With the setting of "INP1" and "DSP1", the instrument should be able to operate correctly. Depending on the system characteristics, it may be necessary to modify the internal measurement times. After programming the "DSP1" parameter with decimal point, pressing \textbf{ENTER} for approximately 3 seconds provides access to set the numerical values of sampling and limit times.

**SAMPLING TIME (TIME)**

With irregular input signals, the display may present fluttering or unwanted variations due that the number of input cycles detected at each reading are not equal.

The "TIME" parameter allows stretching the measurement interval while making an average of the readings taken along the programmed time. This reduces possible display jittering. The sampling time is programmable from 0.0 to 9.9 seconds. A value of 0.0 means that no average will be made. It is set at the factory to 1 second.

To help stabilize the display in case of irregular input signals, it is recommended to increment this parameter, taking into account that the display readout will be updated at the programmed time.

The sampling time can be reduced, if the input signal is stable at the operating frequency, to increase the display update rate.

**LIMIT TIME (LIM)**

The limit time, programmable from 1 to 10 seconds, is used to adjust the waiting time for a minimum of 1 pulse to be produced at the input before considering it to be zero. The limit time is initialized at the reception of each input pulse. If no pulse is detected before completion of the programmed time, the display goes to zero.

The instrument is shipped from the factory with a limit time of 10 seconds.

Decreasing the limit time makes the instrument be able to respond more quickly to the zero condition when the system stops but this reduction increases the minimum displayable reading before the display goes to zero.

For example suppose that the desired readout for an input frequency of 1kHz is 1000 liters/second.

With a limit time of 10s, the minimum frequency is 0.1Hz and the display readout at this frequency is 0.1 liter/second. Since this value would not be readable in a display of 1000 counts, the limit time could be reduced to 1 second, so the minimum frequency will be 1Hz and the minimum readout before displaying zero will be 1 liter/second.
INTRODUCTION TO THE LOVE CONTROLS LCU108 SERIES

This manual does not constitute a formal agreement. All information given in this manual is subject to change without notice.

Love Controls brings a new philosophy in digital panel instrumentation by using multipurpose, modular-concept devices providing a rich array of basic functions and advanced capabilities.

With a fully MODULAR DESIGN, it is possible to implement a wide variety of applications simply by adding the desired option(s).

Built-in intelligence allows the meter to recognize the options installed and implement the necessary parameters to properly function within desired parameters. The basic instrument without output options omits these data in the program routines.

CALIBRATION is performed at the factory eliminating the need for adjustment potentiometers. Any circuit or option liable to be adjusted incorporates a memory where calibration parameters are stored, making it possible the optional cards be totally interchangeable without need of any subsequent adjustments.

Custom CONFIGURATION for specific applications can be made quickly and easily through five front panel keys, following structured choice menus aided by display prompts at each programming step.

Other features of the Love Controls LCIx08 family include:

- CONNECTIONS via plug-in terminal blocks without Screws and CLEMP-WAGO clips cable retention system.
- DIMENSIONS
  - Models LCI308 and LCI408 96x48x120 mm DIN 43700
  - Models LCI108, LCI108J, & LCI208 96x48x60 mm DIN 43700
- CASE MATERIAL UL-94 V0-rated polycarbonate.
- PANEL INSTALLATION by means of single part fingertip without screws.

To guarantee the meter’s technical specifications, its is advised to check calibration parameters at periodical intervals according to the ISO9001 standards for the particular application operating criteria. Recalibration of the meter should be made at the factory or in a qualified laboratory.

RATE METER PROGRAMMING INSTRUCTIONS

[18.1] Display module

From the Pro stage (see fig. 15.1), press ENTER to get access to the different configuration modules (InP = input, DSP = display, and, if option installed, Set = setpoints). Select the display module by pressing (the display appears as shown in figure 18.1).

Press ENTER to enter this module.

[18.2] Display mode

The first menu parameter allows selection between two display modes. The direct mode must be selected when the display readout and the input frequency are to be in a direct proportion, that is, the display goes high as the frequency grows. The reverse mode should be selected when reading variables that are inversely proportional to the input frequency.

Press to change the previously selected option if desired (dir = direct mode, inv = reverse mode) and press ENTER to retain the choice and advance to the next programming step.

[18.3] Input frequency

The display indicates as shown in figure 18.3 for. After 2s or by pressing ENTER, the display shows the selected frequency value (depending on previous setting) with the first digit flashing.

If desired, modify this value by pressing to vary the flashing digit from 0 to 9. Use the key to advance to the next digit to be modified. Repeat these operations until the display reads the required value and press ENTER to save the entry in the memory. The decimal point will then flash. Press the key repeatedly to move the decimal point to the desired position, if required.

Press ENTER to save changes and go to the next programming step.

Custom CONFIGURATION for specific applications can be made quickly and easily through five front panel keys, following structured choice menus aided by display prompts at each programming step.

Other features of the Love Controls LCIx08 family include:

- CONNECTIONS via plug-in terminal blocks without Screws and CLEMP-WAGO clips cable retention system.
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- CASE MATERIAL UL-94 V0-rated polycarbonate.
- PANEL INSTALLATION by means of single part fingertip without screws.

To guarantee the meter’s technical specifications, its is advised to check calibration parameters at periodical intervals according to the ISO9001 standards for the particular application operating criteria. Recalibration of the meter should be made at the factory or in a qualified laboratory.
After programming the input frequency, pressing **ENTER** provides access to program the desired display for this frequency. The display shown in figure 19.1 appears for 2s before giving access to set the numerical value. Proceed as in section 18.3. (**↑** increments digit value, **↓** changes digit) until the desired value is displayed. Press **ENTER** to make the decimal point flash, and use **↑** to move it to the desired location. Finally press **ENTER** to save and go to the run mode.

To access the programming of the sampling and limit times (see page 17), hold down the **ENTER** key for 3 seconds. The display will appear as shown on next figure.

The display shows the symbol shown in figure 19.2, followed (after 2 seconds) by the sampling time (two digits with a decimal place, see page 17).

Use the **↑** and **↓** key procedure to modify the initially programmed value (from 0.1 to 9.9 seconds). Press **ENTER** to save the entry and proceed to the limit time programming phase.

The limit time program symbol (see figure 19.3) is followed (after 2 seconds) by the previously programmed limit time value with the first of its two digits flashing.

Use the **↑** and **↓** key procedure to modify the initially programmed value (from 1 to 10 seconds). Press **ENTER** to save the entry and automatically return to normal operation.
2.6.2 RPM TACHOMETER PROGRAMMING

PULSES PER REVOLUTION (PPR)

The "PPr" parameter is the number of pulses given by a complete revolution of the sensor connected to the instrument's input. It is programmable from 1 to 9999.

RESOLUTION (DCP)

The "dCP" parameter allows setting the display resolution to units (without decimal point) or to tenths (with one decimal place).

EXAMPLE

It is desired to display the rate of a turning shaft that delivers 50 pulses per each revolution.

As the only necessary parameter, the "PPr" (pulses per revolution) must be programmed to 50. The "dCP" parameter should be set to the desired resolution based on the maximum reading.

With the setting of "PPr" and "dCP" the instrument should be able to operate correctly. Depending on sensor characteristics, it may be necessary to adjust the internal sampling and limit times.

After programming "dCP", a pressing ENTER for 3 seconds gives access to program these parameters.

SAMPLING TIME (TIME)

With irregular input signals, the display may exhibit dithering or show unwanted variations due to and unequal number of input cycles detected during each reading cycle.

