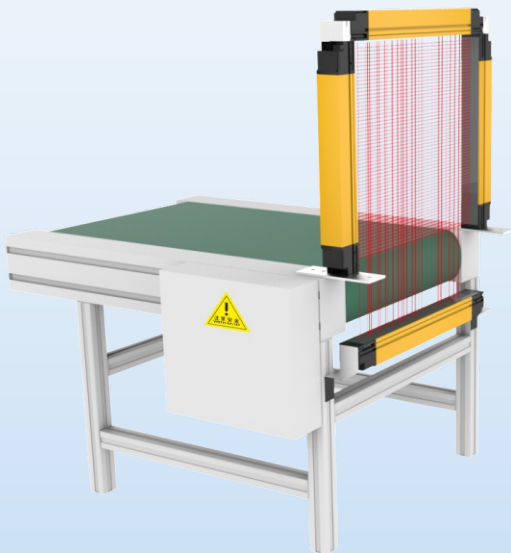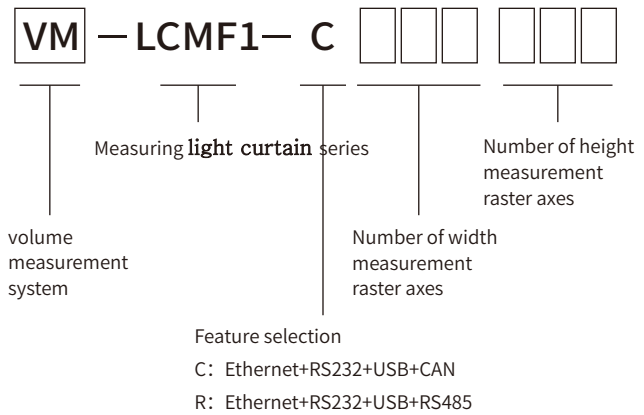# VM-LCMF1 volume measurement system

VM-LCMF1 functional features

The VM-LCM Fl volume measurement system mainly uses the OS LCM F series high-precision measuring light curtain as the scanning sensor for object contour detection. Based on the contour scan information, the length, width, height, rotation angle, volume and other information of the object can be measured.

VM-LCMF1 model description

VM — LCMF1— C ☐☐☐ ☐☐☐

Measuring light curtain series

Number of height measurement raster axes

volume measurement system

Number of width measurement raster axes

Feature selection
C：Ethernet+RS232+USB+CAN
R：Ethernet+RS232+USB+RS485

Accessories selection guide

Name + style	Model	Order number
VM-LCMF1 Control box	VS-LCMF1-R	LOT14210771
	VS-LCMF1-C	LOT14210772
Rotary encoder	VS-RE01	LOT16721M
light curtain cleaning system	VS-CL ☐☐☐ ☐☐☐	

Beam pitch   Number of optical axes

MEASURING SYSTEM

05LCMF series specification and selection(width and height l ight curtain)

S/N	Dimensions L×W×H (mm)	Number of optical axes	Detection height (mm)	Model	
				Transmitting unit	UI-type output receiver unit
1	30×30×160	24	120	05LCMF0160-E024S	05LCMF0160-UIR024S
2	30×30×220	36	180	05LCMF0220-E036S	05LCMF0220-UIR036S
3	30×30×280	48	240	05LCMF0280-E048S	05LCMF0280-UIR048S
4	30×30×340	60	300	05LCMF0340-E060S	05LCMF0340-UIR060S
5	30×30×400	72	360	05LCMF0400-E072S	05LCMF0400-UIR072S
6	30×30×460	84	420	05LCMF0460-E084S	05LCMF0460-UIR084S
7	30×30×520	96	480	05LCMF0520-E096S	05LCMF0520-UIR096S
8	30×30×580	108	540	05LCMF0580-E108S	05LCMF0580-UIR108S
9	30×30×640	120	600	05LCMF0640-E120S	05LCMF0640-UIR120S
10	30×30×700	132	660	05LCMF0700-E132S	05LCMF0700-UIR132S
11	30×30×760	144	720	05LCMF0760-E144S	05LCMF0760-UIR144S
12	30×30×820	156	780	05LCMF0820-E156S	05LCMF0820-UIR156S
13	30×30×880	168	840	05LCMF0880-E168S	05LCMF0880-UIR168S
14	30×30×940	180	900	05LCMF0940-E180S	05LCMF0940-UIR180S
15	30×30×1000	192	960	05LCMF1000-E192S	05LCMF1000-UIR192S
16	30×30×1060	204	1020	05LCMF1060-E204S	05LCMF1060-UIR204S
17	30×30×1120	216	1080	05LCMF1120-E216S	05LCMF1120-UIR216S
18	30×30×1180	228	1140	05LCMF1180-E228S	05LCMF1180-UIR228S
19	30×30×1240	240	1200	05LCMF1240-E240S	05LCMF1240-UIR240S
20	30×30×1300	252	1260	05LCMF1300-E252S	05LCMF1300-UIR252S

