








**Data Sheet**

## **LRF MODULES**

**Laser Rangefinder Modules  
1027, 3020, 3027, 3042, 5020, 5042**

**vectronix** 

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-  Technical parameters, provided in this document, are **typical values**, unless otherwise specified.
-  Do not use the typical properties shown in this technical profile and dimensions on interface drawings as a basis for preparing your specifications. Please contact Vectronix AG for assistance and recommendations in establishing particular specifications.
-  For safe use of the Laser Range Finder modules, please refer to separate operator manuals (OML).
-  The information presented in this data sheet is believed to be accurate and correct for the intended use of the LRF module. All of its contents and the LRF module specifications are subject to change without notice.  
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# 1 Product overview

Your goal is to successfully integrate a laser rangefinder module into your host system, and Vectronix is here to help with its line of innovative LRF modules. The latest laser diode technology ensures a rapid and accurate measurement. Highly skilled technicians are following Swiss quality standards during assembly. All electronic components as well as necessary optics are securely mounted to a stable chassis which is then boresighted to its line-of-sight (LoS).

Vectronix offers a variety of LRF OEM modules available for applications requiring different ranges. Depending on visibility conditions and target properties, ranges can be achieved up to 8 km. The diode laser technology utilized by the Vectronix LRF modules allows cost effectiveness, minimum power consumption, small volume and weight, important for most applications and systems. A standardization of laser range finder modules, allows a large number of applications to be addressed with the same interface conditions, which again supports achieving the best price / performance ratio.

The LRF module for range measurement is a unique instrument combining excellent range performance with outstanding handling comfort. All rangefinder modules are class 1 eye-safe with respect to IEC as well as ANSI standards.

The LRF module provides digital output of range and with the optional DMC also azimuth (heading), elevation (pitch) and bank (roll). The entire communication is done via a serial interface.

A stable and mechanical structure designed to be as small as possible results in a lightweight, low volume and robust module. The modular application concept and the use of modern technologies provide the user with the best price/performance currently available.

The range performance depends on wavelength and optics aperture, but also greatly on the beam divergence. An emitting laser beam with small divergence leads to more laser light on a sighted object, this results in more reflected light back to the receiver of the LRF module. Enhancing the “concentration” of laser light is possible with several technologies.

The LRF family offers **three** different **laser technologies**:

**LRF 1000 series:** for standard range measurements

The laser source of the LRF 1000 series is a 905nm laser diode. This is invisible to the unaided eye.  
The LRF 1027 has a 27mm optical aperture.

**LRF 3000 series:** for extended range performance

The laser source of the LRF 3000 series is a 1550nm laser diode. This is invisible even to an image intensifier device.  
The LRF 3020 has a 20mm, the LRF 3027 a 27mm, the LRF 3042 has a 42 mm optical aperture.

**LRF 5000 series:** with beamshaper for maximum range performance

The proprietary beamshaper technology reduces the divergence and extends the range of this 1550 nm range finder.  
The LRF 5020 has a 20mm optical aperture, the LRF 5042 has a 42mm optical aperture.


## 2 Key Benefits

	Features	Benefits
<b>All series</b>	Class 1 eyesafe laser Rapid measurement High repetition rate Low divergence	Unrestricted, safe operation Nearly instantaneous results about the target Accurate tracking of a moving target Easier finding with more accurate results
<b>3000 series</b>	Wavelength 1550nm	invisible even for NV goggles
<b>5000 series</b>	Wavelength 1550 with beamshaper	longest range, good results also in bad conditions

