | - | - | Clock\ | Clock\ |
| 13 | +5V or +8V or +15V | | | | |
| 14 | 0V | | | | |
| 15 | Motor thermal probe<br>**CAUTION :**<br>**Internal link pin 15 and terminal 8 of the drive. Connect one or another.** | | | | |




**Example : encoder in quadrature**

| Ref.pct. | Designation |
|---|---|
| 1 | Motor thermal probe |
| 2 | |
| 3 | - |
| 4 | U |
| 5 | U\ |
| 6 | V |
| 7 | V\ |
| 8 | W |
| 9 | W\ |
| 10 | A |
| 11 | C or O or Z |
| 12 | C\ or O\ or Z\ |
| 13 | A\ |
| 14 | B |
| 15 | B\ |
| 16 | +5V or +8V or +15V |
| 17 | 0V |
| Shielding (*) | |

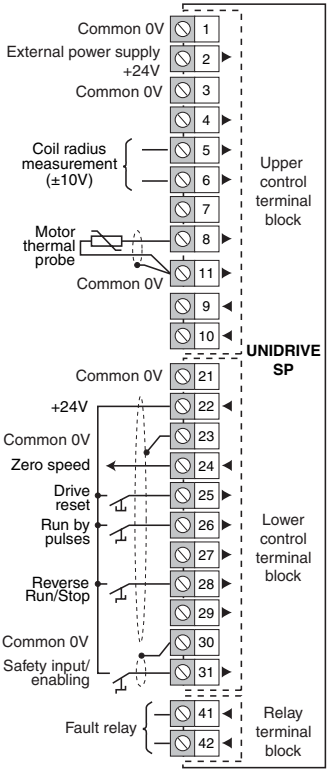
| Ref.pct. | Designation |
|---|---|
| 1 | 0V |
| 2 | +5V or +8V or +12V |
| 3 | A |
| 4 | B |
| 5 | C or O or Z |
| 6 | A\ |
| 7 | B\ |
| 8 | C\ or O\ or Z\ |
| 9 | - |
| 10 | - |
| 11 | Shielding (*) |
| 12 | - |

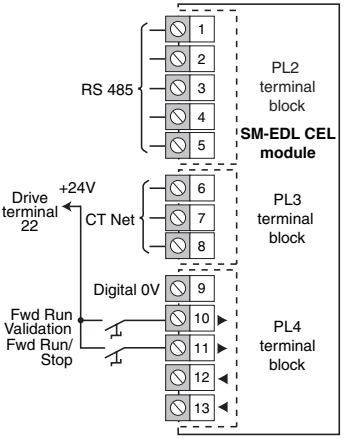
(*) Depending on the encoder supplier, the shielding may be different from that indicated in the table.
If there is no shielding terminal available, connect the shielding to 360 at the connector level.

# UNIDRIVE SP

## Cell winding-unwinding solution

### 3.3 - Control connection




**CAUTION:**
**If the motor probe is connected to pin 15 of the HD-15 connector (see encoder connection), terminal 8 of the drive is no longer available.**

**• In factory settings, UNIDRIVE SP is set in positive logic.**
**The association of a drive with a different command logic may cause the sudden start of the motor.**

Legend:
x ▶ : input
x ◀ : output

# UNIDRIVE SP

## Cell winding-unwinding solution

| 5<br>6 | Coil radius measurement (± 10V analogue) |
|---|---|
| It is used to measure the radius of a coil by means of a cell | |

| 10 | Forward run validation input (SM-EDL CEL) |
|---|---|
| It is used to validate the forward run line speed reference | |

| 11 | Forward Run/Stop input (SM-EDL CEL) |
|---|---|
| It gives the forward run or stop command | |

| 24 | Zero speed output |
|---|---|
| It informs that the motor is at zero speed | |

| 25 | Drive reset input |
|---|---|
| It resets the drive faults | |

| 26 | Run by pulse input |
|---|---|
| It selects the run by pulses | |

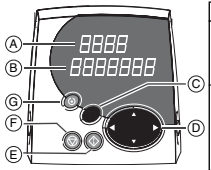
| 28 | Reverse Run/Stop input |
|---|---|
| It gives the reverse run or stop command | |

| 41<br>42 | Relay output |
|---|---|
| When the contact is open, the drive is powered down or stopped | |

