



*INSTRUCTIONS FOR USE*

**PULL RECORDING UNIT MOD. DLR100**



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## **2. GENERAL DATA AND PRESCRIPTIONS**

### **2.1 MANUFACTURER**

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### **2.2 COMMUNICATIONS WITH THE MANUFACTURER**

To receive information related to the machine (use, maintenance, spare parts), always state the Model Number, Serial Number, Manufacturing Year, and Order Number. This information can be found on the Machine-ID tag.

### **2.3 TYPOLOGY AND FIELD USE**

This machine is an electronic device, which monitors stringing operations by collecting the following data:

- applied pull force, with maximum limiting value
- stringing speed
- stringing length.

The following information is recorded for a single laying:

- date and hour of monitoring start
- value for the limiting control value
- sampling distance time
- date and hour of monitoring end.

The following data is recorded in case an alarm sounds for exceeding the pre-set limiting pull value:

- load, speed, and length at the time the alarm sounds (independently of sampling step)
- number of samplings registered during alarm situation
- maximum pull value during alarm situation and correspondent stringing length
- stringing length at the time the alarm ends.

The following data is recorded when the stringing direction is reversed:

- stringing length at time of direction change

This instrument has the capability to record data for individual pulls. Pulls can be stored in memory and printed at a later time or downloaded to a personal computer using a serial interface (COM Port).

The instrument can be calibrated for pulling and recovering separately. This allows the instrument to calculate force differently for recovering then when a machine is pulling. The instrument automatically selects the correct calibration based on the direction of operation.

In addition, the calibration takes into account the overall performance of the machine at various operating conditions.

The instrument's configuration and calibration can be saved and viewed by connecting it to a personal computer with a serial interface or COM port.

The instrument can also store two calibrations into memory and selectively use a specific calibration automatically for machines with a gear reducer with high and low pull settings.



The interface between the operator and the machine is achieved by means of a LCD back lighted display of 2 lines composed by 16 characters each and by means of a keyboard with 5 keys:

(<sup>START</sup>/<sub>STOP</sub>)      (+)      (-)      (←)      (ESC)

- Keys (+) and (-) set numeric digits or select measures
- Key (←) confirms and recalls the settings
- Key (ESC) cancels the last operation
- Key (<sup>START</sup>/<sub>STOP</sub>) starts and ends monitoring

The printer can print data as it is received or from a saved file. A graph of all the collected data can also be printed.

The instrument can detect a load cell with an excitation voltage of 2mV/V or a pressure transducer with an output voltage range of 4 mA to 20 mA. However, the instrument can manage only one sensor at a time.

This instrument is equipped with:

- extension cable - length 10 m (32.8 ft.)
- serial cable for connecting to an external computer
- software "DLR 100 SERIAL RECEIVER" to transfer data and calibrations from the recorder DLR100 to an external computer and vice versa.

It is possible to supply a desk feeder model DLR190 when interfacing the recording unit to a desktop computer.

## **2.4 PERFORMANCES**

The instrument has enough memory to store 1000 layings, consisting of a single data sample or one laying composed of 3200 samples.  
On average the instrument can memorize 10 layings of 300 samples each.

## **2.5 TECHNICAL CHARACTERISTICS**

Power Requirement: 12 V or 24 V (directly from the machine to which it is connected).

The manufacturer reserves the right to change any or all technical aspects of this instrument at any time.

## **2.6 APPLIED NORMS**

The pull recording unit is manufactured in conformity with the following norm:

**89/336/CE** Norm of the European Council, dated 03 May 1989 referring to the laws of the electromagnetic compatibility member States.

### 3. PULL RECORDING UNIT USE

#### 3.1 POSITIONING AND CONNECTION

Do not place the recording unit directly onto the machine because the vibrations could damage the equipment.



**IMPORTANT: Turn off the engine before running the electric connections between the recording unit and the machine.**

Connect the recording unit to the machine by means of the two outlets located on the control panel and on the lower side of the recording unit, using the supplied cable.



**ATTENTION: The instrument is calibrated on a machine with specific load cells and/or pressure transducers.**

**When replacing any load cell or pressure transducer it is necessary to recalibrate the instrument. When using the instrument on a different machine it is also necessary to calibrate the unit to that specific machine.**



**ATTENTION: The instrument may be used to determine maximum pull on a line for machines working as pullers.**

#### 3.2 START-UP

Use the selector **ON/OFF** placed on the lower side of the recording unit.



**ATTENTION: The load cell and the recording unit have to be connected and electrically started for 15 minutes before carrying out any operation.**

When starting the instrument, the serial number, the version, the software date, and the checksum of the program EPROM appear on the display for a few seconds.

After a few seconds, the display indicates the actual date and hour:

|                |
|----------------|
| ** gg/mm/aa ** |
| ** hh/mn/ss ** |

Where:

- gg = day – mm = month – aa = year
- hh = hour – mn = minutes – ss = seconds

Now all functions can be used by means of the keyboard.

