LASER PROFILERS, RF62x SERIES

PURPOSE

Non-conact measuring and checking of surface profile, dimensions, deformations, flatness, gaps, volume, 3D models construction.

WORKING PRINCIPLE

Profiler operation is based on the principle of optical triangulation.

Radiation of a semiconductor laser is formed by a lens in a line and projected to an object. Radiation scattered from the object is collected by the lens and directed to a two-dimensional CMOS image sensor. The image of object outline thus formed is analyzed by a signal processor, which calculates the distance to the object (Z-coordinate) for each point of the set along the laser line on the object (X-coordinate). Profilers are characterized by base distance (beginning of the range), SMR, for Z-coordinate, measuring range (MR) for Z-coordinate, measuring range for X-coordinate at the beginning of Z (Xsmr) and measuring range for X-coordinate at the end of Z (Xemr).

MAIN FEATURES

- Measuring ranges from 10 to 1010 mm
- 0.01% linearity
- Sampling rate up to 16000 profiles/s
- Profilers with RED, BLUE and IR lasers
- Laser Safety Class 2M
- Dual camera profilers
- Trigger and encoder synchronization, mutual synchronization
- WEB-interface
- Free SDK and examples for Windows, Linux, .NET, MATLAB, LabVIEW
- Specialized profilers for hole control
- Profilers with air and water cooling
- Profilers with powerful lasers (1.2W red, 1.5W blue)
- Built-in standard industrial protocols and interfaces for robots

MODELS

RF627Smart — profilers with in-built measurement functions and industry protocols

RF627BiSmart — dual-camera profilers with in-built measurement functions and industry protocols

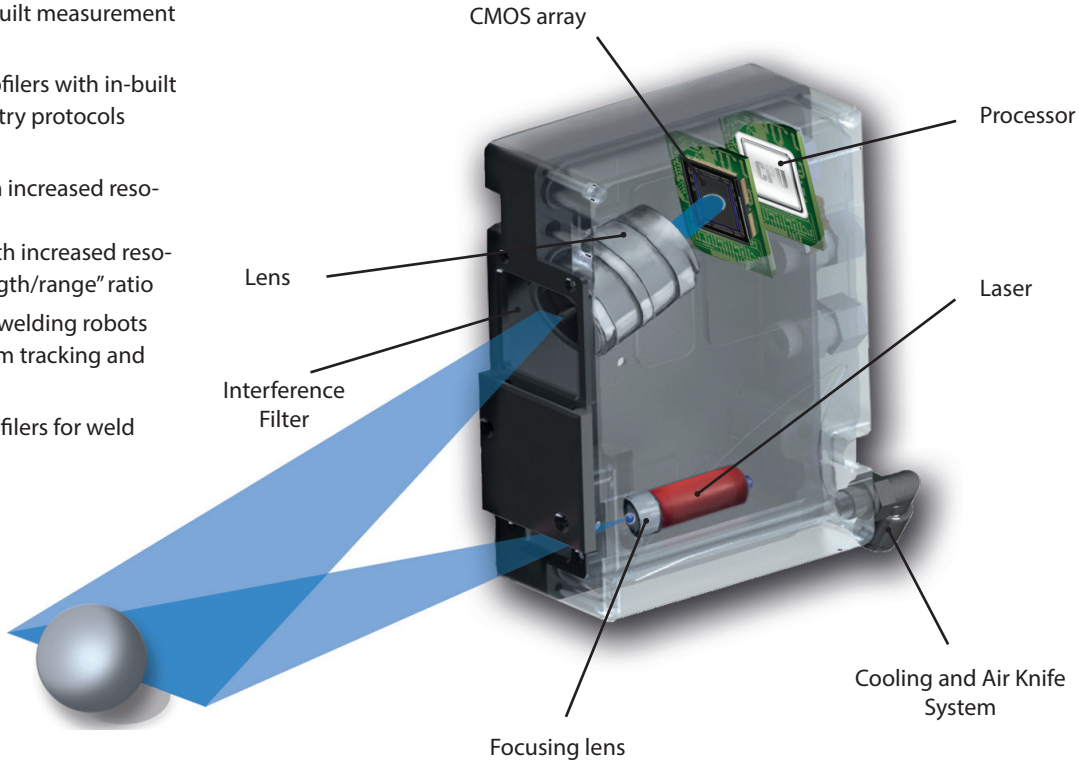
RF628 — high speed profilers

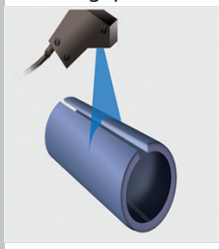
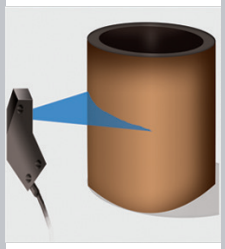
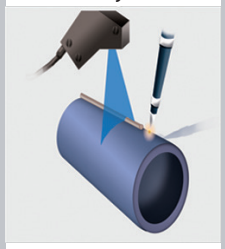
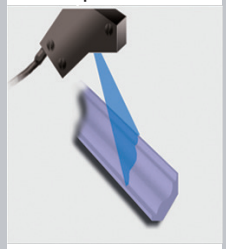
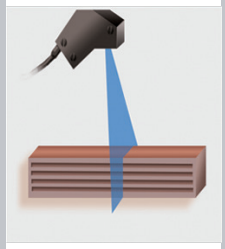
RF629 — high speed profilers with increased resolution