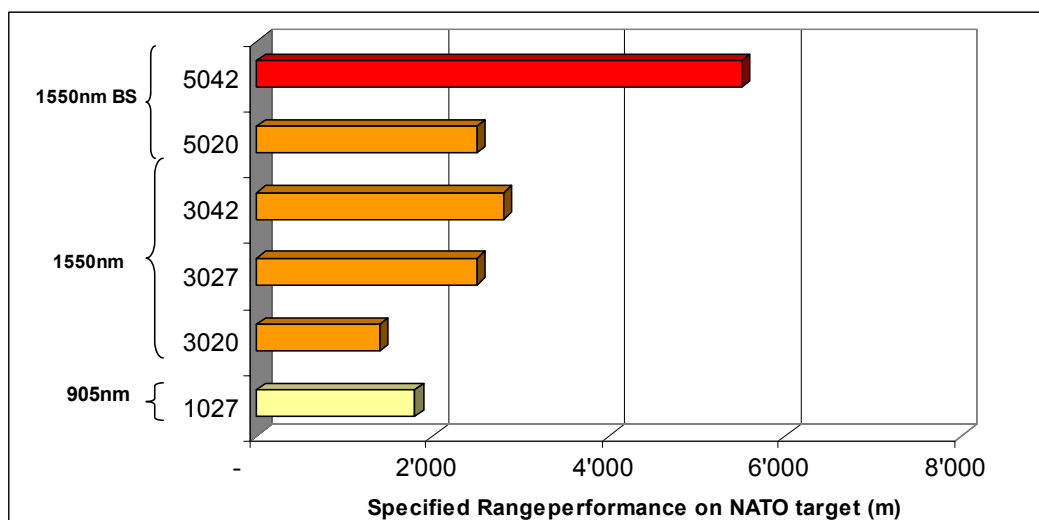
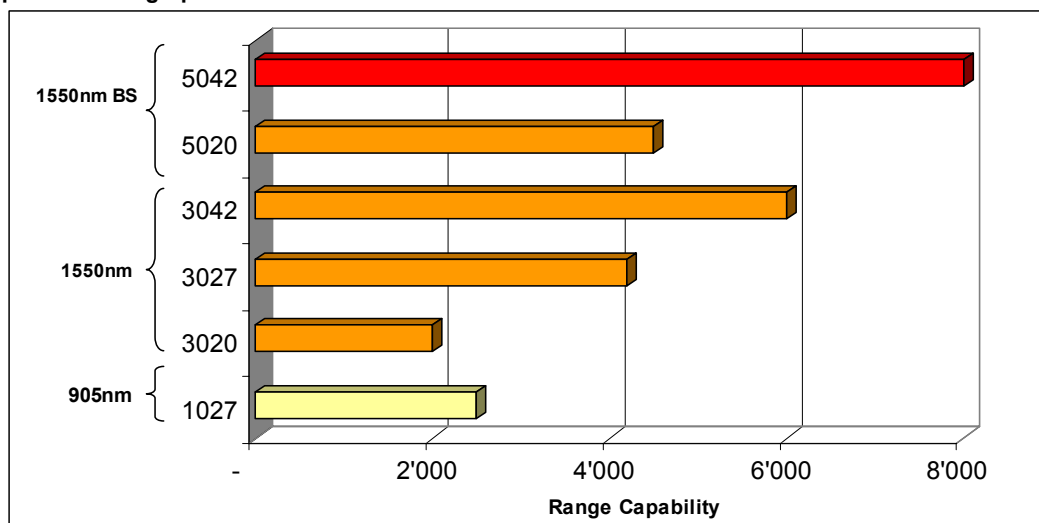


## 3 Features

### 3.1 Overview

	unit	1027 	3020 	3027 	3042 	5020 	5042 
Nom. wave length	nm	905	1550	1550	1550	1550	1550
Optical aperture	mm	27	20	27	42	20	42
Range capability	m	2'500	2'000	4'200	6'000	4'500	8'000
Spec. range perf. on NATO target	m	1'700	1'400	2'500	2'800	2'500	5'500
Max length	mm	105	100	105	114	100	114
Max width	mm	80	50	80	100	50	100
Max height	mm	40.5	35	40.5	50.25	35	50.25
Weight (w/o DMC)	g	250	120	250	325	120	325