The "TIME" parameter allows changing the measurement interval to average of the readings taken over the programmed time. This reduces possible display dithering.

The sampling time is programmable from 0.0 to 9.9 seconds. A value of 0.0 means that no average will be made. It is set at the factory to 1 second.

LIMIT TIME (LIM)

The limit time, programmable from 1 to 10 seconds, is used to adjust the time over which a single pulse at the input is considered to be zero.

The limit time is initialized at the receipt of each input pulse. If no pulse is detected before completion of the programmed time, the display goes to zero.

The instrument is shipped from the factory with a limit time of 10 seconds. Decreasing the limit time makes the instrument be able to respond more quickly to the zero condition when the system stops, but this reduction leads to an increase of the minimum displayable reading before the display goes to zero.
1. MODELS LCI 108-7x and LCI 108J-7x

This manual describes the models LCI108-7x and LCI108J-7x, both instruments are 1/8 DIN, shallow depth format.

The difference between both models is the size of the digits of the display. The LCI108J-7x provides 20mm-high digits which make it easy readable at long distances. In this manual both models are referred with the generic name of LCI108.

The Model LCI1108 are fully configurable by software to measure rpm or rate in the desired units. The input stage admits direct connection of several sensor types which are selected by a DIP-switch.

The basic instrument is a soldered assembly composed of the main board, and the display and keyboard module.

Optionally, it can be equipped with a 2-relay control output card (LCIA-01). This option provides an output connector at the rear of the meter; status LED’s visible from the front and specific programming routines that are enabled automatically once the card is installed.

The outputs are isolated from signal input and power supply.

This instrument conforms the following community standards: 89/336/CEE and 73/23/CEE
WARNING: Refer to the instructions manual to preserve safety protections.

TACHOMETER CONFIGURATION (RPM)

[21.1] Display module

From the Pro stage (see fig. 15.1), press ENTER to get access to the different configuration modules (InP = input, dSP = display, and, if option installed, SET = setpoints). Select the display module by pressing (the indication given in figure 21.1 appears on the display).

Press ENTER to enter this module.

[21.2] Pulses per revolution

The indication shown in figure 21.2 is displayed for 2 seconds before changing to the programming display for the number of pulses per revolution (PPr). This value can be set from 1 to 9999 pulses per revolution. After 2 seconds or by pressing ENTER, the numerical value appears on the display with the first digit flashing. To modify this value, press UP to increment the flashing digit until it reaches the desired value and press to move to the next digit to be modified. Repeat these operations until desired value is completed on the display and press ENTER to save the value and go to the next programming phase.
Pressing **ENTER** at the previous step [21.2] gives access to set the resolution of the display, after the 2 seconds the display will indicate as shown in figure 22.1 (dCP). Available options are “1” = reading without decimal point and “0.1” = reading with one decimal place. Press **UP** as desired to change the decimal point position on the display. Press **ENTER** to save the entry and return to the run mode.

To access to the programming of the sampling and limit times (see page 20), press and hold the **ENTER** key for 3 seconds. The display will indicate as shown in next figure.

**[22.1] Resolution**

Pressing **ENTER** at the previous step [21.2] gives access to set the resolution of the display, after the 2 seconds the display will indicate as shown in figure 22.1 (dCP). Available options are “1” = reading without decimal point and “0.1” = reading with one decimal place. Press **UP** as desired to change the decimal point position on the display. Press **ENTER** to save the entry and return to the run mode.

**[22.2] Sampling time**

The sampling time (two digits with a decimal place, see page 20) is present on the display after the symbol shown in figure 22.2.

Use the **UP** and **DOWN** procedure to modify the initially programmed value (from 0.1 to 9.9 seconds). Press **ENTER** to save the entry and proceed to the limit time programming phase.

**[22.3] Limit time**

The limit time program step (see figure 22.3) follows and is displayed for 2 seconds. Then the previously programmed numerical value will be displayed, with the first of its two digits flashing.

Use the **UP** and **DOWN** key procedure to modify the initially programmed value (from 1 to 10 seconds). Press **ENTER** to validate the entry and automatically return to the normal operation.
2.7 SETPOINT CONFIGURATION (accessible if LCI A-01 option is installed)

If a two-relay option is installed (see page 23) the instrument will allow entering the following routines: activation mode, delay or hysteresis and setpoint program lockout.

From the Pro stage (see fig. 15.1), press the key to access to the setpoint configuration module, indication "SET".

The setpoint numerical values, from the run mode press to recall the Pro stage and press to access the first setpoint value.

The display shown in figure 23.1 appears to indicate that the next step is to program the setpoint1 operating parameters (led Setpoint 1 activated). After 2 seconds or by pressing , the meter allows access to this menu.

The display then shows two digits: the leftmost one corresponds to the output mode (HI or LO) and the rightmost one corresponds to the delay unit (time -delay- or counts of display -hysteresis-) according to the table below the figure. Use the key to change the active digit value (flashing) and the key to go to the next digit to be set.

Press to save the selections and advance to the next step.

Depending on previous step selections, the display will indicate either the delay units (dLY) or hysteresis value (HYS) for 2 seconds. After 2 seconds or by pressing , the initially programmed numerical value appears on the display with the first digit flashing. To program the desired value (from 0 to 9999 counts of hysteresis or from 0 to 99 seconds of time delay) use the key to increment the active digit value and the key to advance to the next digit to be modified. Repeat this procedure until desired value is completed on the display and press to save and proceed to the programming of the setpoint 2 parameters.
PACKING CONTENTS

- Instructions manual in English including Declaration of Conformity.
- The digital panel instrument LCI108(J)-7x.
- Accessories for panel mounting (sealing gasket and fixing clips).
- Accessories for wiring connection (removable terminal block connectors and fingertip).
- Wiring label adhered to the instrument’s case JR/ JR20-TAC
- Set of 4 labels with different engineering units.

✓ Check packing contents.

CONFIGURATION

Power supply (pages 9 & 10)

- The instruments for 115/230V AC power supply, are set up at the factory for 230V AC.
- The instruments for 24/48V AC power supply, are set up at the factory for 48V AC.
- If the instrument is supplied for 12V DC, 24V or 48V DC power supply, it is not necessary to make any change.

✓ Check wiring label before connecting the instrument to the supply.

Programming instructions (page 11)

- The software inside the instrument allows configuring the input and display parameters. If a two-relay output option is installed ref. LCIA-01 (page 27), the software detects it on power up enabling a specific routine for setpoints configuration.

✓ Read this paragraph carefully.

Input type (page 12-15)

- The instrument provides an input for several sensor types including magnetic pickup, Namur, NPN/PNP type and TTL/24V DC (see page 13).

✓ Check the 5-position DIP-switch located on the main board.

Programming lockout (page 26)

- As shipped from the factory, the instrument allows full access to change programming parameters.
- To disable the possibility of making changes on the configuration, it is necessary to remove a plug-in jumper located on the main board.

✓ Check jumper position.

The display shown in figure 24.1 indicates that the next step is to program the setpoint 2 operating parameters (led Setpoint 2 activated). After 2 seconds or by pressing \( \text{ENTER} \), the meter allows access to this menu.

The display then shows two digits; the one on left corresponds to the output mode (HI or LO) and the rightmost one to the delay unit (time -delay- or counts of display -hysteresis-). See table in figure 24.1. Use the \( \text{▲} \) key to change the active digit value (flashing) and the \( \text{▼} \) key to go to the next digit to be modified.

Press \( \text{ENTER} \) to save changes and advance to the next step.