### 3.3 SETTING PARAMETERS

Before every recording, insert the parameters for the correct operation by pushing the following buttons when the display shows the current date:

- ☐ push: (ESC) and (+) at the same time for a few seconds.
- Ⓞ appears: *LEVEL 2 PROGR.*
- ☐ push: (←)

The instrument suggests the setting of a series of parameters; in correspondence of each suggested parameter:

- ☐ push: (←) to enter the programming page of the single parameter or
- ☐ push: (+) to go to the next parameter or
- ☐ push: (-) to go to the previous parameter or
- ☐ push: (ESC) to exit the procedure of using parameters and return to the basic display (actual date and hour).

#### 3.3.1 LANGUAGE SETTING

- Ⓞ appears: *LANGUAGE SETTING.*
- ☐ push: (←) to enter the page for language setting.
- Ⓞ appears: *LANGUAGE: ENGLISH.*
- ☐ push: (+) or (-) until the desired language is selected.

All the indications will be presented in the selected language.



**ATTENTION: When using the English measuring unit (see next point 3.3.2), the instrument will show only English.**

- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving the modifications.

#### 3.3.2 MEASURING UNIT SETTING

- Ⓞ appears: *MEASURING UNIT SETTING.*
- ☐ push: (←) to enter the page for measuring the unit setting.
- Ⓞ appears: *EUROPEANS or ENGLISH.*
- ☐ push: (+) or (-) until the desired units are selected.



**ATTENTION: All displays will be presented in the selected units, but the unit functioning and the data registration in the memory will continue to be the European standard; for this reason the visualised English values will not be entire values but the "simple" conversion of the correspondent European values.**

- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving the modifications.

### 3.3.3 ROPE DIAMETER SETTING

- Ⓞ appears: *ROPE DIAMETER SETTING.*
- ☐ push: (←) to enter the page for rope diameter setting.
- Ⓞ appears: *ROPE DIAMETER (mm): 10.0* (or another pre-set value) represents the rope or conductor diameter in mm with a decimal value.
- ☐ push: (+) or (-) until the desired value is selected.  
**ATTENTION: the values that can be selected start at 1.0 until the pre-set value that means "ROPE MAXIMUM DIAMETER."**
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving the modifications.

### 3.3.4 SAMPLING SETTING

- Ⓞ appears: *SAMPLING SETTING.*
- ☐ push: (←) to enter the page for sampling setting.
- Ⓞ appears: *SAMPLING FOR EACH MT: 10* (or another pre-set value) indicates the recording step in meters. (NOTE: The instrument reads the data several times per second).
- ☐ push: (+) or (-) until the desired value is selected.  
**ATTENTION: The values that can be selected are between 1 and 99 m.**
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving the modifications.

### 3.3.5 LIMIT SETTING

- Ⓞ appears: *LIMIT SETTING.*
- ☐ push: (←) to enter the page for limit setting.
- Ⓞ appears: *PULLING LIMIT (daN): 4000* (or another pre-set value) indicates the limiting value of the applied pull in daN. After that limit, the alarm sounds.
- ☐ push: (+) or (-) until the desired value is selected.  
**ATTENTION: the values that can be selected start at 1 until the pre-set value "PULL AT BOTTOM OF SCALE".**
- ☐ push: (←) to confirm the selection  
or
- ☐ push: (ESC) to go to the next programming page without saving the modifications.

### 3.3.6 TYPE OF PRINTING SETTING

- Ⓞ appears: *TYPE OF PRINTING SETTING.*
- ☐ push: (←) to enter the page of printing type setting.
- Ⓞ appears: *PRINTING IN REAL TIME: NO* (or *YES*). In *NO*, the recorded data will be memorized for a possible printing later. In *YES*, the instrument will print the report in real time while the machine is working.
- ☐ push: (+) or (-) to select the desired value.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving the modifications.

### 3.3.7 CLOCK SETTING

- Ⓞ appears: *CLOCK SETTING.*
- ☐ push: (⇐) to enter the page for clock and date setting.
- Ⓞ appears: *CLOCK DAY/WEEK SETTING: dd.*
- ☐ push: (+) or (-) to select the desired value.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page.
- Ⓞ appears: *CLOCK DATE SETTING: gg.mm.aa.*
- ☐ push: (⇐) to select the value to be modified (gg = day – mm = month – aa = year).
- ☐ push: (+)or (-)to select the desired value.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page.
- Ⓞ appears: *CLOCK HOURS SETTING: hh.mn.ss.*
- ☐ push: (⇐) to select the value to be modified (hh = hours – mn = minutes – ss = seconds).
- ☐ push: (+)or (-)to select the desired value.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page.

### 3.3.8 FREE MEMORY DISPLAY


- Ⓞ appears: *FREE MEMORY DISPLAY.*
- ☐ push: (⇐) to enter the page for free memory display.
- Ⓞ appears: *FREE MEMORY: xxx %.* The displayed value corresponds to the percentage of free memory that can be used for other recordings.
- ☐ push: (⇐) or (ESC) to go to the next programming page.