# 4 - PARAMETER-SETTING

## 4.1 - Display and keypad

**•LED display**

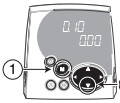
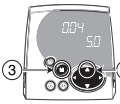
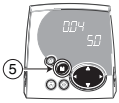
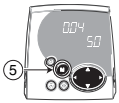



| Ref. | Function |
|---|---|
| Ⓐ | It is used to display :<br>- the drive operating status,<br>- the adjustment parameters, from the parameter menu. |
| Ⓑ | It is used to display:<br>- the operating mode,<br>- the parameter content,<br>- the trip state code. |
| Ⓒ | Touche Mode is used to pass from the normal mode to the parameter-setting mode. |
| Ⓓ | The 2 arrows are used to move under the lower display in order to modify its value or to move from one menu to another.<br>The 2 arrows are used to display in an increasing or decreasing order the parmeters or their values. |
| Ⓔ<br>Ⓕ<br>Ⓖ | In keypad mode, these keys are used for the commands :<br>- Run,<br>- Stop, drive reset,<br>- Inversion of the direction of rotation. |

**•Indications on the operation**

|  | Comment |
|---|---|
| **Auto/tunE** | Ongoing auto-tuning phase |
| **dEC** | Deceleration after a stop command |
| **inh** | - The drive is disabled, it may not start the motor<br>- Free wheel stop |
| **rdY** | - The drive is enabled, it is wating for a command<br>- The motor is ready to turn |
| **run** | The motor is controlled by the drive |
| **StoP** | The drive maintains the motor torque at zero speed |
| **triP** | The drive is stopped, it does not control any longer the motor. The trip state code is displayed on the lower display |

## 4.2 - Selection and modification of a parameter

| Action | Comment |
|---|---|
|  | Power-up<br>Disabled drive (terminal 31 opened)<br>(initial status) |
|  | ① : Access to parameter-setting mode. The parameter **0.10** flashes.<br>② : The keys ▲ and ▼ are used to access the parameter to be modified.<br>For instance, select parameter **0.04**. |
|  | ③ : Access to the parameter modification. The parameter number does not flash any longer.<br>Its value is indicated on the the lower display (the lowest value digit flashes).<br>④ : Maintain the key pressed in order to display quickly the parameter value.<br>The final adjustment is made by quick presses on the same key.<br>For more quickness, we may move to modify the other digits<br>by ▲ or ▼. |
|  | ⑤ : The new value of **0.04** is stored<br>Press ▲ or ▼ in order to select a new parameter<br>to be modified. |
|  | ⑥ : Return to the initial status of the drive. |

**Note :** In parameter-setting mode, if the user stops inputs for 4 minutes, the display stops flashing and returns automatically to the initial status of the drive.

## 4.3 - Access level

In factory settings, only menu 0 is accessible by the user (parameters **0.00** to **0.50**).
To access other menus :
- select the parameter **0.49** : its value is L1,
- modify its value of **0.49** to " L2 ". The left and right arrows of the keyboard are active at present, and the menus 1 to 22 are accessible (parameters **1.01** to **22.29**).

## 4.4 - Modification of the operating mode

| Parameter | Settings | Description | Validation |
|---|---|---|---|
| **0.00** | **1253** | European configuration, mains supply of 50 Hz | Press the Reset key |
| | **or** | or | |
| | **1254** | USA configuration, mains supply of 60 Hz | |
| **0.48** | **OPEn LP (1)** | **Open loop** | |
| | **or** | or | |
| | **CL VECt (2)** | Vector control in closed loop with asynchronous motor | |
| | **or** | or | |
| | **SErVO (3)** | Servo mode with Brushless motor | |
| | **or** | or | |
| | **rEgEn (4)** | Regenerative mode (not used) | |

**• This procedure of modification of the operating mode causes the return to factory settings of the parameters corresponding to the new mode, including the motor parameters (it is necessary to set the motor parameters before starting). The modification of the operating mode must be made with the variable speed drive stopped or disabled.**

**• Before following this procedure, check that the system safety is adequate.**

## 4.5 - Return to winding/unwinding factory settings

| Parameter | Settings | Description | Validation |
|---|---|---|---|
| **0.00** | **1233** | European factory setting configuration (50 Hz) | Press the Reset key |
| | **or** | or | |
| | **1244** | USA factory setting configuration (60 Hz) | |
| **0.29** | **2047** | **EDL CEL program initialisation.**<br>**The value 2047 is not visible on the display that passes from 2047 to 0.**<br>**The return of 0.29 to 0 indicates the fact that the program initialisation is performed.** | **-** |