Depending on previous step selections, the display will indicate either the delay units (dLY) or hysteresis value (HYS) for 2 seconds. After 2 seconds or by pressing \( \text{ENTER} \), the initially programmed numerical value appears on the display with the first digit flashing. To program the desired value (from 0 to 9999 counts of hysteresis or from 0 to 99 seconds of time delay) use the \( \text{▲} \) key to increment the active digit value and the \( \text{▼} \) key to advance to the next digit to be modified. Repeat this procedure until desired value is completed on the display and press \( \text{ENTER} \) to save and advance to the next step.

The figure 24.3 shows one of the two options available at this step [LC 0 = setpoint values programming enabled (unlocked) or LC 1 = setpoint values programming disabled (locked)].

To modify this parameter, use the \( \text{▲} \) key to switch to the desired option. If you decide to lock the setpoint values, it will be also necessary to lock out the entire program routine (see page 18).

Press \( \text{ENTER} \) to save programmed data and return to the run mode (indication Stor).
2.1 - Power supply and connectors

To change the meter's physical configuration remove the case as shown in figure 9.1.

115/230 V AC (LCI108[J]-70): The instruments with 115/230 V AC power are set up at fabrication for 230 V AC (USA market 115 V AC), see figure 9.2. To change power supply configuration to 115 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

24/48 V AC (LCI108[J]-71): The instruments with 24/48 V AC power are set up at fabrication for 24 V AC, see figure 9.2. To change power supply configuration to 48 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

12, 24 or 48V DC (LCI108[J]-72, 3, 4): Instruments for DC power are set up for the supply voltage specified in the wiring label (12V, 24V or 48V according to the last digit of the order reference).

### Table 1. Jumper settings.

<table>
<thead>
<tr>
<th>Pin</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>230V AC</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>115V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 9.1. Disassembly.

2.1 – Power supply and connectors

To change the meter's physical configuration remove the case as shown in figure 9.1.

115/230 V AC (LCI108[J]-70): The instruments with 115/230 V AC power are set up at fabrication for 230 V AC (USA market 115 V AC), see figure 9.2. To change power supply configuration to 115 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

24/48 V AC (LCI108[J]-71): The instruments with 24/48 V AC power are set up at fabrication for 24 V AC, see figure 9.2. To change power supply configuration to 48 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

12, 24 or 48V DC (LCI108[J]-72, 3, 4): Instruments for DC power are set up for the supply voltage specified in the wiring label (12V, 24V or 48V according to the last digit of the order reference).

### Table 1. Jumper settings.

<table>
<thead>
<tr>
<th>Pin</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>230V AC</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>115V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24V AC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 9.2. Jumper settings for 230 V or 48 V AC

Fig. 9.3. Jumper settings for 115 V or 24 V AC

### [25.1] Setpoint Programming

To program the setpoint values, press enter to access the programming mode (indication Pro, figure 25.1) and press ▲ to make the display show the previously programmed value of setpoint 1.

NOTE: The setpoint values should be programmed within the selected measurement range.

### [25.2] Setpoint 1

During the programming of the setpoint 1 value, the LED 1 is activated.

The initially programmed value appears on the display with the first digit flashing. Press the ▲ key repeatedly to increment the active digit from 0 to 9 until it takes the desired value and press ▼ to advance to the next digit to be modified. Repeat these operations to complete the desired setpoint value with sign.

Press enter to save the entry and move on to the programming of setpoint 2.

### [25.3] Setpoint 2

During the programming of the setpoint 2 value, the LED 2 is activated.

Program the setpoint 2 value with sign by means of the ▲ key (change value) and ▼ key (change digit) procedure as described in previous step.

Press enter to store programmed data in the memory and exit from the programming mode.
INSTALLATION
To meet the requirements of the directive EN61010-1, where the unit is permanently connected to the mains supply, it is obligatory to install a circuit breaking device easy reachable to the operator and clearly marked as the disconnect device.

WARNING
In order to guarantee the electromagnetic compatibility, the following guidelines should be observed:

- Power supply wires must be routed separately from signal wires. Never run power and signal wires in the same conduit.
- Use shielded cable for signal wiring and connect the shield to the ground of the indicator (pin 2 CN1).
- The cable cross-section should be ≥0.25 mm²

If not installed and used in accordance with these instructions, protection against hazards may be impaired.

CONNECTORS
To perform wiring connections, remove the terminal block from the meter's connector, strip the wire leaving from 7 to 10mm exposed and insert it into the proper terminal while pushing the fingertip down to open the clip inside the connector as shown in the figure. Proceed in the same manner with all pins and plug the terminal block back to the corresponding meter’s connector. Each terminal can admit wires of section between 0.08 mm² and 2.5 mm² (AWG 26 – 14). Some terminals have removable adaptors to provide proper fastening for wires of sections less than 0.5 mm².

2.8 – Programming lockout

After completing the programming of the instrument, it is recommended that access to the programming be locked out to prevent accidental or unauthorized modifications.

This operation is made by taking off a plug-in jumper located on the main board circuit (see figure at right).

NOTE: Disconnect power before changing the jumper position.

While the instrument is locked out it is still possible to access the programming routines to check the current configuration, but it won't be possible to enter or modify data. In this case, a push of ENTER to access the programming routines will indicate dAtA instead of Pro.
2.2 - Programming Instructions

To enter in the programming mode
Connect the meter to the main supply, for approximately 1 second a self-test routine automatically activates all the digits of the display. After, the instrument goes to the normal operating mode (RUN).
To enter in the programming mode press the **Enter** key and hold for 5 seconds until the indication **Pro** shown in figure 11.1 appears on the display.

To exit from the programming mode
To return to the run mode, it is necessary to pass through the different menu steps by successively pressing the **Enter** key until the meter displays **Stor**, while internally storing the programmed parameters into the memory. After, it automatically goes to the normal operating mode.

How to interpret the programming instructions
The programming software routine is composed by a series of hierarchically organized menus, each allowing the setting of a specific parameter. In general, the normal sequence at each step is to push the **Enter** key a number of times to make changes and the **Enter** key to store them in the memory and advance to the next step.

The elements used along the programming instructions are described following.

- The programming instructions for each menu step are accompanied by a figure representing the display indication for the corresponding parameter. Pay special attention to the LED indications and active keys and follow the procedure described in the text to enter the desired data correctly.
- When the display indication is represented with blank segments, it means that this is one of the possible options of this menu (normally the default one) depending on the previous selection.
- A series of blanked ‘8’ represents any numerical value that can be changed by use of keys **<** (change digit) and **>** (change value).

### 3. LCIA-01 RELAY OUTPUT OPTION

As an option, the LCI108(J) models can be equipped with the following output option:

- A control output card with two SPDT relay outputs rating 8 A @ 250 V AC / 150 V DC. The outputs can be programmed for HI or LO operation and selectable time delay or hysteresis action. **Ref. LCIA-01**

The LCIA-01 option consists of an additional card installable to the meter’s main board by means of a plug-in connector.

The option is supplied with a specific instructions manual describing installation and characteristics. Nevertheless, the programming instructions are given in the LCI108(J) manual.

For more detailed information on characteristics, applications and mounting, please refer to the specific LCIA-01 instruction manual.
The enclosed diagram shows the complete programming routines for models JR/ JR20-TAC.

a) The basic parameters, which refer to the input and display configuration is organized into two modules: "InP" and "dSP".

b) If a 2-relay option (LCIA-01) is installed (see page 27), the module "Set", that allows configuring the option, is automatically included in the routines.

c) If a 2-relay option (LCIA-01) is installed, the setpoint value programming is directly entered from the Pro stage.