### 3.3.9 WORKING HOURS DISPLAY

- Ⓞ appears: *WORKING HOURS DISPLAY.*
- ☐ push: (⇐) to enter the page for working hours' display.
- Ⓞ appears: *WORKING HOURS: yyy.* The displayed value corresponds to the exact functioning hours of the instrument.
- ☐ push: (⇐) or (ESC) to go to the next programming page.

### 3.4 MONITORING START AND END

To start the monitoring process, when the display indicates the date and hour:

 push: (<sup>START</sup>/<sub>STOP</sub>) two times quickly

now the display shows the following data:

|          |          |
|----------|----------|
| F = xxxx | L = xxxx |
| V = xxxx | m = xxxx |

Where:

- F = applied pull (in daN – lbf)
- L = value of the control limiting pull (in daN – lbf)
- V = stringing speed (in km/h – ft/min.)
- m = stringing length (in m – ft) can be positive or negative on the basis of the stringing direction (for convention the positive value correspond to the use in puller mode).


And the instrument is set for data recording.

During data monitoring it is possible to modify the value of the control limiting pull of a quantity equal to the value pre-set in the indication "LIMIT CHANGING SETTING"; to carry out this step:

 push: (+) or (-) to increase or decrease the control limit.

Obviously if the pre-set value "LIMIT CHANGING SETTING" is equal to "0" (zero) there will be no changing of the control limiting pull.

To end the monitoring process:

 push: (<sup>START</sup>/<sub>STOP</sub>) to times quickly

and the display will indicate the current date and hours.

If during monitoring, the instrument is inadvertently switched off, after restoring and displaying of current date and hour:

 push: (<sup>START</sup>/<sub>STOP</sub>) two times very quickly

and the instrument will start recording the laying that was on course before the equipment was switched off.

### 3.5 MEMORY EXHAUSTION

If during monitoring the free memory for the recording decreases under 10% of the total memory, the display will indicate the message:

*FREE MEMORY: xxx %.*

End the laying as quickly as possible and free the memory by eliminating the recording of the laying (see par. 3.6 – PRINTING MANAGEMENT AND MEMORISED LAYING).


If during monitoring, the available memory for recording should be exhausted, the display indicates the following message:

*ATTENTION! EXHAUSTED MEMORY*


and the laying recording will be interrupted.


### 3.6 PRINTING MANAGEMENT AND MEMORIZED LAYING


To enter into the process of printing and memorized laying management, when the display indicates the current date and hour:


 push: ( $\leftarrow$ )

the instrument will suggest some alternatives; in correspondence of each suggested page:

 push: ( $\leftarrow$ ) to enter into the suggested page  
or


 push: (+) to go to the following page  
or


 push: (-) to go to the previous page  
or

 push: (ESC) to exit from the process of printings and memorised laying management and return to the basic display (current date and hour).


#### 3.6.1 PRINT LAYING


 appears: *PRINT LAYING.*

 push: ( $\leftarrow$ ) to enter the print laying page.


 appears: *PRINT LAYING N.xx OF gg.mm.aa* (NOTE: each single laying is indexed with an incremental number *xx* and with the date *gg.mm.aa*. In case of cancelling one laying, however, the index *xx* is modified as a function of the laying number present in the memory. Therefore, each day you should print or discharge the memorized laying by cancelling them from the memory.

 push: (+) or (-) until the print laying is selected.


 push: ( $\leftarrow$ ) to confirm the selection or

 push: (ESC) to exit from the printings' management.

At the end of the data printing, the instrument asks if the operator wants to print the graphic:

 appears: *PRINT ALSO THE GRAPHIC?*

 push: ( $\leftarrow$ ) to confirm the print of the graphic or

 push: (ESC) to exit from the printing page.



**ATTENTION: It is necessary to see the numeric print and know the measurements as numeric values because the graphic supplies a qualitative and not a quantitative indication of the laying.**

**The strung meters are indicated on the horizontal axis of the graphic.**

**A moving reversal is indicated by a vertical continuous line that indicates the positions.**

**The applied pulls are indicated on the vertical axis; the axis has been dimensioned to represent the maximum memorized pull during the recording operations and not necessarily the maximum pre-set control limit; then, if no alarm sounds for exceeding the limit pull, this limit will not appear on the graphic; if the alarm sounds for exceeding the limit, the limit will be identified with a horizontal line along the complete length of the graphic.**

|                                   |                     |                         |                   |
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### 3.6.2 LAYING DISPLAY

- Ⓢ appears: *LAYING DISPLAY.*
- ☐ push: (←) to enter the laying display page.
- Ⓢ appears: *DISPL. LAYING N.xx OF gg.mm.aa.*
- ☐ push: (+)or (-) until selection of the laying between the suggested ones.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to exit from the printing page and go to the next page.

The instrument indicates the recorder data in sequence. To advance or reverse display:

- ☐ push: (+)or (-).

At the displaying end:

- ☐ push: (ESC) to exit from the displaying page and go to the next one.

