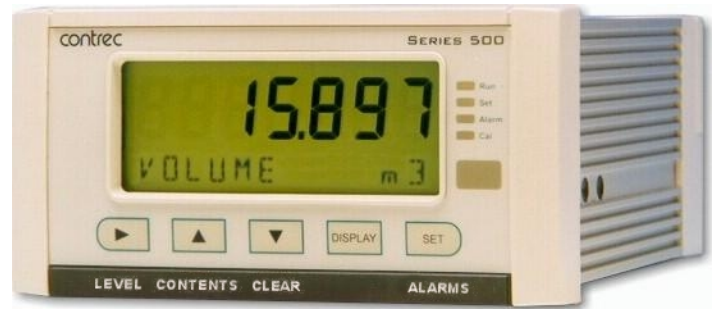


# Application LM01

## Single Tank Level Monitor

for Analog Level Sensors



### Features

- 20 point level to volume strapping table
- Level control output
- Accepts level and pressure (product head) sensors
- Density correction available for pressure level sensors
- Provides volume to mass conversion via density value
- Freely assignable alarms for high or low levels
- Selection of second language and user tags
- RTC logging with up to 100 entries at user-specified scheduled times
- 4-20mA retransmission
- RS-232 and RS-485 (optional) serial ports
- Modbus RTU, Printer and other serial port protocols
- Front panel adjustment of 8-24V DC output voltage
- Backlit display



### Overview

The 505 LM01 application monitors and measures the level of product in a single tank. The instrument uses the 4-20mA signal from a wide range of level sensors, including pressure transmitters, ultrasonic sensors and capacitance probes.

The level monitor provides a 20 point strapping table and product density for level to volume and volume to mass conversions. The instrument can display Volume, Percentage Full and Mass as well as Level. Relay alarms are freely assignable as high or low alarms and an open collector output is provided for programmable level control.

A sub-menu gives full details of alarm status and can offer direct access to change the alarm setpoints. The instrument also has density correction available for pressure level sensors to cater for a deviation in product density.

### Calculations

Calculations are based on the analog input signal representing the product level in the tank.

$$level = (Lmax - Lmin) \times A + Lmin$$

$$volume = (Vmax - Vmin) \times A^* + Vmin$$

$$mass = volume \times density$$

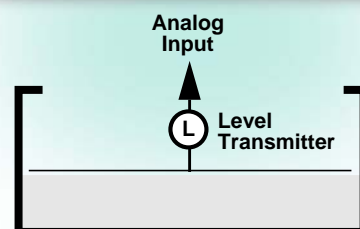
where:

A = normalised input signal with density correction.

A\* = A for linear tanks.

A\* = f(A) for non-linear tanks.

f(A) = level to volume normalised strapping table.



## Displayed Information

The front panel display shows the current values of the input variables and the results of the calculations. A list of the variables for this application and their type (total or rate) is shown at the end of this document.

The instrument can be supplied with a real-time clock for data logging of up to 100 entries of the variables as displayed on the main menu.

## Communications

There are two communication ports available as follows:

- RS-232 port
- RS-485 port

The ports can be used for remote data reading, printouts and for initial application loading of the instrument.

## Retransmission & Control Outputs

The instrument can re-transmit any main menu variable. The digital output can be used as logic levels for control outputs. If the instrument has the advanced option, it outputs rates as a 4-20mA signal.

## Relay Outputs

The relay alarms can be assigned to any of the main menu variables of a rate type. The alarms can be fully configured including hysteresis. Two relays are standard.

## Software Configuration

The instrument can be further tailored to suit specific application needs including units of measurement, custom tags, second language or access levels. A distributor can configure these requirements before delivery.