At the end of each module, the indication Stor appears while data is saved in the memory.

**4. TECHNICAL SPECIFICATIONS**

**INPUT**
- Maximum frequency ........................................... 7 KHz
- Minimum frequency ............................................ 0.1 Hz
- Excitation ..................................................... 8V @ 20mA or 22V ±5 @ 20mA

**Magnetic pickup**
- Sensitivity ............................................... Vin (AC) > 120 mV eff.

**NAMUR sensor**
- Rc .............................................. 1 KΩ (incorporated)
- Ion .................................................. < 1 mA DC
- Ioff ..................................................... > 3 mA DC

**NPN and PNP type sensors**
- Rc .............................................. 1 KΩ (incorporated)
- Logic levels ........................................ "0" < 2.4 V DC, "1" > 2.6 V DC

**TTL/24V DC (encoder)**
- Logic levels ........................................ "0" < 2.4 V DC, "1" > 2.6 V DC

**Contact closure**
- Vc ................................................... 5 V
- Rc ................................................... 3.9 KΩ (incorporated)
- Fc ...................................................... 100 Hz

**ACCURACY AT 23º ± 5º C**
- Max. error ................................................ ± (0.01% of the reading +1 digits)
- Temperature coefficient ..................................... 100 ppm/ ºC
- Warmup time ............................................. 5 minutes

**POWER SUPPLY**
- AC ................................................. 230/115 V, 24/48 V 50/60 Hz AC
- DC ................................................. 12V (10.5 to 16 V), 24V (21 to 32 V), 48V (42 to 64V)
- Consumption ............................................. 3 W

**FUSES (DIN 41661) - (Recommended)**
- LCI108(j)-70 (230/115V AC) ....................... F 0.1A / 250 V
- LCI108(j)-71 (24/48V AC) ....................... F 0.2A / 250 V
- LCI108(j)-72 (12 V DC) ......................... F 1A / 250 V
- LCI108(j)-73 (24 V DC) ......................... F 0.5A / 250 V
- LCI108(j)-74 (48 V DC) ......................... F 0.5A / 250 V

**DISPLAY**
- Type ............................................. 9999, 7-segment red LED
- LCI108 ........................................ 4 digits, 14 mm high
- LCI108j ........................................ 4 digits, 20 mm high
- Decimal point ............................................ programmable
- LED’s..................................................... 2, setpoint status
- Over range indication .................................. OvE

**ENVIRONMENTAL**
- Operating temperature ....................... -10 ºC to +60 ºC
- Storage temperature .......................... -25 ºC to +85 ºC
- Relative humidity (non condensing) ........<95 % at 40 ºC
- Maximum altitude ..................................... 2000m

**DIMENSIONS**
- Dimensions ........................................... 96x48x60 mm
- Panel cutout ........................................ 92x45 mm
- Weight ................................................... 250 g
- Case material ........................................ polycarbonate s/UL 94 V-0
- Frontal sealing ........................................ IP65
**2.4 - INPUT CONFIGURATION**

To configure the input to the indicator, set the switch SW1 as indicated in the table below.

<table>
<thead>
<tr>
<th>SW1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic pickup</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>NAMUR sensor</td>
<td>on</td>
<td>off</td>
<td>on</td>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>NPN type sensor</td>
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<td>off</td>
</tr>
<tr>
<td>TTL/ 24V (encoder) *</td>
<td>on</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>on</td>
</tr>
<tr>
<td>Contact closure</td>
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<td>on</td>
<td>on</td>
<td>off</td>
<td>on</td>
</tr>
</tbody>
</table>

* Factory setup

---

**4.1 - Dimensions and mounting**

To install the instrument into the panel, make a 92x45mm cutout and insert the instrument from the front placing the sealing gasket between this and the front bezel.

Place the fixing clips on both sides of the case and slide them over the guide tracks until they touch the panel at the rear side. Press slightly to fasten the bezel to the panel and secure the clips.

To remove the instrument from the panel, pull outwards the fixing clips rear tabs to disengage and slide them back over the case.

**CLEANING:** The front cover should be cleaned only with a soft cloth soaked in neutral soap product. **DO NOT USE SOLVENTS**
2. Signal connections.  
See wiring information on page 10.

INPUT SIGNAL CONNECTION (CN2)  
PIN 1 = -IN [common (-)]  
PIN 2 = +IN [LOW]  
PIN 3 = +EXC [24V DC (+)]  
PIN 4 = +EXC [8V DC (+)]  
PIN 5 = NOT CONNECTED

See wiring information on page 10.

5. WARRANTY

The instruments are warranted against defective materials and workmanship for a period of three years from date of delivery.

If a product appears to have a defect or fails during the normal use within the warranty period, please contact the distributor from which you purchased the product.

This warranty does not apply to defects resulting from action of the buyer such as mishandling or improper interfacing.

The liability under this warranty shall extend only to the repair of the instrument. No responsibility is assumed by the manufacturer for any damage that may result from its use.
Access to the Programming Mode

[15.1] Programming mode

Connect the instrument to the main supply, it automatically enters in a self-test routine, which briefly illuminates all segments and LEDs, shows the software version, and finally goes to the normal reading (“RUN” mode).

Press ENTER to access the programming mode.
The display shows the indication given in fig. 15.1. The LEDs 1 and 2 will flash during the programming mode (except when programming the setpoints).
Press ENTER to have access to the programming parameters.

2.5 - Input Configuration

[15.2] Input Module

Press ENTER to get access to the input configuration module (fig. 15.2).

Other modules (dSP = display, and, if option installed, SET = setpoints) are selected by pressing the key.

[15.3] Input type

The display shows the previously selected input type: tAC = tachometer for RPM or rATe = rate meter.

To change this parameter, press to switch to the desired option and press ENTER to save the choice in the memory and automatically return to the run mode (indication Stor).

6 - Declaration of Conformity

Manufacturer: Love Controls
Address: 102 Highway 212
Michigan City, IN 46360
USA
Declarations, that the product:

Name: Digital panel meter
Model: LCI108-xx and LCI108J-xx
Conforms with: EMC 89/336/CEE
LVD 73/23/CEE

Applicable Standards:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>EN50081-1 Generic emission Class B</th>
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</thead>
<tbody>
<tr>
<td>EN55022/CISPR22</td>
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<tr>
<td>EN50082-1 Generic immunity</td>
<td></td>
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<tr>
<td>IEC1000-4-2 Level 3 Criteria B</td>
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<td>Air Discharge 8kV</td>
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<td>Contact Discharge 6kV</td>
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<tr>
<td>IEC1000-4-3 Level 2 Criteria A</td>
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<tr>
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<td>1kV Power Lines</td>
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<tr>
<td>0.5kV Signal Lines</td>
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<td>EN61010-1 Generic Safety</td>
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<tr>
<td>Inputs/Outputs: Basic</td>
<td></td>
</tr>
</tbody>
</table>

Date: 1 January 2001
Signed: James W. Nolan
Title: Technical Sales Manager
2.6 - DISPLAY CONFIGURATION

The display configuration depends on the input type selected in the input module.

- As RATE METER, the display module includes programming of the input frequency with decimal point and the desired display with decimal point. The display/frequency ratio may be set for direct or reverse operation.
- As RPM METER, the only parameter necessary to configure the display is the number of pulses per revolution that delivers the sensor. Programming is completed with the display resolution.

To adjust the display to the particular system characteristics, the display module includes the parameters sampling time and limit time, which are accessible by holding the “ENTER” key for 3 seconds before exiting from the program routines.