### 3.2 Range performance graphs



### 3.3 Range performance

Name	unit	1027	3020	3027	3042	5020	5042
Nominal wave length	nm	905	1550	1550	1550	1550	1550
Eye safety per IEC 60825-1, Second Edition (2007-03)	-	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1
Optical aperture	mm	27	20	27	42	20	42
Beam divergence (typical)	mrاد	0.1 x 1.3	2.0 x 0.3	2.0 x 0.5	2.0 x 2.0	1.0 x 1.6	0.4 x 0.7
Range capability <sup>1)</sup>	m	2'500	2'000	4'200	6'000	4'500	8'000
Specified range performance on NATO target <sup>2)</sup>	m	1'700	1'400	2'500	2'800	2'500	5'500
Typical range performance 1Hz on NATO target <sup>2)</sup>	m	1'300	1'200	1'600	2'000	1'800	3'300
Typical range performance on man size target <sup>3)</sup>	m	1'300	800	1'200	1'600	1'400	3'000
Minimum range (functional)	m	5	5	5	5	5	5
Accuracy 50 – 1'500 m (1 $\sigma$ ) <sup>2)</sup>	m	± 3	± 3	± 3	± 3	± 3	± 3
Accuracy > 1'500 m (1 $\sigma$ )	m	± 5	± 5	± 5	± 5	± 5	± 5
Measurement time for range measurement	s	0.3 – 1.1	0.3 – 1.3	0.3 – 1.1	0.3 – 1.1	0.3 – 1.3	0.3 – 1.1
Repetition rate for single measurement mode	Hz	0.3	0.25	0.3	0.3	0.25	0.3
High repetition rate	Hz	1	1	1	1	1	1

Up to three separate distances can be obtained with a single measurement.

The typical target discrimination (distance between the targets) is 30m.

#### Conditions

- 1) target size: beam filling, reflectivity 60%,  
detection rate 90%, visibility 10 km,  
20 °C environmental temperature,  
1013 mbar pressure
- 2) analogue 1, except:  
target size: NATO (2.3 x 2.3 m), reflectivity 30%
- 3) analogue 1, except:  
target size: man (1 x 1 m), reflectivity 10%  
this is a typical range only and not specified

### 3.4 Additional functions

Name	unit	1027	3020	3027	3042	5020	5042
DMC-SX 5000 included (optional)		possible	no	possible	possible	no	possible
Multiple target ranging (allows interpretation as first)		yes	yes	yes	yes	yes	yes
Operating modes (via serial interface)		yes	yes	yes	yes	yes	yes
Built-in Test (BIT) (via serial interface)		yes	yes	yes	yes	yes	yes

### 3.5 Electrical interface

Note: The xx20 modules have different electronics than the LRF xx27 and xx42 modules.

Name	unit	1027	3020	3027	3042	5020	5042
Power supply, ripple < 100mVpp (min ... max)	V	4 ... 6	4 ... 12	4 ... 6	4 ... 6	4 ... 12	4 ... 6
Voltage ripple (maximum allowable)	mVpp	100	50	100	100	50	100
Typical current consumption at 5V while lasing (peak value for not more than 500 $\mu$ s)	mA	650 RMS typ. (1300 peak)	700 typ. (1100 peak)	650 RMS typ. (1300 peak)	650 RMS typ. (1300 peak)	700 typ. (1100 peak)	650 RMS typ. (1300 peak)
Typical power consumption at 5V during heading & tilt measurement (with DMC-SX 5000)	mW	600	(no DMC)	600	600	(no DMC)	600
Typical power consumption at 5V in standby mode (SWT or Com. switch to GND)	mW	DMC: 600 STD.: 250	1	DMC: 600 STD.: 250	DMC: 600 STD.: 250	1	DMC: 600 STD.: 250
Typical power consumption at 5V in shutdown mode (no SWT or Com. switch to GND)	mW	0.055	0.1	0.055	0.055	0.1	0.055
Capacity to charge when applying power	uF	2.5		2.5	2.5		2.5
Capacity to charge when powering up to standby mode (Note: Depending on the power supply, these capacitance can cause high current spikes)	uF	600		600	600		600

### 3.6 Communication

Note: The xx20 modules have different electronics than the LRF xx27 and xx42 modules.