**• Check that the motor is stopped and that the system safety is adequate.**

# UNIDRIVE SP

## Cell winding-unwinding solution

## 5 - COMMISSIONING

**Powered down drive, check that...**

- The drive is disabled
- The run command is not validated
- The motor and the encoder are connected

↓

**Drive power-up**

- The drive displays " inh "
- If the drive stops "trip", see art. 7 " diagnostics "

↓

**Operating mode selection**

- **0.00** : enter the value 1253 for an European configuration (mains supply 50 Hz) or enter the value1254 for an USA configuration (mains supply 60 Hz)
  **0.48** : enter the mode OPEn.LP (1) or CL.VECt (2) for the asynchronous motor or SerVO (3) for the servo motor
- Press the Reset key

↓

**SM-EDL CEL program initialisation**

- **0.29** : enter the value 2047

After initialisation, **0.29** returns to 0

↓

**Enter the motor parameters indicated on the nameplate**

- **0.42** : Poles [Auto (0), 2POLE (1), 4POLE (2), 6POLE (3) etc…]
- **0.43** : Power factor (cos φ) +
- **0.44** : Motor rated voltage (V) +
- **0.45** : Rated speed with load ($min^{-1}$) + or motor thermal time constant (see the motor catalogue)
- **0.46** : Motor rated current (A) + / Stall current (A)
- **0.47** : Motor rated frequency (Hz) +

**Pay attention to the motor connection (star or delta)**

↓

• Incremental encoder in quadrature, 5V 1024 pts/turn or 4096 points/turn ?
or • Operation in open loop ?

NO → B

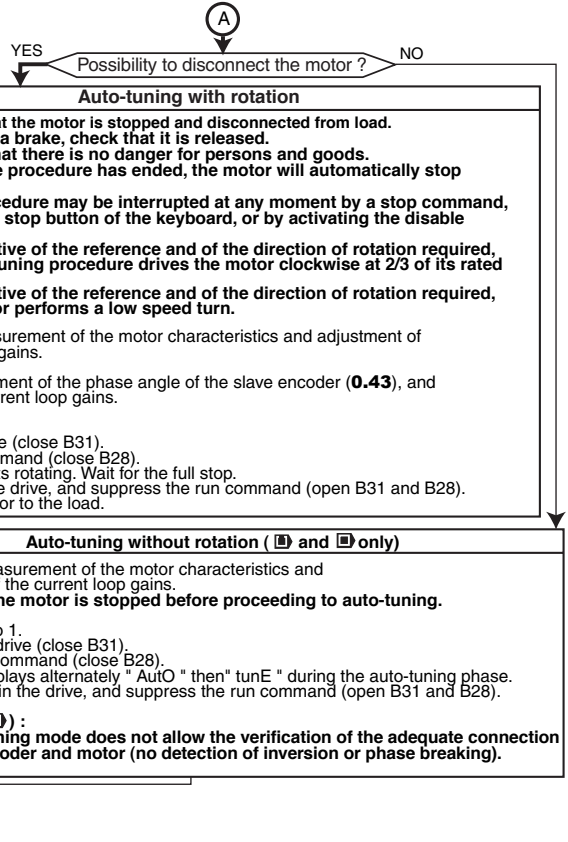
To enter the encoder characteristics, see page 16

YES ↓

A

# UNIDRIVE SP

## Cell winding-unwinding solution



# UNIDRIVE SP

## Cell winding-unwinding solution

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### Cell scaling

To adapt the external radius measurement to the application, it is necessary to proceed to scaling by the following procedure :
- Implement or simulate a coil without load (min radius), read and note the value of parameter **0.15**.
- Set **0.21** to this value, then set the min radius **0.16** in mm.
- Implement or simulate a coil with load (max radius), read and note the value of parameter **0.15**.
- Set **0.22** to this value, then set the max radius **0.17** in mm.

The radius visualisation in mm is possible with **0.11**.