2.6.1 RATE METER PROGRAMMING

**INPUT FREQUENCY (INP1)**

The “INP1” parameter refers to the input frequency generated by the transducer. This frequency must be within the specified limits (0.1Hz to 7KHz) and can be programmed with two, one or no decimal places.

**DESIRED DISPLAY (DSP1)**

The “DSP1” parameter is the desired display readout corresponding to the frequency programmed in the “INP” phase. The decimal point can be located in any of the digits of the display.

The display variation can be directly proportional to the input variation (increasing frequency → increasing display) or inversely proportional (increasing frequency → decreasing display and vice-versa).

The first menu step allows to select one of these modes (dir = direct, inv = reverse).

**EXAMPLE**

It is desired to measure the rate in m/s of a conveyor belt which is driven by a turning shaft of 20 cm diameter and 300 rpm that gives 4 pulses per revolution.

In 1 second, the shaft gives 20 pulses (300 rpm = 5 revolutions per second and 1 revolution = 4 pulses). The input frequency is then 20Hz. At such frequency, the rate of the conveyor belt is:

\[
\text{rpm} \times \pi \times d = 300 \times \pi \times 20 = 18849.6 \text{ cm/min} = 3.142 \text{ m/s}
\]

The INP1 and DSP1 parameters must be: INP1 = 20, DSP1 = 3.142.

The display mode must be selected for direct variation with respect to the input frequency (dir option).
With the setting of "INP1" and "DSP1", the instrument should be able to operate correctly. Depending on the system characteristics, it may be necessary to modify the internal measurement times.

After programming the "DSP1" parameter with decimal point, pressing ENTER for approximately 3 seconds provides access to set the numerical values of sampling and limit times.

**Sampling Time (TIME)**

With irregular input signals, the display may present fluttering or unwanted variations due to the number of input cycles detected at each reading are not equal.

The "TIME" parameter allows stretching the measurement interval while making an average of the readings taken along the programmed time. This reduces possible display jittering. The sampling time is programmable from 0.0 to 9.9 seconds. A value of 0.0 means that no average will be made. It is set at the factory to 1 second.

To help stabilize the display in case of irregular input signals, it is recommended to increment this parameter, taking into account that the display readout will be updated at the programmed time.

The sampling time can be reduced, if the input signal is stable at the operating frequency, to increase the display update rate.

**Limit Time (LIM)**

The limit time, programmable from 1 to 10 seconds, is used to adjust the waiting time for a minimum of 1 pulse to be produced at the input before considering it to be zero. The limit time is initialized at the reception of each input pulse. If no pulse is detected before completion of the programmed time, the display goes to zero.

The instrument is shipped from the factory with a limit time of 10 seconds.

Decreasing the limit time makes the instrument be able to respond more quickly to the zero condition when the system stops but this reduction increases the minimum displayable reading before the display goes to zero.

For example suppose that the desired readout for an input frequency of 1kHz is 1000 liters/second.

With a limit time of 10s, the minimum frequency is 0.1Hz and the display readout at this frequency is 0.1 liter/second. Since this value would not be readable in a display of 1000 counts, the limit time could be reduced to 1 second, so the minimum frequency will be 1Hz and the minimum readout before displaying zero will be 1 liter/second.
The first menu parameter allows selection between two display modes. The direct mode must be selected when the display readout and the input frequency are to be in a direct proportion, that is, the display goes high as the frequency grows. The reverse mode should be selected when reading variables that are inversely proportional to the input frequency.

Press \( \text{dir} \) to change the previously selected option if desired (dir = direct mode, inv = reverse mode) and press \( \text{ENTER} \) to retain the choice and advance to the next programming step.

The display indicates as shown in figure 18.3 for. After 2s or by pressing \( \text{ENTER} \), the display shows the selected frequency value (depending on previous setting) with the first digit flashing. If desired, modify this value by pressing \( \text{UP} \) to vary the flashing digit from 0 to 9. Use the \( \text{UP} \) key to advance to the next digit to be modified. Repeat these operations until the display reads the required value and press \( \text{ENTER} \) to save the entry in the memory. The decimal point will then flash. Press the \( \text{UP} \) key repeatedly to move the decimal point to the desired position, if required. Press \( \text{ENTER} \) to save changes and go to the next programming step.
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**[19.1] Desired display**

After programming the input frequency, pressing the **ENTER** key provides access to program the desired display for this frequency. The display shown in figure 19.1 appears for 2s before giving access to set the numerical value. Proceed as in section 18.3. (△ increments digit value, ▶ changes digit) until the desired value is displayed. Press **ENTER** to make the decimal point flash, and use ▲ to move it to the desired location. Finally press **ENTER** to save and go to the run mode.

To access the programming of the sampling and limit times (see page 17), hold down the **ENTER** key for 3 seconds. The display will appear as shown on next figure.

---

**[19.2] Sampling time**

The display shows the symbol shown in figure 19.2, followed (after 2 seconds) by the sampling time (two digits with a decimal place, see page 17).

Use the ▲ and ▶ key procedure to modify the initially programmed value (from 0.1 to 9.9 seconds). Press **ENTER** to save the entry and proceed to the limit time programming phase.

---

**[19.3] Limit time**

The limit time program symbol (see figure 19.3) is followed (after 2 seconds) by the previously programmed limit time value with the first of its two digits flashing.

Use the ▲ and ▶ key procedure to modify the initially programmed value (from 1 to 10 seconds). Press **ENTER** to save the entry and automatically return to normal operation.
2.6.2 RPM TACHOMETER PROGRAMMING

PULSES PER REVOLUTION (PPR)

The "PPr" parameter is the number of pulses given by a complete revolution of the sensor connected to the instrument's input. It is programmable from 1 to 9999.

RESOLUTION (DCP)

The "dCP" parameter allows setting the display resolution to units (without decimal point) or to tenths (with one decimal place).

EXAMPLE

It is desired to display the rate of a turning shaft that delivers 50 pulses per each revolution.

As the only necessary parameter, the "PPr" (pulses per revolution) must be programmed to 50. The "dCP" parameter should be set to the desired resolution based on the maximum reading.

With the setting of "PPr" and "dCP" the instrument should be able to operate correctly. Depending on sensor characteristics, it may be necessary to adjust the internal sampling and limit times.

After programming "dCP", a pressing [ENTER] for 3 seconds gives access to program these parameters.

SAMPLING TIME (TIME)

With irregular input signals, the display may exhibit dithering or show unwanted variations due to and unequal number of input cycles detected during each reading cycle.

The "TIME" parameter allows changing the measurement interval to average of the readings taken over the programmed time. This reduces possible display dithering.

The sampling time is programmable from 0.0 to 9.9 seconds.

A value of 0.0 means that no average will be made. It is set at the factory to 1 second.

LIMIT TIME (LIM)

The limit time, programmable from 1 to 10 seconds, is used to adjust the time over which a single pulse at the input is considered to be zero.

The limit time is initialized at the receipt of each input pulse. If no pulse is detected before completion of the programmed time, the display goes to zero.

The instrument is shipped from the factory with a limit time of 10 seconds.

Decreasing the limit time makes the instrument be able to respond more quickly to the zero condition when the system stops, but this reduction leads to an increase of the minimum displayable reading before the display goes to zero.
This manual describes the models LCI108-7x and LCI108J-7x, both instruments are 1/8 DIN, shallow depth format.

The difference between both models is the size of the digits of the display. The LCI108J-7x provides 20mm-high digits which make it easy readable at long distances. In this manual both models are referred with the generic name of LCI108.