Name	unit	1027	3020	3027	3042	5020	5042
Connector Interface (PCB is with FCI Minitek)		2 PCB	ERNI	2 PCB	2 PCB	ERNI	2 PCB
Interface type	-	RS232	RS232	RS232	RS232	RS232	RS232
Voltage level	V	-3...-15V +3...+15V	-3...-15V +3...+15V	-3...-15V +3...+15V	-3...-15V +3...+15V	-3...-15V +3...+15V	-3...-15V +3...+15V
Serial interface baud rate, factory setting		9600	38'400	9'600	9600	38'400	9'600
Serial interface baud rate, optional user settings	Baud	no	yes	no	no	yes	no

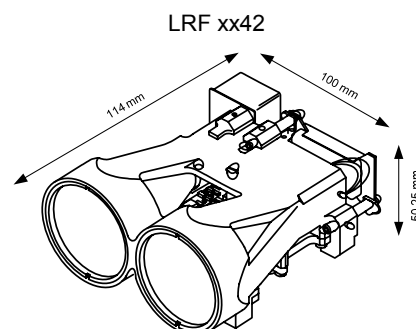
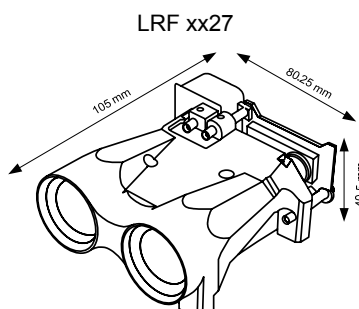
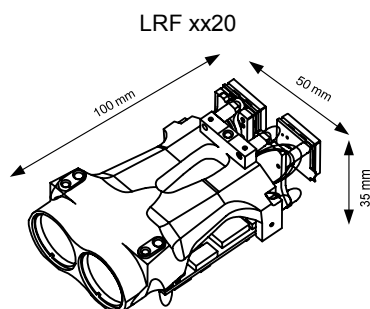
### 3.7 Environmental

Name	unit	1027	3020	3027	3042	5020	5042
Operating temperature	°C	-35 ... +55	-35 ... +55	-35 ... +55	-35 ... +55	-35 ... +55	-35 ... +55
Storage temperature	°C	-40 ... +85	-40 ... +85	-40 ... +85	-40 ... +85	-40 ... +85	-40 ... +85
Functional Shock (half sine) at 11ms	g	50	50	50	50	50	50
Shock (half sine) at 1ms in z-direction (optical dir.)	g	1'000	1'500	1'000	1'000	1'500	1'000
Shock (half sine) at 1ms in x and y-direction	g	500	500	500	500	500	500
Vibration (Random 10 to 500Hz, x,y,z, 30 min.)	g <sup>2</sup> /Hz	0.04	0.04	0.04	0.04	0.04	0.04

### 3.8 Mechanical interface, dimensions and weight

Name	unit	1027	3020	3027	3042	5020	5042
Positioning holes	-	2x 3H8	2x 3H8	2x 3H8	2x 3H8	2x 3H8	2x 3H8
Mounting threads	-	4x M4/5	3x M3/4	4x M4/5	4x M4/5	3x M3/4	4x M4/5
Tolerance (laser to mechanics)	mm	+/-0.5	+/-0.5	+/-0.5	+/-0.5	+/-0.5	+/-0.5
Max length	mm	105.00	100.00	105.00	114.00	100.00	114.00
Max width	mm	80.25	50.00	80.25	100.00	50.00	100.00
Max height	mm	40.50	35.00	40.50	50.25	35.00	50.25
Weight	gr	250	120	250	325	120	325
Weight with DMC-SX 5000 [x y]	gr	275	+25g (sep.)	275	350	+25g (sep.)	350

Note: LRFxx20 - no compass can be attached to the LRF (neither electronically, nor mechanically)



## 4 Kits

### 4.1 Starter Kit

Vectronix supports LRF Module test and initial integration by supplying a LRF Interface Box.

New customers have the possibility to order a LRF starter kit, which could consist of several different LRF modules as well as a complete interface kit. Existing customers already using LRF modules can also order a separate interface kit.

### 4.2 Interface Kit

The intention of the LRF Interface Box is to avoid data cable wiring and powering the LRF before starting. The LRF Interface Box, a standard terminal software and the LRF User Manual is enough to get a first impression of the LRF Module. The Laser Range Finder Interface Box can be powered either through a single 9V battery block or through the external power.