### 3.6.3 LAYING TRANSMISSION

The data transmission to a Personal Computer is done with the following non-modifiable parameters:

- speed 9600 bit/sec
- equal N
- bit of 8
- stop bit 1.

To enable the Personal Computer, set on the DOS control line of the Personal Computer and enter the following instructions:

- **MODE COMy:9600,N,8,1** (y is the number of the serial port used on the PC).
- **ENTER.**

Start the unit DLR100 SERIAL RECEIVER on the personal computer (see 3.6.4) and

- ☐ Press on the PC: **RECEIVE DATA** - the unit is in stand by and awaits the data from the pull recording unit.

In case you lack the above software, select the command line DOS of the Personal Computer and type the following instructions:

- **COPY COMy C:\xxxxxxx** (y is the number of the serial port used on the PC – C:\ is the PC disk on which to discharge the data and xxxxxxxx is the name of each single transferred laying).
- **ENTER.**

#### **Now on the DLR100 instrument:**

- Ⓢ appears: *LAYING TRANSMISSION.*
- ☐ push: (←) to enter the laying transmission page.
- Ⓢ appears: *TRASM. LAYING N.xx OF gg.mm.aa.*
- ☐ push: (+)or (-) until the desired laying to be transmitted is selected.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to exit from the transmitting page and go to the next one.
- Ⓢ appears: *TRASM. ON COURSE WAIT.*

At the end of the transmission, the instrument automatically exits from the printing; to save the data on the personal computer click "SAVE DATA".

|  |                            |                                |                          |
|--|----------------------------|--------------------------------|--------------------------|
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### 3.6.4 INTERFACE SOFTWARE

- The interface software is compatible with **Win95 – Win98 – Win2000 – Win NT**.
- Connect the pull recording unit mod. DLR100 to the port COM1 or COM2 of the computer.
- Activate the program DLR100 SR.
- After the opening of the program page, verify that the set entry port corresponds to the port that the pull recording unit has been connected. If the set port is different from the connected one, click the sliding arrow to set the effective port.

For the detailed use of the software, see the following sections:

- 3.6.3 (Laying transmission)
- 4.1.22 (Configuration transmission)
- 4.1.23 (Configuration receiving)

### 3.6.5 TO DELETE SINGLE LAYING

- Ⓞ appears: *DELETE LAYING.*
- ☐ push: (←) to enter the page for deleting single laying.
- Ⓞ appears: *DELETE LAYING N.xx OF gg.mm.aa.*
- ☐ push: (+)or (-) until the laying to be deleted is selected.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to exit the deleting page and go to the next one.
- Ⓞ appears: *ATTENTION! CONFIRM?*
- ☐ push: (←) to confirm the deleting operation or
- ☐ push: (ESC) to cancel the deleting operation.

After the deleting of the laying:

- Ⓞ appears: *FREE MEMORY: xxx %.*
- ☐ push: (←)or (ESC) to exit from the printing.

### 3.6.6 TO DELETE ALL LAYING

- Ⓞ appears: *DELETE ALL LAYING.*
- ☐ push: (←)to confirm the selection or
- ☐ push: (ESC) to exit from the deleting page and go to the next one.
- Ⓞ appears: *CODE.*
- ☐ push: (<sup>START</sup>/<sub>STOP</sub>) (+) (<sup>START</sup>/<sub>STOP</sub>) (+) (<sup>START</sup>/<sub>STOP</sub>) (+) (<sup>START</sup>/<sub>STOP</sub>) (+) to insert the code to delete all laying.
- Ⓞ appears: *ATTENTION! CONFIRM?*
- ☐ push: (←)to confirm the deleting operation or
- ☐ push: (ESC) to cancel the deleting operation.

The instrument automatically exits from printing at the end of the deleting operation.

## 3.7 **REPLACING THE PAPER ROLL**

- Cut the paper ribbon on the diagonal.
- Place the paper ribbon in the printing device opening.
- Push the paper feeding push-button (**FEED**) until the ribbon comes out.

### **3.8 REPLACING THE RIBBON**

- Push on the ribbon cartridge where it says **PUSH**.
- Insert the new cartridge. Be sure the paper is in the opening between the ribbon and the chassis ribbon carrier.
- Put the ribbon under tension, turning the proper roller in clockwise direction.

### **3.9 WARNINGS**

**The previous instructions are sufficient to use the pull recording unit correctly.**

**All the other instructions in the following pages refer to programming, setting, and calibrating operations ordered by the manufacturer. Ignoring these instructions could cause software malfunction or cancellation of the software.**

**It is strictly forbidden to make changes to the pre-set parameters described in the following pages of this manual, unless written permission is obtained from the manufacturer; normal operations must be limited to those described in the previous parameters.**

## 4. CONSTANTS AND CALIBRATIONS SETTING

### 4.1 CONSTANTS AND CALIBRATIONS SETTING PROCEDURE

The coupling between the machine and recording unit requires the definition of a series of parameters depending from the machine configuration and from the instrument anticipated use, as well as from the calibration of the pull recording system. These operations have to be ordered by the manufacturer.