The Model LCI108 are fully configurable by software to measure rpm or rate in the desired units. The input stage admits direct connection of several sensor types which are selected by a DIP-switch.

The basic instrument is a soldered assembly composed of the main board, and the display and keyboard module.

Optionally, it can be equipped with a 2-relay control output card (LCIA-01). This option provides an output connector at the rear of the meter; status LED’s visible from the front and specific programming routines that are enabled automatically once the card is installed.

The outputs are isolated from signal input and power supply.

---

**TACHOMETER CONFIGURATION (RPM)**

**[21.1] Display module**

From the Pro stage (see fig. 15.1), press `ENTER` to get access to the different configuration modules (InP = input, dSP = display, and, if option installed, SEt = setpoints). Select the display module by pressing (the indication given in figure 21.1 appears on the display).

Press `ENTER` to enter this module.

**[21.2] Pulses per revolution**

The indication shown in figure 21.2 is displayed for 2 seconds before changing to the programming display for the number of pulses per revolution (PPr). This value can be set from 1 to 9999 pulses per revolution. After 2 seconds or by pressing `ENTER`, the numerical value appears on the display with the first digit flashing. To modify this value, press `UP` to increment the flashing digit until it reaches the desired value and press `SHIFT` to move to the next digit to be modified. Repeat these operations until desired value is completed on the display and press `ENTER` to save the value and go to the next programming phase.

---

This instrument conforms the following community standards: 89/336/CEE and 73/23/CEE

WARNING: Refer to the instructions manual to preserve safety protections.
[22.1] Resolution

Pressing **ENTER** at the previous step [21.2] gives access to set the resolution of the display, after the 2 seconds the display will indicate as shown in figure 22.1 (dCP). Available options are **"1"** = reading without decimal point and **"0.1"** = reading with one decimal place. Press **UP** as desired to change the decimal point position on the display. Press **ENTER** to save the entry and return to the run mode.

To access to the programming of the sampling and limit times (see page 20), press and hold the **ENTER** key for 3 seconds. The display will indicate as shown in next figure.

[22.2] Sampling time

The sampling time (two digits with a decimal place, see page 20) is present on the display after the symbol shown in figure 22.2.

Use the **UP** and **SHIFT** procedure to modify the initially programmed value (from 0.1 to 9.9 seconds). Press **ENTER** to save the entry and proceed to the limit time programming phase.

[22.3] Limit time

The limit time program step (see figure 22.3) follows and is displayed for 2 seconds. Then the previously programmed numerical value will be displayed, with the first of its two digits flashing.

Use the **UP** and **SHIFT** key procedure to modify the initially programmed value (from 1 to 10 seconds). Press **ENTER** to validate the entry and automatically return to the normal operation.
2.7 SETPOINT CONFIGURATION (accessible if LCI A-01 option is installed)

If a two-relay option is installed (see page 23) the instrument will allow entering the following routines: activation mode, delay or hysteresis and setpoint program lockout.

From the Pro stage (see fig. 15.1), press the key to access to the setpoint configuration module, indication "SET".

The setpoint numerical values, from the run mode press to recall the Pro stage and press to access the first setpoint value.

The display shown in figure 23.1 appears to indicate that the next step is to program the setpoint1 operating parameters (led Setpoint 1 activated). After 2 seconds or by pressing , the meter allows access to this menu.

The display then shows two digits: the leftmost one corresponds to the output mode (HI or LO) and the rightmost one corresponds to the delay unit (time -delay- or counts of display -hysteresis-) according to the table below the figure. Use the key to change the active digit value (flashing) and the key to go to the next digit to be set.

Press to save the selections and advance to the next step.

Depending on previous step selections, the display will indicate either the delay units (dLY) or hysteresis value (HYS) for 2 seconds. After 2 seconds or by pressing , the initially programmed numerical value appears on the display with the first digit flashing. To program the desired value (from 0 to 9999 counts of hysteresis or from 0 to 99 seconds of time delay) use the key to increment the active digit value and the key to advance to the next digit to be modified. Repeat this procedure until desired value is completed on the display and press to save and proceed to the programming of the setpoint 2 parameters.
2. OPERATING INSTRUCTIONS

PACKING CONTENTS

- Instructions manual in English including Declaration of Conformity.
- The digital panel instrument LCI108(J)-7x.
- Accessories for panel mounting (sealing gasket and fixing clips).
- Accessories for wiring connection (removable terminal block connectors and fingertip).
- Wiring label adhered to the instrument’s case JR/ JR20-TAC
- Set of 4 labels with different engineering units.

✓ Check packing contents.

CONFIGURATION

Power supply (pages 9 & 10)

- The instruments for 115/230V AC power supply, are set up at the factory for 230V AC.
- The instruments for 24/48V AC power supply, are set up at the factory for 48V AC.
- If the instrument is supplied for 12V DC, 24V or 48V DC power supply, it is not necessary to make any change.

✓ Check wiring label before connecting the instrument to the supply.

Programming instructions (page 11)

- The software inside the instrument allows configuring the input and display parameters. If a two-relay output option is installed ref. LCIA-01 (page 27), the software detects it on power up enabling a specific routine for setpoints configuration.

✓ Read this paragraph carefully.

Input type (page 12-15)

- The instrument provides an input for several sensor types including magnetic pickup, Namur, NPN/PNP type and TTL/24V DC (see page 13).

✓ Check the 5-position DIP-switch located on the main board.

Programming lockout (page 26)

- As shipped from the factory, the instrument allows full access to change programming parameters. To disable the possibility of making changes on the configuration, it is necessary to remove a plug-in jumper located on the main board.

✓ Check jumper position.

---

The display shown in figure 24.1 indicates that the next step is to program the setpoint 2 operating parameters (led Setpoint 2 activated). After 2 seconds or by pressing ENTER, the meter allows access to this menu.

The display then shows two digits, the one on left corresponds to the output mode (HI or LO) and the rightmost one to the delay unit (time -delay- or counts of display -hysteresis-). See table in figure 24.1. Use the key to change the active digit value (flashing) and the key to go to the next digit to be modified.

Press ENTER to save changes and advance to the next step.

Depending on previous step selections, the display will indicate either the delay units (dLY) or hysteresis value (HYS) for 2 seconds. After 2 seconds or by pressing ENTER, the initially programmed numerical value appears on the display with the first digit flashing. To program the desired value (from 0 to 9999 counts of hysteresis or from 0 to 99 seconds of time delay) use the key to increment the active digit value and the key to advance to the next digit to be modified. Repeat this procedure until desired value is completed on the display and press ENTER to save and advance to the next step.

The figure 24.3 shows one of the two options available at this step [LC O = setpoint values programming enabled (unlocked) or LC 1 = setpoint values programming disabled (locked)].

To modify this parameter, use the key to switch to the desired option. If you decide to lock the setpoint values, it will be also necessary to lock out the entire program routine (see page 18).

Press ENTER to save programmed data and return to the run mode (indication Stor).
2.1 - Power supply and connectors

To change the meter’s physical configuration remove the case as shown in figure 9.1.

115/230 V AC (LCI108[J]-70): The instruments with 115/230 V AC power are set up at fabrication for 230 V AC (USA market 115 V AC), see figure 9.2. To change power supply configuration to 115 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

24/48 V AC (LCI108[J]-71): The instruments with 24/48 V AC power are set up at fabrication for 24 V AC, see figure 9.2. To change power supply configuration to 48 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

12, 24 or 48V DC (LCI108[J]-72, 3, 4): Instruments for DC power are set up for the supply voltage specified in the wiring label (12V, 24V or 48V according to the last digit of the order reference).