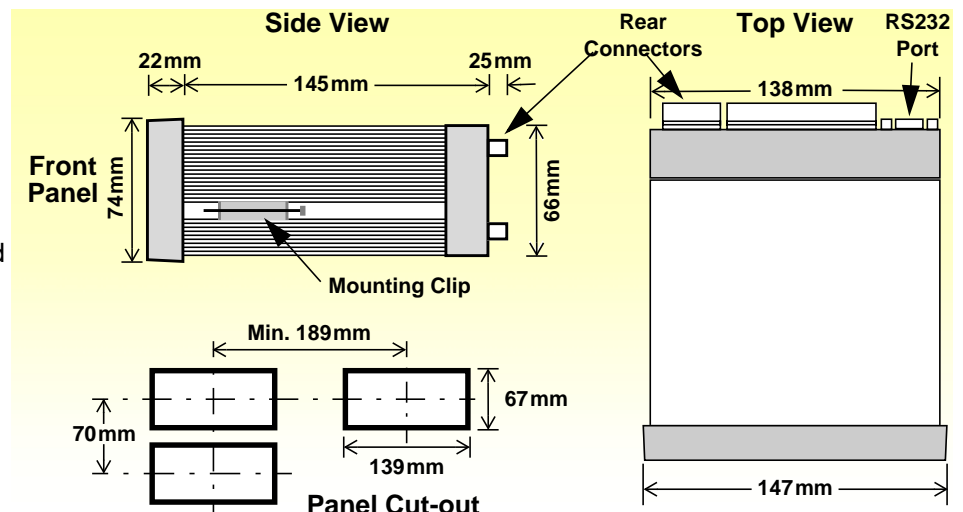
Instrument parameters including units of measurement can be programmed in the field, according to the user access levels assigned to parameters by the distributor.

## Dimension Drawings

### Part Number

505.XXXXXX-LM01  
see **Product Codes** to select required features

Default Application software:  
505-LM01-000000



All set-up parameters and logged data are stored in non-volatile memory with at least 30 years retention.

## Terminal Designations

Terminal Label	Designation	Comment
1	+	RS485 (+)
2	-	RS485 (-)
3	G	Comms ground
4	Tx	RS232 data out
5	Rx	RS232 data in
6	C	CTS (Clear to send)
7	Io	4-20mA output
8	SG	Signal Ground 0V
9	Li	Logic input
10	1+	Open collector o/p 1
11	2+	Open collector o/p 2
12	li	4-20mA input
13	SG	Signal Ground 0V
14	Fi	Frequency input
15	Vo	8-24 volts DC output
16	G	DC Ground
17	Vi	DC power input
18	SH	Shield terminal
19	R1	Relay 1
20	RC	Relay Common
21	R2	Relay 2
E	E	Mains ground
N	N	Mains neutral
A	A	Mains active
RS232 port		9-pin serial port

# Specifications

## Operating Environment

<b>Temperature</b>	0°C to +60°C (conformal coating) +5°C to +40°C (no coating)
<b>Humidity</b>	0 to 95% non condensing (conformal coating) 5% to 85% non condensing (no coating)
<b>Power Supply</b>	95...135 V AC or 190...260 V AC or 12...28 V DC
<b>Consumption</b>	6W (typical)
<b>Protection</b>	Sealed to IP65 (Nema 4X) when panel mounted
<b>Dimensions</b>	147mm (5.8") width 74mm (2.9") height 167mm (6.6") depth

## Display

<b>Type</b>	LCD with 7-digit numeric display and 11-character alphanumeric display (backlit optional)
<b>Digits</b>	15.5mm (0.6") high
<b>Characters</b>	6mm (0.24") high
<b>LCD Backup</b>	Last data visible for 15min after power down (optional)
<b>Update Rate</b>	0.3 second

## Non-volatile Memory

<b>Retention</b>	> 30 years
<b>Data Stored</b>	Setup, Totals and Logs

## Approvals

<b>Interference</b>	CE compliance
<b>Enclosure</b>	ATEX, FM, CSA and SAA approved enclosures available for hazardous areas

## Real Time Clock (Optional)

<b>Battery Type</b>	3 volts Lithium button cell (CR2032)
<b>Battery Life</b>	5 years (typical)

