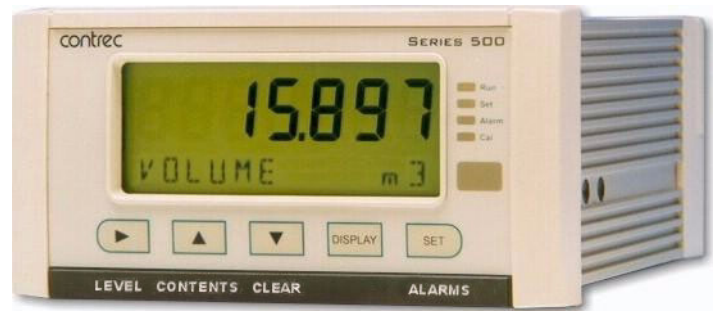


# Application LM01

## Single Tank Level Monitor

for Analog Level Sensors



### Features

- 20 point level to volume strapping table
- Level control output
- Density correction factor for pressure level sensors
- Freely assignable alarms for high or low levels
- Allows for non-linear correction
- Selection of second language and user tags
- RTC logging with up to 100 entries at user-specified scheduled times
- Infra-red communications port on front panel
- 4-20mA retransmission
- Selectable protocols on serial ports including Modbus RTU and Printer output
- Front panel adjustment of 8-24V DC output voltage
- Backlit display
- LCD backup



### 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 for level to volume conversion allowing it to display Volume and Percentage Full 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 a density correction factor 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.

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

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

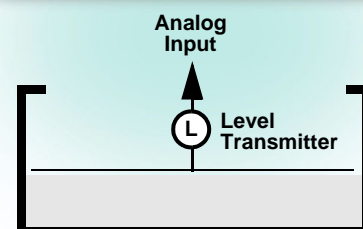
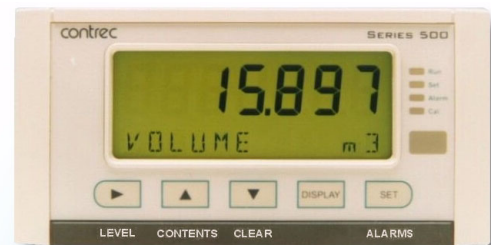
where:

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 three communication ports available as follows:

- RS-232 port (standard)
- RS-485 port (standard)
- Infra-red port (on front panel - display panel option)

The ports are available 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 outputs can re-transmit totals as pulses or operate 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.

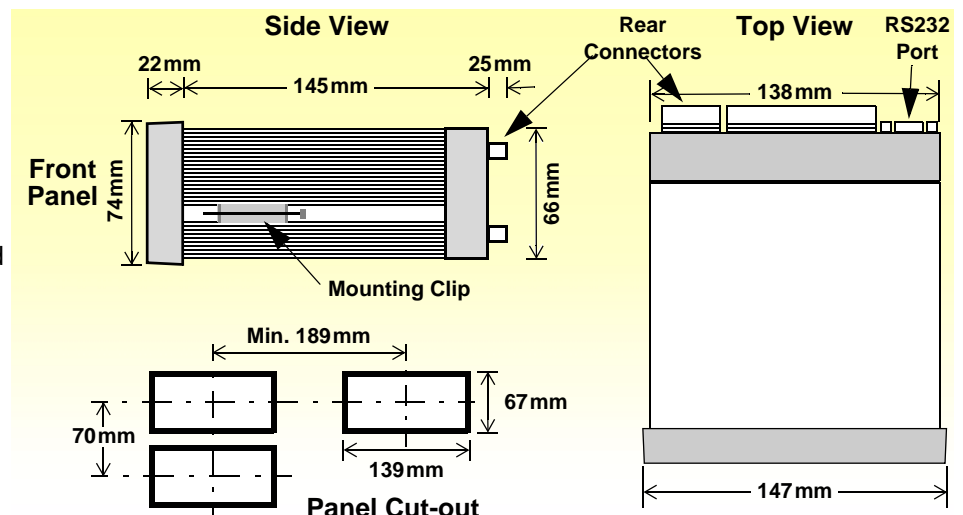
Instrument parameters including units of measurement can be programmed in the field, according to the user-access levels assigned to parameters by the distributor.

## Dimension Drawings

### Part Number

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

Default Application software:  
505-LM01-000000



All set-up parameters, totals 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	Advanced option
8	SG	Signal Ground 0V	
9	Li	Logic input	
10	1+	Open collector o/p 1	Control output
11	2+	Open collector o/p 2	Not used
12	li	4-20mA input	Level input
13	SG	Signal Ground 0V	
14	Fi	Frequency input	Not used
15	Vo	8-24 volts DC output	70mA power limited
16	G	DC Ground	
17	Vi	DC power input	DC power in 12-28V
18	SH	E	Shield terminal
19	R1	Relay 1	
20	RC	Relay Common	
21	R2	Relay 2	
E	E	Mains ground	
N	N	Mains neutral	AC power in 95-135V or 190-260V
A	A	Mains active	
RS232 port		9-pin serial port	Extra option

# Specifications

## General

### 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>	Typically 6W
<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 option)
<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)

## Inputs

### 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

## Outputs

### 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 Infra-red port (optional)
<b>Baud Rate</b>	2400 to 19200 baud
<b>Parity</b>	Odd, even or none
<b>Stop Bits</b>	1 or 2
<b>Protocols</b>	ASCII, Modbus RTU, Printer (RS232)

### 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
<b>Pulse Width</b>	Programmable: 10, 20, 50, 100, 200 or 500ms

### 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.*

# Ordering Information

Customer: .....

Purchase Order Ref: .....

If custom settings are required prior to delivery, please specify the preferences in the table below. Include this form with the purchase order and specify "Custom Selection Attached". (Units of measurement can be changed in field if required).

## 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 or Infra-Red comms port)
	F						Fully optioned (with backlight, LCD backup and Infra-Red comms port)
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
Tank Volume	m <sup>3</sup>		Rate
Product Level	m		Rate
Volume Full %	%		Rate

Please specify the preferred units of measurement.



500 Series in Ex410 Enclosure

[www.contrec.com.au](http://www.contrec.com.au)

### Contrec Pty Ltd

22 Hall Street Hawthorn East  
Victoria 3123 AUSTRALIA  
Tel: +61 3 9804 4200 Fax: +61 3 9822 8329  
Email: sales@contrec.com.au

### Contrec Europe Limited

PO Box 436 Sowerby Bridge,  
West Yorkshire HX6 3YA, UK  
Tel: +44 1422 829 940 Fax +44 1422 829 941  
Email: sales@contrec.co.uk

### Contrec - USA, LLC

916 Belcher Drive, Pelham AL 35124 USA  
Tel: (205) 685 3000 Fax: (205) 685 3001  
Email: contrec@contrec-usa.com

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