<table>
<thead>
<tr>
<th>Table 1. Jumper settings.</th>
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</thead>
<tbody>
<tr>
<td>Pin</td>
</tr>
<tr>
<td>230V AC</td>
</tr>
<tr>
<td>115V AC</td>
</tr>
<tr>
<td>48V AC</td>
</tr>
<tr>
<td>24V AC</td>
</tr>
</tbody>
</table>

[25.1] Setpoint Programming

To program the setpoint values, press ENTER to access the programming mode (indication Pro, figure 25.1) and press ▲ to make the display show the previously programmed value of setpoint 1.

NOTE: The setpoint values should be programmed within the selected measurement range.

[25.2] Setpoint 1

During the programming of the setpoint 1 value, the LED 1 is activated.

The initially programmed value appears on the display with the first digit flashing. Press the ▲ key repeatedly to increment the active digit from 0 to 9 until it takes the desired value and press ▼ to advance to the next digit to be modified. Repeat these operations to complete the desired setpoint value with sign.

Press ENTER to save the entry and move on to the programming of setpoint 2.

[25.3] Setpoint 2

During the programming of the setpoint 2 value, the LED 2 is activated.

Program the setpoint 2 value with sign by means of the ▲ key (change value) and ▼ key (change digit) procedure as described in previous step.

Press ENTER to store programmed data in the memory and exit from the programming mode.
**INSTALLATION**

To meet the requirements of the directive EN61010-1, where the unit is permanently connected to the mains supply, it is obligatory to install a circuit breaking device easy reachable to the operator and clearly marked as the disconnect device.

**WARNING**

In order to guarantee the electromagnetic compatibility, the following guidelines should be observed:
- Power supply wires must be routed separately from signal wires. Never run power and signal wires in the same conduit.
- Use shielded cable for signal wiring and connect the shield to the ground of the indicator (pin2 CN1).
- The cable cross-section should be ≥0.25 mm²

*If not installed and used in accordance with these instructions, protection against hazards may be impaired.*

---

**CONNECTORS**

To perform wiring connections, remove the terminal block from the meter’s connector, strip the wire leaving from 7 to 10mm exposed and insert it into the proper terminal while pushing the fingertip down to open the clip inside the connector as shown in the figure. Proceed in the same manner with all pins and plug the terminal block back to the corresponding meter’s connector. Each terminal can admit wires of section between 0.08 mm² and 2.5 mm² (AWG 26 ÷ 14). Some terminals have removable adaptors to provide proper fastening for wires of sections less than 0.5 mm².

---

**AC VERSIONS**

- PIN 1 – AC PHASE
- PIN 2 – GND (GROUND)
- PIN 3 – AC NEUTRAL

**DC VERSIONS**

- PIN 1 – DC POSITIVE
- PIN 2 – Not connected
- PIN 3 – DC NEGATIVE

---

**2.8 – Programming lockout**

After completing the programming of the instrument, it is recommended that access to the programming be locked out to prevent accidental or unauthorized modifications.

This operation is made by taking off a plug-in jumper located on the main board circuit (see figure at right).

**NOTE:** Disconnect power before changing the jumper position.

While the instrument is locked out it is still possible to access the programming routines to check the current configuration, but it won’t be possible to enter or modify data. In this case, a push of ENTER to access the programming routines will indicate data instead of Pro.
2.2 - Programming Instructions

To enter in the programming mode
Connect the meter to the main supply, for approximately 1 second a self-test routine automatically activates all the digits of the display. After, the instrument goes to the normal operating mode (RUN).
To enter in the programming mode press the ENTER key and hold for 5 seconds until the indication Pro shown in figure 11.1 appears on the display.

To exit from the programming mode
To return to the run mode, it is necessary to pass through the different menu steps by successively pressing the ENTER key until the meter displays Stor, while internally storing the programmed parameters into the memory. After, it automatically goes to the normal operating mode.

How to interpret the programming instructions
The programming software routine is composed by a series of hierarchically organized menus, each allowing the setting of a specific parameter. In general, the normal sequence at each step is to push the key a number of times to make changes and the ENTER key to store them in the memory and advance to the next step.

The elements used along the programming instructions are described following.

[11.1] Programming Method

The programming instructions for each menu step are accompanied by a figure representing the display indication for the corresponding parameter. Pay special attention to the LED indications and active keys and follow the procedure described in the text to enter the desired data correctly.
When the display indication is represented with blank segments, it means that this is one of the possible options of this menu (normally the default one) depending on the previous selection.
A series of blanked ‘8’ represents any numerical value that can be changed by use of keys (change digit) and (change value).

3. LCIA-01 RELAY OUTPUT OPTION

As an option, the LCI108(J) models can be equipped with the following output option:

• A control output card with two SPDT relay outputs rating 8 A @ 250 V AC / 150 V DC. The outputs can be programmed for HI or LO operation and selectable time delay or hysteresis action. Ref. LCIA-01

The LCIA-01 option consists of an additional card installable to the meter’s main board by means of a plug-in connector.

The option is supplied with a specific instructions manual describing installation and characteristics. Nevertheless, the programming instructions are given in the LCI108(J) manual.

For more detailed information on characteristics, applications and mounting, please refer to the specific LCIA-01 instruction manual.
The enclosed diagram shows the complete programming routines for models JR/ JR20-TAC.

a) The basic parameters, which refer to the input and display configuration is organized into two modules: “InP” and “dSP”.

b) If a 2-relay option (LCIA-01) is installed (see page 27), the module “Set”, that allows configuring the option, is automatically included in the routines.

c) If a 2-relay option (LCIA-01) is installed, the setpoint value programming is directly entered from the Pro stage.

At the end of each module, the indication Stor appears while data is saved in the memory.

4. TECHNICAL SPECIFICATIONS

INPUT
- Maximum frequency ............................................. 7 KHz
- Minimum frequency ............................................. 0.1 Hz
- Excitation ........................................ 8V @ 20mA or 22V ±5 @ 20mA

Magnetic pickup
- Sensitivity ........................................ Vin (AC) > 120 mV eff.

NAMUR sensor
- Rc ........................................ 1 KΩ (incorporated)
- Ion .............................................. < 1 mA DC
- Ioff ................................................ > 3 mA DC

NPN and PNP type sensors
- Rc ........................................ 1 KΩ (incorporated)
- Logic levels ........................................... “0” < 2.4 V DC, “1” > 2.6 V DC

TTL/24V DC (encoder)
- Logic levels ......................................... “0” < 2.4 V DC, “1” > 2.6 V DC

Contact closure
- Vc ........................................ 5 V
- Rc ........................................ 3.9 KΩ (incorporated)
- Fc ........................................ 100 Hz

ACCURACY AT 23º ± 5º C
- Max. error ........................................ ± (0.01% of the reading +1 digits)
- Temperature coefficient ................................ 100 ppm/ºC
- Warmup time ........................................... 5 minutes

POWER SUPPLY
- AC ........................................ 230/115 V, 24/48 V 50/60 Hz AC
- DC ........................................ 12V (10.5 to 16 V), 24V (21 to 32 V), 48V (42 to 64V)
- Consumption ................................................. 3 W

FUSES (DIN 41661) - (Recommended)
- LC108(J)-70 (230/115V AC) ......................... F 0.1A / 250 V
- LC108(J)-71 (24/48V AC) ......................... F 0.2A / 250 V
- LC108(J)-72 (12 V DC) ............................. F 0.1A / 250 V
- LC108(J)-73 (24 V DC) ............................. F 0.5A / 250 V
- LC108(J)-74 (48 V DC).............................. F 0.5A / 250 V

DISPLAY
- Type ............................................ 9999, 7-segment red LED
- LC108 ............................................ 4 digits, 14mm high
- LC108J ........................................... 4 digits, 20mm high
- Decimal point ............................................. programmable
- LED’s ......................................... 2, setpoint status
- Over range indication ..................................... OvE

ENVIRONMENTAL
- Operating temperature ................................ -10 ºC to +60 ºC
- Storage temperature .................................. -25 ºC to +85 ºC
- Relative humidity (non condensing) ........... <95 % at 40 ºC
- Maximum altitude ........................................ 2000m

DIMENSIONS
- Dimensions ........................................... 96x48x60 mm
- Panel cutout ........................................... 92x45 mm
- Weight ............................................. 250 g
- Case material ............................................. polycarbonate s/UL 94 V-0
- Frontal sealing ......................................... IP65
To configure the input to the indicator, set the switch SW1 as indicated in the table below.