### Enter the values of the parameters essential for the application

- **0.18**: Set the reverse maximum speed in $m.min^{-1}$ x 10.
- **0.19**: Set the line speed by pulses in $m.min^{-1}$ x 10.
- **0.20**: Set the forward maximum line speed in $m.min^{-1}$ x 10.
- **0.24**: Set the acceleration ramp of the line speed in seconds for 1000 $min^{-1}$.
- **0.25**: Set the deceleration ramp of the line speed in seconds for 1000 $min^{-1}$.
- **0.27**: Set the value 0, if the product comes over the coil, and the value 1, if the product comes under the coil.
- **0.28**: Set the coil reduction (between the motor and the chuck driving axle) x 100.

### Storing

- **0.00**: Enter the value 1000
- Press the Reset key

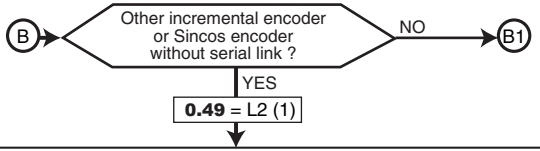
### Commissioning

- Enable the drive (close B31).
- For a forward run command by pulses, close terminal 26 of the drive and terminal 11 of SM-EDL CEL.
- For a reverse run command by pulses, close terminals 26 and 28 of the drive.
- For a forward run command, close terminals 10 and 11 of SM-EDL CEL.
- For a reverse run command, close terminal 28 of the drive.
- To stop the motor, suppress the run command, then disable the drive.

# UNIDRIVE SP

## Cell winding-unwinding solution

If the encoder is not a standard LEROY-SOMER incremental encoder, follow the indications below:




**Enter the encoder characteristics**

- **3.34** : **ELPR (0 to 50000)**
  Quadrature : enter the number of points by turn
  Frequency/direction or forward/reverse : enter the number of points by turn divided by 2.
  Sincos : enter the number of sinusoids by turn.
- **3.36** : **Voltage**
  Enter the encoder power supply voltage : 5V (0) or 8V (1) or 15V (2)
  **CAUTION:**
  **Feeding an encoder with an excessive voltage can damage it.**
- **3.38** : **Type**
  Enter the type of encoder used : Ab (0) : quadrature encoder
  Fd (1) : frequency-direction
  Fr (2) : fwd-reverse
  Ab.SErvo (3) : quadrature encoder + switching paths
  Fd.SErvo (4) : frequency-direction + switching paths
  Fr.SErvo (5) : fwd-reverse + switching paths
  SC (6) : SinCos encoder without serial link


In order to proceed to commissioning, resume page 14

# UNIDRIVE SP

## Cell winding-unwinding solution

B1

**0.49** = L2 (1)

**Enter the encoder characteristics**

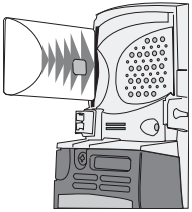
| SinCos encoder with Hiperface or EndAt serial link or EnDat encoder | Sincos encoder with SSI link or SSI encoder |
|---|---|
| • **3.41** : **Auto-configuration**<br>Enter the On (1) value for an auto-configuration of the encoder parameters when powering up (**3.33**, **3.34** and **3.35**).<br>• **3.36**: **Voltage**<br>Enter the encoder power supply voltage: 5V (0) or 8V (1) or 15V (2).<br>**CAUTION:**<br>**Feeding an encoder with an excessive voltage can damage it.**<br>• **3.37** : **Transmission speed**<br>Enter the serial link speed (save for SinCos encoder with Hiperface link) :<br>100 kbauds (0), 200 kbauds (1), 300 kbauds (2), 400 kbauds (3), 500 kbauds (4), 1000 kbauds (5), 1500 kbauds (6), 2000 kbauds (7), 4000 kbauds (8).<br>• **3.38** : **Type**<br>Enter the type of encoder used :<br>SC.Hiper (7) : SinCos with Hiperface,<br>EndAt (8) : EndAt,<br>SC.EndAt (9) : SinCos with EnDat link. | • **3.41** : **Selection of SSI format**<br>Enter the OFF (0) value to select the Gray SSI code format or On (1) to select the SSI binary format.<br>• **3.33** : **number of turns (number of bits)**<br>Enter the maximum number of encoder turns. Ex. : if **3.33** = 5, the maximum number of turns will be of $2^5$.<br>• **3.35** : **Resolution (number of bits)**<br>Enter the resolution of the serial link (number of bits used to represent an encoder turn).<br>• **3.36**: **Voltage**<br>Enter the encoder power supply voltage : 5V (0) or 8V (1) or 15V (2).<br>**CAUTION:**<br>**Feeding an encoder with an excessive voltage can damage it.**<br>• **3.37**: **Transmission speed**<br>Enter the link speed :<br>100 kbauds (0), 200 kbauds (1), 300 kbauds (2), 400 kbauds (3), 500 kbauds (4), 1000 kbauds (5), 1500 kbauds (6), 2000 kbauds (7), 4000 kbauds (8).<br>• **3.38** : **Type**<br>Enter the type of encoder used :<br>SSI (10) : SSI encoder,<br>SC.SSI (11) : SinCos with SSI link. |