S/N	Dimensions L×W×H (mm)	Number of optical axes	Detection height (mm)	Model	
				Transmitting unit	UI-type output receiver unit
21	30×30×1360	264	1320	05LCMF1360-E264S	05LCMF1360-UIR264S
22	30×30×1420	276	1380	05LCMF1420-E276S	05LCMF1420-UIR276S
23	30×30×1480	288	1440	05LCMF1480-E288S	05LCMF1480-UIR288S
24	30×30×1540	300	1500	05LCMF1540-E300S	05LCMF1540-UIR300S
25	30×30×1600	312	1560	05LCMF1600-E312S	05LCMF1600-UIR312S
26	30×30×1660	324	1620	05LCMF1660-E324S	05LCMF1660-UIR324S
27	30×30×1720	336	1680	05LCMF1720-E336S	05LCMF1720-UIR336S
28	30×30×1780	348	1740	05LCMF1780-E348S	05LCMF1780-UIR348S
29	30×30×1840	360	1800	05LCMF1840-E360S	05LCMF1840-UIR360S
30	30×30×1900	372	1860	05LCMF1900-E372S	05LCMF1900-UIR372S
31	30×30×1960	384	1920	05LCMF1960-E384S	05LCMF1960-UIR384S
32	30×30×2020	396	1980	05LCMF2020-E396S	05LCMF2020-UIR396S
33	30×30×2080	408	2040	05LCMF2080-E408S	05LCMF2080-UIR408S
34	30×30×2140	420	2100	05LCMF2140-E420S	05LCMF2140-UIR420S
35	30×30×2200	432	2160	05LCMF2200-E432S	05LCMF2200-UIR432S
36	30×30×2260	444	2220	05LCMF2260-E444S	05LCMF2260-UIR444S
37	30×30×2320	456	2280	05LCMF2320-E456S	05LCMF2320-UIR456S
38	30×30×2380	468	2340	05LCMF2380-E468S	05LCMF2380-UIR468S
39	30×30×2440	480	2400	05LCMF2440-E480S	05LCMF2440-UIR480S

※Depending on the product configuration and manufacturing process, the actual product size and weight may vary, please refer to the actual product N represents the number of optical axes.

※For O5LCMF l ight curtain size, please refer to the LCMF Measurement l ight curtain(Optical Axis Spacing 05mm) section.

VM-LCM1 volume measurement system composition

VM-LCMF1 measuring system components consist of a pair of horizontally mounted and a pair of vertically mounted measuring light curtain, controllers, rotary encoders, (it is recommended to add a cleaner to clean horizontally mounted transmitters).
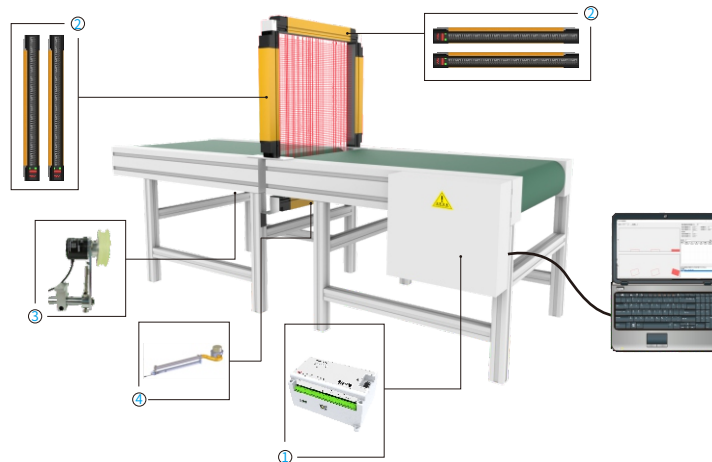
◆ **1. VM-LCM F1 control box**

The VM-LCM F1 control box is the heart of the dimensioning system.