1. Sensor type switch settings
Before connecting the input signal to the instrument, set the 5-position DIP-switch SW1 (see figure) according to the sensor type as indicated in the table below.
To make changes remove the instrument from the case as shown in figure 9.1.

<table>
<thead>
<tr>
<th>SW1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic pickup</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>NAMUR sensor</td>
<td>on</td>
<td>off</td>
<td>on</td>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>NPN type sensor</td>
<td>on</td>
<td>on</td>
<td>off</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>PNP type sensor</td>
<td>on</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>TTL/ 24V (encoder) *</td>
<td>on</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>on</td>
</tr>
<tr>
<td>Contact closure</td>
<td>on</td>
<td>on</td>
<td>on</td>
<td>off</td>
<td>on</td>
</tr>
</tbody>
</table>

* Factory setup

Fig. 13.1. Main circuit ref. 474, component side

4.1 - Dimensions and mounting
To install the instrument into the panel, make a 92x45mm cutout and insert the instrument from the front placing the sealing gasket between this and the front bezel.

Place the fixing clips on both sides of the case and slide them over the guide tracks until they touch the panel at the rear side. Press slightly to fasten the bezel to the panel and secure the clips.

To remove the instrument from the panel, pull outwards the fixing clips rear tabs to disengage and slide them back over the case.

**CLEANING:** The front cover should be cleaned only with a soft cloth soaked in neutral soap product. DO NOT USE SOLVENTS
INPUT SIGNAL CONNECTION (CN2)
PIN 1 = -IN [common (-)]
PIN 2 = +IN [LOW]
PIN 3 = +EXC [24V DC (+)]
PIN 4 = +EXC [8V DC (+)]
PIN 5 = NOT CONNECTED

2. Signal connections.
See wiring information on page 10.

See wiring information on page 10.

5. WARRANTY

The instruments are warranted against defective materials and workmanship for a period of three years from date of delivery.

If a product appears to have a defect or fails during the normal use within the warranty period, please contact the distributor from which you purchased the product.

This warranty does not apply to defects resulting from action of the buyer such as mishandling or improper interfacing.

The liability under this warranty shall extend only to the repair of the instrument. No responsibility is assumed by the manufacturer for any damage that may result from its use.
**ACCESS TO THE PROGRAMMING MODE**

### [15.1] Programming mode

Connect the instrument to the main supply, it automatically enters in a self-test routine, which briefly illuminates all segments and LEDs, shows the software version, and finally goes to the normal reading (“RUN” mode).

Press **ENTER** to access the programming mode. The display shows the indication given in fig. 15.1. The LEDs 1 and 2 will flash during the programming mode (except when programming the setpoints). Press **ENTER** to have access to the programming parameters.

### [2.5] INPUT CONFIGURATION

#### [15.2] Input Module

Press **ENTER** to get access to the input configuration module (fig. 15.2).

Other modules (dSP = display, and, if option installed, SEt = setpoints) are selected by pressing the **key**.

#### [15.3] Input type

The display shows the previously selected input type: **tAC** = tachometer for RPM or **rAtE** = rate meter. To change this parameter, press **right** to switch to the desired option and press **ENTER** to save the choice in the memory and automatically return to the run mode (indication **Stor**).

### 6 - DECLARATION OF CONFORMITY

**Manufacturer:** Love Controls  
**Address:** 102 Highway 212  
Michigan City, IN 46360  
USA  

**Declares, that the product:**  
**Name:** Digital panel meter  
**Model:** LCI108-xx and LCI108J-xx  
**Conforms with:** EMC 89/336/CEE  
LVD 73/23/CEE

**Applicable Standards:**  
- EN50081-1 Generic emission Class B  
- EN55022/CISPR22 Class B  
- EN50082-1 Generic immunity  
  - Level 3 Criteria B  
  - Air Discharge 8kV  
  - Contact Discharge 6kV  
- IEC1000-4-2  
  - Level 2 Criteria A  
  - 3V/m 80..1000MHz  
- IEC1000-4-3  
  - Level 2 Criteria B  
  - 1kV Power Lines  
  - 0.5kV Signal Lines

**Applicable Standards:**  
- EN61010-1 Generic Safety  
  - Installation Category II  
  - Transient Voltages <2.5kV  
  - Degree of Pollution 2  
  - Conductive pollution excluded  
  - Insulation type  
  - Enclosure: Double  
  - Inputs/Outputs: Basic

**Date:** 1 January 2001  
**Signed:** James W. Nolan  
**Title:** Technical Sales Manager
2.6 - DISPLAY CONFIGURATION

The display configuration depends on the input type selected in the input module. 
- As RATE METER, the display module includes programming of the input frequency with decimal point and the desired display with decimal point. The display/frequency ratio may be set for direct or reverse operation. 
- As RPM METER, the only parameter necessary to configure the display is the number of pulses per revolution that delivers the sensor. Programming is completed with the display resolution. 

To adjust the display to the particular system characteristics, the display module includes the parameters sampling time and limit time, which are accessible by holding the “ENTER” key for 3 seconds before exiting from the program routines.

2.6.1 RATE METER PROGRAMMING

INPUT FREQUENCY (INP1)

The “INP1” parameter refers to the input frequency generated by the transducer. This frequency must be within the specified limits (0.1Hz to 7KHz) and can be programmed with two, one or no decimal places.

DESIRE DISPLAY (DSP1)

The “DSP1” parameter is the desired display readout corresponding to the frequency programmed in the “INP” phase. The decimal point can be located in any of the digits of the display.

The display variation can be directly proportional to the input variation (increasing frequency → increasing display) or inversely proportional (increasing frequency → decreasing display and vice-versa). The first menu step allows to select one of these modes (dir = direct, inv = reverse).

EXAMPLE

It is desired to measure the rate in m/s of a conveyor belt which is driven by a turning shaft of 20 cm diameter and 300 rpm that gives 4 pulses per revolution. 

In 1 second, the shaft gives 20 pulses (300 rpm = 5 revolutions per second and 1 revolution = 4 pulses). The input frequency is then 20Hz. At such frequency, the rate of the conveyor belt is:

\[
\text{rpm} \times \pi \times d = 300 \times \pi \times 20 = 18849.6 \text{ cm/min} = 3.142 \text{ m/s}
\]

The INP1 and DSP1 parameters must be: INP1 = 20, DSP1 = 3.142.

The display mode must be selected for direct variation with respect to the input frequency (dir option).