To enter in this programming level, when the display indicates the current date and hour, act as follows:

☐ push: (ESC) and (-) simultaneously for some seconds.

Ⓢ appears: *CODE*.

☐ push: (<sup>START</sup>/<sub>STOP</sub>) (+) (-) (⇐) (⇐) (-) (+) (<sup>START</sup>/<sub>STOP</sub>) to enter the qualification code for programming the machine and instrument parameters.

The instrument will propose the setting of a series of parameters; next to each proposed parameter:

☐ push: (⇐) to enter the programming page of the single parameter or

☐ push: (+) to go to the next parameter or

☐ push: (-) to go to the previous parameter or

☐ push: (ESC) to exit the setting procedure and return to the basic visualisation.

#### 4.1.1 SETTING OF COMPANY NAME

Ⓢ appears: *SETTING OF COMPANY NAME*.

☐ push: (⇐) to enter the company name setting page.

Ⓢ appears: *C<TESMEC* (or another pre-set name of the company).

☐ push: (⇐) to select the single character to modify

☐ push: (+) or (-) up to select the desired character  
up to the realisation of the desired writing.

☐ push: (<sup>START</sup>/<sub>STOP</sub>) to confirm the set writing and to go to the next programming page or

☐ push: (ESC) to abandon the setting and to go to the next programming page.

#### 4.1.2 SETTING OF BULL-WHEEL DIAMETER

Ⓢ appears: *SETTING OF BULL-WHEEL DIAMETER*.

☐ push: (⇐) to enter the bull-wheel diameter setting page.

Ⓢ appears: *BULL-WHEEL DIAMETER: 1200* (or another pre-set value) represents the diameter of the bottom of groove of the bull-wheel, expressed in mm.

☐ push: (+) or (-) to select the desired value.

ATTENTION: the selectable values go from 1 to 2500 mm.

☐ push: (⇐) to confirm the selection or

☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.3 SETTING OF MAX. DIAMETER OF THE ROPE

- Ⓒ appears: *SETTING OF MAX. DIAMETER OF THE ROPE.*
- ☐ push: (⇐) to enter the programming page of max. diameter of the rope.
- Ⓒ appears: *ROPE MAX. DIAMETER: 100* (or another pre-set value) represents the maximum expected diameter for the rope or conductor on the machine, expressed in mm.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 100 mm.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.4 SETTING OF THE NUMBER OF THE CROWN TEETH

- Ⓒ appears: *SETTING OF THE CROWN TEETH.*
- ☐ push: (⇐) to enter the programming page of the number of the crown teeth.
- Ⓒ appears: *NUMBER OF CROWN TEETH: 200* (or another pre-set value) represents the number of the teeth of the bull-wheel crown.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 1000.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.5 SETTING OF THE NUMBER OF THE ENCODER TEETH

- Ⓒ appears: *SETTING OF THE ENCODER TEETH.*
- ☐ push: (⇐) to enter the programming page of the number of the encoder teeth.
- Ⓒ appears: *NUMBER OF CROWN TEETH: 25* (or another pre-set value) represents the number of the teeth of the meter-counter wheel connected to the encoder.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 100.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.6 SETTING OF THE NUMBER OF THE ENCODER IMPULSES

- Ⓒ appears: *SETTING OF THE ENCODER IMPULSES.*
- ☐ push: (⇐) to enter the programming page of the encoder impulses.
- Ⓒ appears: *NUMBER OF THE ENCODER IMPULSES: 100* (or another pre-set value) that represents the number of the impulses per turn transmitted by the encoder.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 100.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.7 SETTING OF SENSOR TYPE

- Ⓒ appears: *SETTING OF SENSOR TYPE*.
- ☐ push: (←) to enter the programming page of the type of sensor.
- Ⓒ appears: *TYPE OF SENSOR: LOADING CELL* (or *TRANSDUCER*).
- ☐ push: (+) or (-) up to select the type of sensor used.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.8 SETTING OF THE BOTTOM SCALE PULL

- Ⓒ appears: *SETTING OF THE BOTTOM SCALE PULL*.
- ☐ push: (←) to enter the programming page of the bottom scale pull.
- Ⓒ appears: *BOTTOM SCALE PULL (daN): 4500* (or another pre-set value) corresponds to the projected pull next to the bottom scale of the used sensor (on the average between 10% and 25% of the maximum pull projected for the machine).
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 25.000 daN.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.9 SETTING OF LIMIT CHANGE

- Ⓒ appears: *SETTING OF LIMIT CHANGE*.
- ☐ push: (←) to enter the programming page of the limit change.
- Ⓒ appears: *LIMIT CHANGE (daN): 0* (or another pre-set value) corresponds to the variation step of the pre-set limit pull that it is possible to realize during the monitoring of the applied pull (see paragraph BEGINNING AND END OF MONITORING).
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 0 to 100 daN.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.10 SETTING OF ADC FILTER