Key Features:
①Obtain the scanning information of 2 sets of gratings. It can be obtained by analog or serial communication;
②Capture the rotary encoder information and calculate the running speed of the conveyor belt;
③Calculate the relevant data of the object, including length, width, height, rotation angle (relative transmission direction), volume and other information;
④Communicate with the outside world, provide data to the user, and provide serial port (RS232/RS485), CAN, Ethernet, USB and other interfaces.

◆ **2. 05LCMF high-precision measurement l ight curtain** Two sets of OSLCMF high-precision measuring gratings are required to scan width information and height information.

In order to increase the scanning speed, the l ight curtain measuring width needs to operate in bilateral scan mode. The specific bilateral sweep mode is determined by the smallest object that can be measured. Light grids that measure height need to operate in single-sided scan mode.

In order to increase the data sampling speed of the VM-LCMF1, the raster output type is required to be analog. The sampling period of the VM-LCMF1 can be synchronized to the scan period of the l ight curtain. The specific scanning period of the l ight curtain is related to the l ight curtain length and scanning method, and the details can be found in the 05LCMF high-precision measurement l ight curtain manual.
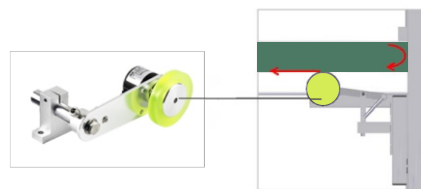
If the data is acquired serially, the sampling period can only reach 35ms at the fastest.

The specific l ight curtain model selection is based on the largest measuring object.

Receiver
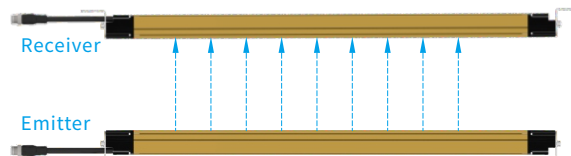
Emitter

◆ **3. Rotary encoder**

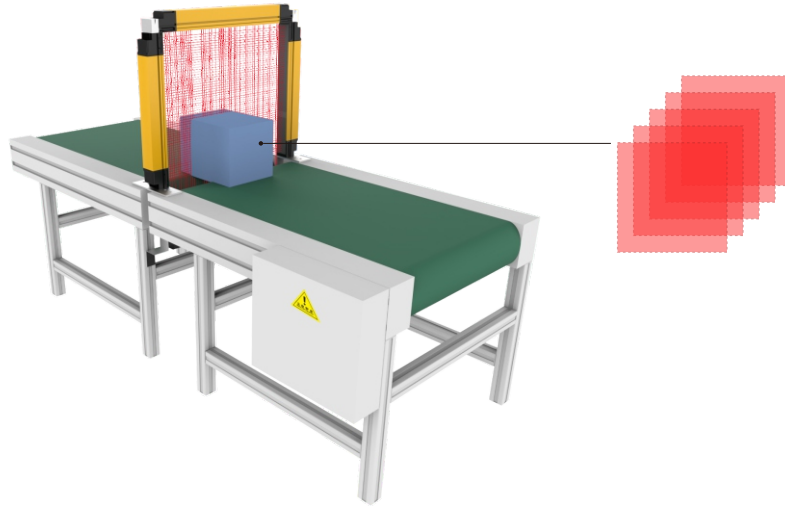Rotary encoders are used to measure conveyor belt speeds in real time.
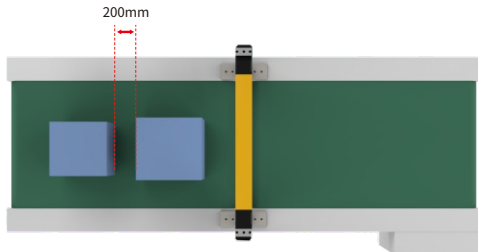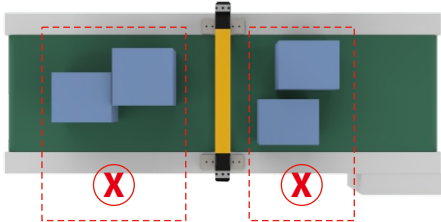
◆ **4. Clean the system**

It is recommended to install a cleaning system under the conveyor belt, at the location of the l ight curtain emitter. Prevents contamination of the emitter's luminous surface during prolonged operation, reducing the resulting degradation or errors in measurement accuracy.