## 4-20mA Input

<b>Overcurrent</b>	100mA absolute maximum rating
<b>Impedance</b>	250 Ohms (to common signal ground)
<b>Accuracy</b>	0.1% typical full scale (20°C) 0.2% (full temperature range)
<b>Non-linearity</b>	Up to 20 correction points (flow inputs)

## Remote Key Input

<b>Signal Type</b>	CMOS, TTL, open collector, reed switch
<b>Configuration</b>	One input set as one of front five keys

## Relay Output

<b>No. of Outputs</b>	2 relays
<b>Voltage</b>	250 volts AC, 30 volts DC maximum
<b>Current</b>	3A maximum

## Communication Ports

<b>Ports</b>	RS-232 port RS-485 port
<b>Baud Rate</b>	2400 to 19200 baud
<b>Parity</b>	Odd, even or none
<b>Stop Bits</b>	1 or 2
<b>Data Bits</b>	8
<b>Protocols</b>	Modbus RTU, Printer*

## Transducer Supply

<b>Voltage</b>	8 to 24 volts DC, programmable
<b>Current</b>	70mA @ 24V, 120mA @ 12V maximum
<b>Protection</b>	Power limited output

## Pulse/Digital Output

<b>Signal Type</b>	Open collector, non-isolated
<b>Switching</b>	200mA, 30 volts DC maximum
<b>Saturation</b>	0.8 volts maximum

## 4-20mA Output (Optional)

<b>Supply</b>	24 volts DC internal, non-isolated
<b>Resolution</b>	0.05% full scale
<b>Accuracy</b>	0.05% full scale (20°C) 0.1% (full temperature range, typical)

*Important: Specifications are subject to change without notice.  
Printer protocol is available only if RTC option is installed.*

# Ordering Information

## Product Codes

Model	Supplementary Code						Description
505	- LM01						
Enclosure	1						Panel mount enclosure
	2						Field mount enclosure (not yet available)
	3/5						Explosion proof Ex410 with metric glands (5 specifies heater version)
	4/6						Explosion proof Ex410 with NPT glands (6 specifies heater version)
Output Options	0						<b>Basic</b> - RS232 and RS485 serial ports, 2 relays, 2 pulse outputs, rear key input
	1						<b>Advanced</b> - also includes 4-20mA o/p and Real-time clock for printer output and logging (100 logs)
Extra Options	2						9 way DB connector for RS232 serial port
Power Supply	E						For 220/240 VAC
	A						For 110/120 VAC
	D						For DC power only 12-28 VDC
Display Panel Options	S						Standard (no backlight & LCD backup)
	F						Fully optioned (with backlight & LCD backup)
PCB Protection	C						<b>Conformal coating</b> - required for maximum environmental operating range. Recommended to avoid damage from moisture and corrosion.
	N						<b>None</b> - suitable for IEC standard 654-1 Climatic Conditions up to Class B2 (Heated and/or cooled enclosed locations)
Application Pack Number	LM01						Defines the application software to be loaded into the instrument

Example full product part number is 505.112EFC-LM01 (this is the number used for placing orders).

## Main Menu Variables

Main Menu Variables	Default Units	Preferred Units	Variable Type
Product Volume	m <sup>3</sup>		Rate
Product Level	m		Rate
Volume Full %	%		Rate
Product Mass	kg		Rate



500 Series in Ex410 Enclosure

[www.contrec.co.uk](http://www.contrec.co.uk)



**Contrec Europe Limited**  
 Riverside, Canal Road  
 Sowerby Bridge, West Yorkshire  
 HX6 2AY United Kingdom  
 Tel: +44 1422 829920  
 Email: sales@contrec.co.uk

**Contrec - USA, LLC**  
 916 Belcher Drive  
 Pelham, Alabama  
 AL 35124 United States  
 Tel: (205) 685 3000  
 Email: contrec@contrec-usa.com

**Contrec Systems Pty Ltd**  
 5 Norfolk Avenue  
 Ringwood, Victoria 3134  
 Melbourne Australia  
 Tel: +61 413 505 114  
 Email: info@contrec.com.au