A

In order to proceed to commissioning, resume page 14

## 6 - SMARTCARD

SMARTCARD is supplied in standard version together with UNIDRIVE SP.
It is used to save the drive parameters on SMARTCARD, or to load parameters in the drive by means of SMARTCARD.



**• Drive saving**

| Parameter | Settings | Description | Validation |
|---|---|---|---|
| **0.00** | 1000 | Storage of all the drive parameters | Press the Reset key |
| **0.30** | Prog (2) | Storage of the drive parameters on SMARTCARD | Press the Reset key<br>After the transfer, **0.30** returns to 0. |
| **0.29** | 3333 | Storage of the drive parameters on SMARTCARD (menus 20, 70 and 71) | Press the M key |

**• SMARTCARD loading**

| Parameter | Settings | Description | Validation |
|---|---|---|---|
| **0.30** | REAd | Loading of the SMARTCARD parameters into the drive | Press the Reset key<br>After the transfer, **0.30** returns to 0 |
| **0.29** | 6666 | Loading of the SMARTCARD application parameters into the drive (menus 20, 70 and 71) | Press the M key |

## 7 - DIAGNOSTICS

• **Indications on winding-unwinding** (reading parameters only) :

| Parameter | Indication | Unit |
|---|---|---|
| **0.10** | Measured motor speed | $min^{-1}$ |
| **0.11** | Product radius | mm |
| **0.12** | Line speed | x 0,1m.$min^{-1}$ |
| **0.13** | Coil speed | $min^{-1}$ |
| **0.14** | Mechanical reduction | x 0,01 |
| **0.15** | Coil radius measurement | points |

• **Indications on trip state**

If the drive stops, the output bridge of the drive is inactive and the drive does not control any longer the motor.

The upper display indicates " triP " and the lower display indicates the fault type.

| Mnemonic display | EDL fault | Solution |
|---|---|---|
| th | Motor thermal probe | The EDL CEL solution manages the motor thermal probe in standard version.<br>If there is no probe connected, set **0.49** = L2 (1), then **7.15** = Volt (6).<br>If the probe is connected, the motor temperature is too high. |
| t127 | • Fault on RS485 link in RTU modbus<br>• A problem occurred on the signal reception | • Check the cabling<br>• Check the drive configuration, the transmission speed, the addressing etc… |

**Note :** For the other drive faults, see section K of the commissioning manual that may be set on CD-ROM.

# UNIDRIVE SP
## Cell winding-unwinding solution

**• Terminal block configuration**

| | Function | Terminal | Source/ Dest. | Digital inversion | Assignment |
|---|---|---|---|---|---|
| **UNIDRIVE SP** | Coil 1 ray measurement | 5 and 6 | **7.10** | **7.09** | **18.08 (0.15)** |
| | Zero speed | 24 | **8.21** | **8.11** | **10.03** |
| | Drive reset | 25 | **8.22** | **8.12** | **10.33** |
| | Run by pulses | 26 | **8.23** | **8.13** | **19.42** |
| | Free | 27 | **8.24** | **8.14** | **-** |
| | Reverse Run/Stop | 28 | **8.25** | **8.15** | **19.48** |
| **SM-EDL CEL** | Forward Run validation | 10 | **-** | **-** | **19.45** |
| | Forward Run/Stop | 11 | **-** | **-** | **19.47** |
| | Min radius reached | 12 | **-** | **-** | **18.31** |
| | Max radius reached | 13 | **-** | **-** | **18.32** |

**Notes**

**Notes**

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**MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE**

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