MEASURING SYSTEM
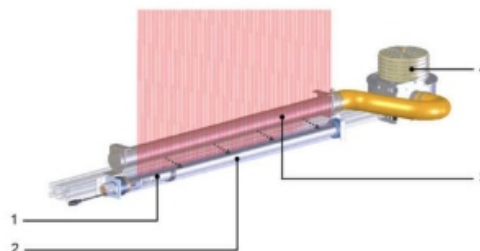
Detection principle of VM-LCMF1 dimensioning system

The object moves on the conveyor line, and as it passes through the light curtain, the light curtain continuously scans the width and height information of the object to form a two-dimensional section. Multiple two-dimensional cross-sectional information, with reference to the speed of movement during scanning, can render a three-dimensional message. From this, the contour information of the object can be derived, and the length, width, height, deflection angle, volume and other information of the object can be calculated.

Measurement considerations

◆ To obtain data in the accuracy range, the measured object must be a regular cuboid or cylinder.

◆ The measuring system measures the dimensions of individual objects in the flat conveyor system. When handling, the goods shall not be placed side by side, and the distance between the goods and the goods shall not be less than 200mm (the distance from the back edge of the goods to the front edge of the next cargo).

◆ The measuring system cannot measure objects placed adjacent or side-by-side.

Warn

VM-LCMF1 conntrol box size

VM-LCMF1 volume measurement system accessory parameters

◆ VM-LCNF1 control box parameters

Electrical parameters	
Supply voltage	24V(+ 10%~-15%)
Maximum power consumption	＜24W
Transistor output and on-load capability	24V/20mA
Relay output and load capacity	5~24V/100mA
Measurement data	
Data type	• Length • Deflection angle • Width • volume • Height
Result output	60ms (after the object leaves the scanning area)
Performance	
Volume measurement accuracy	±5‰
Conveying speed	0.2m/s — 2.0m/s
Minimum detected object	100mm×50mm×5mm (L×W×H)
Maximum detected object	2000mm×2000mm×2000mm (L×W×H)
Minimum object interval	200mm
Object detection accuracy	±10mm×±5mm×±2.5mm (L×W×H)
Interface	
Serial(RS232/RS485)	Mobus RTU protocol 4800/9600/19200/38400/115200bit/s
CAN	100Kbps/500Kbps/1Mbps
Ethernet	Modbus TCP 10Mbit/s,100Mbit/s
PNP/NPN output	2-way optional
Optocoupler output	2-way
Environment parameters	
Operating ambient temperature	0°C~+40°C
Storage ambient temperature	-20°C~+70°C
Permissible relative humidity	90%、Frost free

◆ Rotary encoder parameters

Technical parameters	
Supply voltage	DC5V~12V
Consumes current	Below 100mA
Resolution	2000
Output form	PNP
Maximum response frequency	100KHz

◆ 05LCMF measurement I ight curtain technical parameters (see LCMF measurement I ight curtain description for details)

VM-LCMF1 control box interface introduction

Receiver-3
- Ground
- OUT2 — Receiver analog output 2 (black)
- OUT1 — Receiver analog output 1 (pink)
- 24V — Receiver power supply (brown)
- — Receiver power ground (blue)
- SYNC — Receiver sync cable (yellow)

Emitter-3
- SYNC — Transmitter sync cable (yellow)
- 24V — Transmitter power supply (brown)
- — Transmitter power ground (blue)

Reserve the shed interface

Receiver-2
- TEACH — Receiver TEACH (white)
- 485B — Receiver 485B (green)
- 485A — Receiver 485A (grey)
- OUT2 — Receiver analog output 2 (black)
- OUT1 — Receiver analog output 1 (pink)
- 24V — Receiver power supply (brown)
- — Receiver power ground (blue)
- SYNC — Receiver sync cable (yellow)

Emitter-2
- SYNC — Transmitter sync cable (yellow)
- 24V — Transmitter power supply (brown)
- — Transmitter power ground (blue)