The Universal Interface Kit consists of

- Interface Box with On / Off Switch
- Banana connectors for external power supply
- Battery connector in the battery case on the back of the Interface Box
- RS232 connector, female 9 pin Sub-D
- LRF Module connectors (serial, power)
- Screw set
- USB stick with manuals



Figure 1.: LRF Modules Interface kit



## 5 Ordering Information

Customer: .....

Project: .....

Order Nr: .....

Units	Part No.	Name	Description
	906 590	LRF 1027	27.5 mm optics, 905 nm wavelength
	906 591	LRF 1027-DMC <sup>*)</sup>	27.5 mm optics, 905 nm wavelength, incl. DMC-SX
	906 665	LRF 3020	20 mm optics, 1550 nm wavelength
	906 592	LRF 3027	27.5 mm optics, 1550 nm wavelength
	906 593	LRF 3027-DMC <sup>*)</sup>	27.5 mm optics, 1550 nm wavelength, incl. DMC-SX
	901 860	LRF 3042	42 mm optics, 1550 nm wavelength
	901 859	LRF 3042-DMC <sup>*)</sup>	42 mm optics, 1550 nm wavelength, incl. DMC-SX
	905 284	LRF 5020	20 mm optics, 1550 nm Beamshaper
	901 862	LRF 5042	42 mm optics, 1550 nm Beamshaper
	901 861	LRF 5042-DMC <sup>*)</sup>	42 mm optics, 1550 nm Beamshaper, incl. DMC-SX
	905 501	LRF Interface Kit	LRF Interface Kit for LRF xx27 and xx42
	907 281	LRF Interface Kit CPU	LRF Interface Kit for LRF xx20

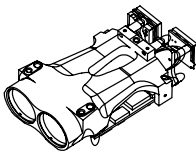
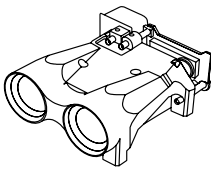
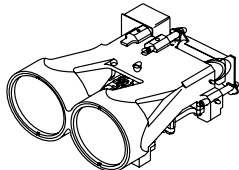
<sup>\*)</sup> Note:

In case of choosing a DMC, the normal orientation (1) is delivered as standard.

Other orientations (2, 3, 4) on request. LRF xx20mm modules are not available with DMC.

	LRF Orientation	Orient. Text	Picture	Description
<b>Standard</b> 1 <input type="checkbox"/>	<b>Normal</b> orientated <b>LRF</b>	(2/1)		Normal LRF orientation, modules feet are pointing to the earth
<b>On request:</b> 2 <input type="checkbox"/>	<b>Inverted LRF</b>	(2/4)		Inverted LRF orientation, modules feet are pointing to the sky
<b>On request:</b> 3 <input type="checkbox"/>	<b>Left tilted LRF</b>	(2/6)		Left side LRF orientation, modules feet are pointing to the left
<b>On request:</b> 4 <input type="checkbox"/>	<b>Right tilted LRF</b>	(2/3)		Right side LRF orientation, modules feet are pointing to the right

## 6 Part Numbers

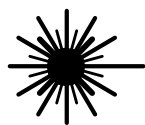
	20mm	27mm	42mm
			
<b>LRF 1000</b> Art. No without DMC Art. No incl. DMC		<b>LRF 1027</b> 906590 906591	
<b>LRF 3000</b> Art. No without DMC Art. No incl. DMC	<b>LRF 3020</b> 906665	<b>LRF 3027</b> 906592 906593	<b>LRF 3042</b> 901860 901859
<b>LRF 5000</b> Art. No without DMC Art. No incl. DMC	<b>LRF 5020</b> 905284		<b>LRF 5042</b> 901862 901861
<div> <div> <b>x000</b>  <b>0x00</b>  <b>00xx</b>  <b>xxxx-DMC</b> </div> <div> laser technology  option  optics diameter  for an integrated DMC </div> <div> 1= 905nm, 3= 1550nm, 5= 1550nm BS  0= standard, 1= pointer possible, 2= integrated photosensor  20, 27, 42  (optional) </div> </div>			



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CLASS 1  
LASER PRODUCT

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