- Ⓒ appears: *SETTING OF ADC FILTER*.
- ☐ push: (←) to enter the programming page of the ADC filter.
- Ⓒ appears: *BIT OF ADC FILTER: 10* (or another pre-set value) corresponds to the maximum difference of bit between two consecutive readings that the instrument accepts to consider the reading valid; it is necessary to remove undesired raps or trouble. With low values it corresponds to a greater reply readiness to the variations of the load but less stability of the detected datum; with high values there is a lower reply readiness of the instrument to the loading variations but greater stability of the detected datum.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 250 bit.
- ☐ push: (←) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.11 SETTING OF SAMPLING FREQUENCY

- Ⓞ appears: *SETTING OF SAMPLING FREQUENCY.*
- ☐ push: (⇐) to enter the programming page of the sampling frequency.
- Ⓞ appears: *SAMPLING FREQUENCY (HZ): 50* (or another pre-set value) corresponds to the number of readings of the different signals that are completed each second. With low values, it corresponds a greater reply readiness to the variations of the load but less stability of the detected datum; with high values there is a lower reply readiness of the instrument to the variations of the load but greater stability of the detected datum.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 10 to 50 Hz.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.12 SETTING OF SAMPLES PER ADC MEAN

- Ⓞ appears: *SETTING OF SAMPLES PER ADC MEAN.*
- ☐ push: (⇐) to enter the programming page of the samples per ADC mean.
- Ⓞ appears: *NUMBER OF SAMPLES PER ADC MEAN: 50* (or another pre-set value) corresponds to the number of readings on which the arithmetic mean of the values is calculated. With low values there is greater reply readiness of the instrument to the variations of the load but less stability of the detected datum; with high values, there is lower reply readiness of the instrument to the variations of the load but greater stability of the detected datum.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 50.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.13 SETTING OF HOUR-COUNTER

- Ⓞ appears: *SETTING OF HOUR-COUNTER.*
- ☐ push: (⇐) to enter the programming page of the hour-counter.
- Ⓞ appears: *HOUR-COUNTER: xx* that corresponds to the number of working hours of the instrument.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 0 to 65500 h.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.14 SETTING OF SERIES NUMBER

- Ⓞ appears: *SETTING OF SERIES NUMBER.*
- ☐ push: (⇐) to enter the programming page of the series number.
- Ⓞ appears: *SERIES NUMBER: xx* that corresponds to the series number given by the constructor.
- ☐ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 0 to 65535.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.15 SETTING OF PULL VARIATION

- Ⓢ appears: *SETTING OF PULL VARIATION*.
- ⏪ push: (←) to enter the programming page of the pull variation.
- Ⓢ appears: *PULL VARIATION (daN): 50* (or another pre-set value) corresponds to the resolution by which the pull is visualized, registered, and printed by the instrument. With low values there is better precision of the datum but less stability of the visualization; with high values there is lower precision of the datum but better stability of the visualization.  
ATTENTION: the value of the pull calculated and visualized is always rounded off per defect to the next value.
- ⏪ push: (+) or (-) up to select the desired value.  
ATTENTION: the selectable values go from 1 to 200 daN.
- ⏪ push: (←) to confirm the selection or
- ⏪ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.16 SETTING OF DIRECTIONALITY

- Ⓢ appears: *SETTING OF DIRECTIONALITY*.
- ⏪ push: (←) to enter the programming page of the directionality.
- Ⓢ appears: *UNIDIRECTIONAL/BI-DIRECTIONAL*.  
If the machine will be used **ONLY** as a puller **OR** a tensioner, **choose the unidirectional setting**.  
If the machine is used as a puller **AND** a tensioner, **choose the bi-directional setting** (except for machines with bull-wheels covered by nylon sectors).  
This will allow the instrument to use the correct calibration map for its intended use.
- ⏪ push: (+) or (-) up to select the desired value.
- ⏪ push: (←) to confirm the selection or
- ⏪ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.17 SETTING OF FUNCTIONALITY

- Ⓢ appears: *SETTING OF FUNCTIONALITY*.  
ATTENTION: this page is intended only if the previous page has selected the unidirectional functioning.
- ⏪ push: (←) to enter the programming page of the functionality.
- Ⓢ appears: *PULLER (or TENSIONER)*.
- ⏪ push: (+) or (-) up to select the desired value.
- ⏪ push: (←) to confirm the selection or
- ⏪ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.18 RESETTING OF SENSOR

- Ⓞ appears: *RESETTING OF SENSOR.*
- ☐ push: (⇐) to enter the resetting page of the sensor.
- Ⓞ appears: *ZERO: xx.* This procedure allows the user to get the value of the sensor signal with applied effort null (bit of zero). Completely unload the loading cell or the pressure transducer: the correspondent bit is visualized on the display; for the sensor loading cell this value must be next to 0 (zero), while for sensor pressure transducer this value must be next to 204.  
The zero value is independent from the foreseen functioning way.
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to go to the next programming page without saving any changes.