Scan the [height] raster interface

Receiver-1
- TEACH — Receiver TEACH (white)
- 485B — Receiver 485B (green)
- 485A — Receiver 485A (grey)
- OUT2 — Receiver analog output 2 (black)
- OUT1 — Receiver analog output 1 (pink)
- 24V — Receiver power supply (brown)
- — Receiver power ground (blue)
- SYNC — Receiver sync cable (yellow)

Emitter-1
- SYNC — Transmitter sync cable (yellow)
- 24V — Transmitter power supply (brown)
- — Transmitter power ground (blue)

Scan the [width] raster interface

- Shielded ground
- Ground
- N/A — Control box power supply (24V)
- POWER — Control box power supply (24V)
- Ground

System power supply

- OUT2 — Level (PNP/NPN) output 2
- OUT1 — Level (PNP/NPN) output 1
- K2- — Optocoupler output 2 -
- K2+ — Optocoupler output 2 +
- K1- — Optocoupler output 1 -
- K1+ — Optocoupler output 1 +
- GND — Isolate the 485/CAN output ground
- 485A/CANL — Isolation 485A/CANL
- 485B/CANH — Isolation 485B/CANH
- R- — Isolation 485/CAN internal Resistor Short-
- R+ — Isolation 485/CAN internal Resistor Short+

Encoder2
- OUT — Output
- — Ground
- 5V — Power supply 5V

Rotary encoder 2 interface

Encoder1
- OUT — Output
- — Ground
- 5V — Power supply 5V

Rotary encoder 1 interface

Photo2
- OUT — Output
- — Ground
- 24V — Power supply 24V

Photoelectric sensor 2 interface

Photo1
- OUT — Output
- — Ground
- 24V — Power supply 24V

Photoelectric sensor 1 interface

Receiver-3
- TEACH — Receiver TEACH (white)
- 485B — Receiver 485B (green)
- 485A — Receiver 485A (grey)

Reserve the raster interface

◆ **Wiring diagram**

SLC®
施 莱 格

❯ Installation requirements

Fixed frame

The VM-LCMF1 dimensioning system requires a stable and reliable framework to prevent jitter or deflection and to have sufficient load carrying capacity.

● The frame assembly must be vibration-free;

● The frame should preferably be rectangular and must be perpendicular to the conveying direction;

● The frame must be securely fastened;

● Profile frames or professionally designed structures are recommended.
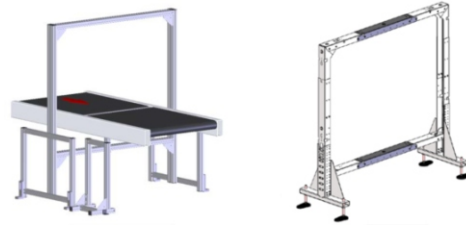
Light curtain

The two pairs of light curtains are installed horizontally and vertically in the frame respectively, so that the two pairs of light curtains form a rectangular detection field in the middle of the transition between the two conveyor lines.

● The beams of the vertical and horizontal gratings must be aligned, in the same plane;

● Horizontally mounted gratings, transmitters mounted below, receivers mounted above to minimize environmental interference;

● Without affecting the vertical light curtain to the light, the smaller the gap between the two adjacent conveyor lines, the better.

Receiver

Receiver

Emitter

Emitter
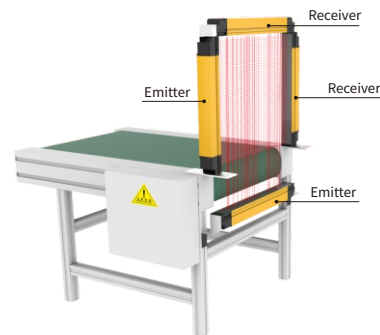
Rotary encoder

The rotary encoder is installed under the conveyor line, next to the conveyor line surface. There can be no slippage. The VM-LCMF1 supports access to two rotary encoders that can evaluate and measure the speed of two conveyor belts.
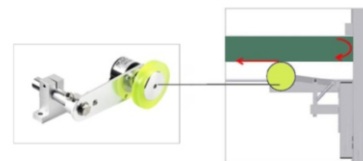
Conveying systm

The conveyor lines on both sides of the scanning area must run at the same speed and must be horizontally aligned, and objects must be guaranteed to move one by one on the conveyor line.

If an object rotates, vibrates, rolls, or slips on the conveyor line, it may reduce measurement accuracy.