#### 4.1.19 PULLER CALIBRATION

- Ⓞ appears: *PULLER CALIBRATION.*  
**ATTENTION: This page is not necessary if previous steps have selected UNIDIRECTIONAL functioning and TENSIONER functionality.**
- ☐ push: (⇐) to enter the calibration page of the puller functioning.
- Ⓞ appears: *NUMBER OF LINEARISATION STEPS: 1* (or another pre-set value).  
This value corresponds to the calibration steps anticipated on the puller functioning scale. Do at least 4 calibration steps, one next to the maximum pull projected for the machine and the others on the intermediate values.
- ☐ push: (+) or (-) up to select the desired value.  
**ATTENTION: the selectable values go from 1 to 10.**
- ☐ push: (⇐) to confirm the selection or
- ☐ push: (ESC) to exit from the puller calibration page.
- Ⓞ appears: *P. x: PULL yyyy.*  
While entering in the calibration data, enter the values in order from lowest to highest or highest to lowest. In the case of errors during the acquisition of the values make reference to chapter ERRORS MANAGEMENT.
- ☐ push: (+) or (-) to select the pull value yyyy next to the linearization step x.  
**ATTENTION: the selectable values go from 1 daN to BOTTOM SCALE PULL (see the relevant paragraph). Perform the calibration with the application of a dynamic pull rather than a static pull. The instrument needs about 10 seconds to execute the survey, and it is recommended to let stabilize the pull on the bull-wheels at least for 30 seconds each time before passing to the survey.**
- ☐ push: (⇐) to confirm the selection and begin the survey or
- ☐ push: (ESC) to exit from the puller calibration page.
- Ⓞ appears: *BIT PULL xxxx.* The instrument memorizes the registered data for about 10 seconds; At the end.
- Ⓞ appears: *MEDIA BIT xxxx.* This is the mean calculated during the survey interval.
- ☐ push: (⇐) to confirm the survey and to go to the next linearization step or
- ☐ push: (ESC) to repeat the linearization step.

#### 4.1.20 TENSIONER CALIBRATION

Ⓞ appears: *TENSIONER CALIBRATION.*

**ATTENTION: This page is not necessary if previous steps have selected UNIDIRECTIONAL functioning and PULLER functionality.**

☐ push: (←) to enter the calibration page of the tensioner functioning.

Ⓞ appears: *NUMBER OF LINEARISATION STEPS: 1* (or another pre-set value).

This value corresponds to the calibration steps anticipated on the tensioner functioning scale. Do at least 4 calibration steps, one next to the maximum pull projected for the machine and the others on intermediate values.

The more calibration steps, the greater the capacity of the instrument to chase and reproduce the behaviour of the machine.

☐ push: (+) or (-) up to select the desired value.

ATTENTION: the selectable values go from 1 to 10.

☐ push: (←) to confirm the selection or

☐ push: (ESC) to exit from the tensioner calibration page.

Ⓞ appears: *P. x: PULL yyyy.*

For each step previously selected during this procedure, the pull values should always increase or decrease for each individual sample step. In the case of errors signalling during the acquisition of the values make reference to the chapter ERRORS MANAGEMENT.

☐ push: (+) or (-) up to select the pull value yyyy next to the linearization step x and to realize with the machine this pull situation.

**ATTENTION: the selectable values go from 1 daN to BOTTOM SCALE PULL (see the relevant paragraph). Perform the calibration with the application of a dynamic pull rather than a static pull. The instrument needs about 10 seconds to execute the survey, and it is recommended to let stabilize the pull on the bull-wheels at least for 30 seconds each time before passing to the survey.**

☐ push: (←) to confirm the selection and begin the survey or

☐ push: (ESC) to exit from the tensioner calibration page.

Ⓞ appears: *BIT PULL xxxx.* The instrument memorizes the registered data for about 10 seconds; At the end

Ⓞ appears: *MEDIA BIT xxxx.* This is the mean calculated values for the calibration values.

☐ push: (←) to confirm the survey and to go to the next linearization step or

☐ push: (ESC) to repeat the linearization step.

#### 4.1.21 PRINTING OF CALIBRATION DATA

Ⓞ appears: *PRINTING OF CALIBRATION DATA.*

It allows printing of the linearization schedule acquired in the previous steps.

The first acquired step always refers to the value of zero; the following are the single executed linearization steps, ordered in increasing sense while the last value constitutes the pull calculated in condition of saturation of the sensor signal.

☐ push: (←) to do the print of the calibration data or

☐ push: (ESC) to exit from the print page of the calibration data.

#### 4.1.22 TX CONFIGURATION TO THE PC

Ⓢ appears: *TX CONFIGURATION TO THE PC.*

This allows the transfer of the configuration and calibration data of the instrument to an external PC in order to use the same instrument on different machines by simply changing the setting of data relevant to the configuration of the machine.

Operating on the machine (DLR100 powered by the machine) or with the proper desk feeder (model DLR190), connect the DLR100 to the personal computer by the proper serial cable RS232 supplied with the equipment.

Start the unit DLR100 SERIAL RECEIVER on the personal computer and

☞ press on the PC: RECEIVE & SAVE the unit waits the data from the pull recording unit.

Operate on the pull recording unit DLR100 and

☞ press: (⇐) to start the transmission of data.

After receiving data on the personal computer, the user will be asked for a name to be given to the configuration file. We suggest adding the model and serial number of the machine to find it easily.



**ATTENTION: Do not modify the extension .epr of the configuration file since it would become unusable.**

#### 4.1.23 RX CONFIGURATION FROM THE PC

Ⓢ appears: *RX CONFIGURATION FROM THE PC.*

This permits the user to load the instrument configuration and calibration data on the DLR100 previously loaded on an external PC; now it is possible to use the same instrument on different machines simply by changing the setting data relevant to the specific configuration of that machine.

Operating on the machine (DLR100 powered by the machine) or with the proper desk feeder (model DLR190), connect the instrument DLR100 to the personal computer by the proper serial cable RS232 supplied with the equipment.

Operate on the pull recording unit DLR100 and

☞ press: (⇐) to start the transmission of data.

Start the unit DLR100 SERIAL RECEIVER on the personal computer and

☞ press on the PC: LOAD & TRANSMIT - select the file to be transmitted and confirm with ENTER.

At the end of the transmission the DLR100 will return to the first step of the configuration options (par. 4.1.1).

## **5. ERROR MANAGEMENT**

### **5.1 ERROR 1 – CONTROL GENERAL PARAMETERS**

© appears: *ERR.1: CONTROL. GENERAL PARAMETERS.*  
The memory of the instrument is not programmed.

- Verify the correct setting of all data, both for the utilization parameters and for the constants and the calibrations.

### **5.2 ERROR 2 – EPROM BREAKDOWN**

© appears: *ERR.2: EPROM WRITE ERROR.*  
This error means a breakdown to the flash memory of backup.

- The instrument can be used with all its functions, but it must be repaired as soon as possible. Immediately contact the manufacturer.

### **5.3 ERROR 3 – ENCODER CONSTANT CALCULUS**

© appears: *ERR.3: ENCODER CONSTANT ENCODER.*  
This error means a value in the calculus of the encoder constant.

- See the used parameters for the calculus of its value (bull-wheel diameter, rope diameter, encoder impulses, number of crown teeth, number of encoder teeth) verifying that they are all included in the projected values.

### **5.4 ERROR 4 – BIT ERROR OF SPAN**

© appears: *ERR.4: BIT ERROR OF SPAN.*  
This error means that a bit value acquired during the calibration results to be lower than the bit of zero or in the case of acquisition of two equal values.

- Repeat the execution of the calibration as the acquired values are cancelled.

### **5.5 ERROR 5 – PULL ERROR OF SPAN**

© appears: *ERR.5: PULL ERROR OF SPAN.*  
This error appears during the calibration when two or more values of the same pull are inserted or when increasing values of bit correspond to decreasing values of pull.

- Repeat the execution of the calibration as the acquired values are cancelled.

### **5.6 ERROR 6 – BOTTOM SCALE ERROR**

© appears: *ERR.6: BOTTOM SCALE ERROR.*  
This error can appear after the calibration of the sensor when at 1023 bit (physic limit of the bit equivalent to the bottom scale of the sensor) corresponds to a pull value lower than BOTTOM SCALE PULL (see chapter SETTING OF CONSTANTS AND CALIBRATIONS).

- If possible, modify the value of the BOTTOM SCALE PULL; in each case the acquired values are memorized and valid. The only drawback is that the maximum pull detected and visualized will be limited to the correspondent pull at 1023 bit.

## 6. RESET PROCEDURES

### 6.1 RAM MEMORY RESET

To reset the RAM memory of the instrument it is necessary to operate as follows:

- ☐ push: (ESC) and (-) for a few seconds
- Ⓞ appears: *CODE*
- ☐ push: (⇐) (⇐) (-) (-) (+) (+) (<sup>START</sup>/<sub>STOP</sub>) (<sup>START</sup>/<sub>STOP</sub>)
- Ⓞ appears: *ATTENTION! CONFIRMATION?*
- ☐ push: (⇐) to confirm the operation or
- ☐ push: (ESC) to annul the operation.



**ATTENTION:** This operation cancels all the RAM memory, and therefore all the memorized data. After this operation, the instrument returns on the default values set by the manufacturer, so it is necessary to program the instrument with the new data relevant to the application and it is necessary to carry out a new calibration.

### 6.2 PRINTER RESET

To reset the printer it is necessary to operate as follows:

- ☐ Turn off the instrument.
- ☐ Turn on the instrument by pushing the **FEED** and **PRINT** keys until the printer starts working.
- ☐ Push in sequence the **FEED** and **PRINT** keys of the printer for 4 times.
- ☐ Push the **PRINT** key of the printer.
- ☐ Turn off and therefore turn on the instrument.

### 7. CONNECTIONS SCHEME