RF6292 — high speed profilers with increased resolution and increased "laser line length/range" ratio

RF627Smart-Weld — profilers for welding robots with in-built functions of weld seam tracking and measurement

RF627AVIKScan — hand-held profilers for weld seam geometry control



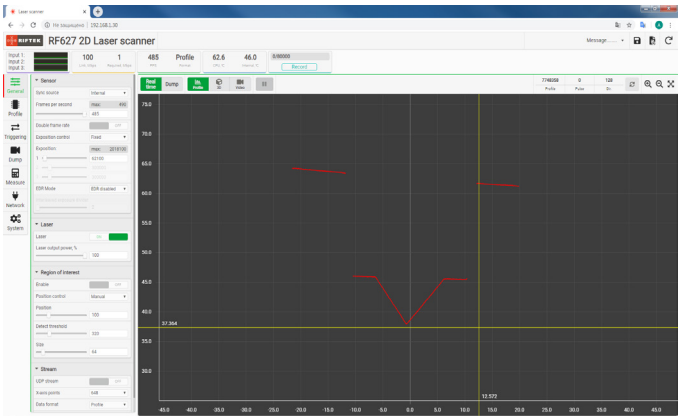
gaps	diameter	weld joint	profile	object	dimensions
					
control	measurement	control	measurement	recognition	measurement

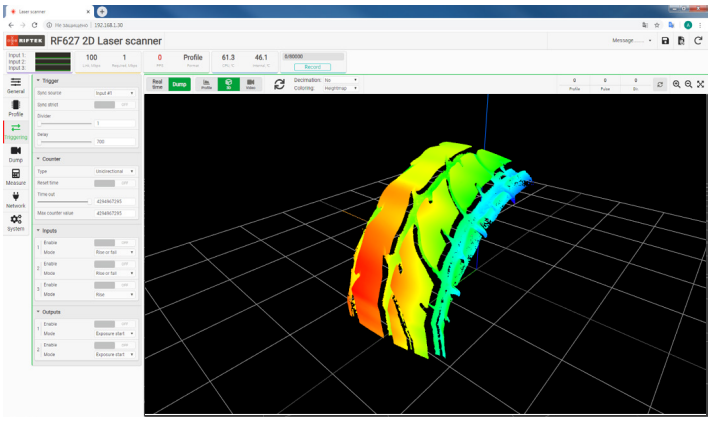
LASER PROFILERS, RF62x SERIES

SOFTWARE

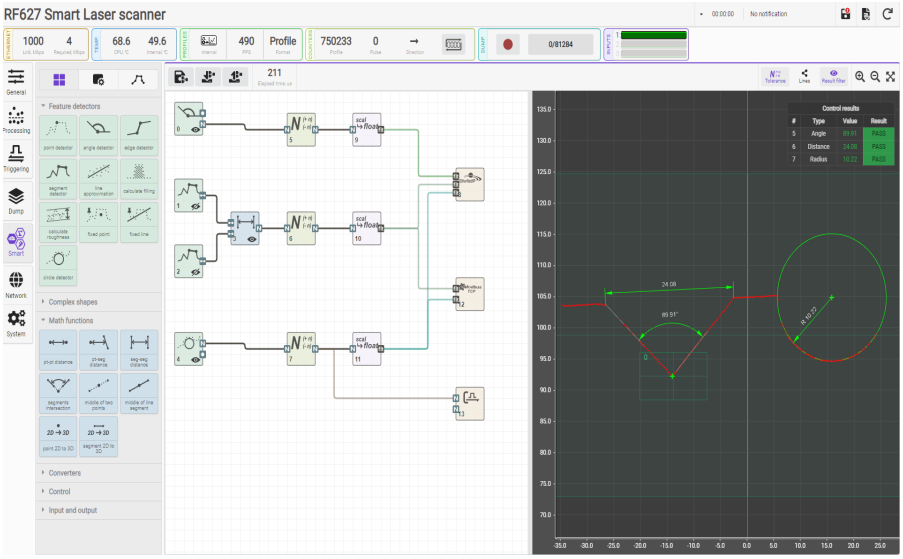
INTEGRATED WEB-INTERFACE
for profilers parameterization,
image and profile visualization

- Setting sensor parameters
- Data receiving, storage, visualization





SMART-PROFILERS



RF627Smart profilers makes it possible to measure geometric parameters of the object profile in real time directly in the profiler without connecting to a computer. Analysis, calculations, measurements, tolerance control are carried out according to the algorithm created by the user. To build the algorithm, a simple and intuitive tool is provided - a computation graph. The graph is formed from a library of ready-made blocks. Various combinations of blocks and connections between them allow the user to create an almost unlimited number of measuring functions, as well as to process profiles of any complexity. Measurement results can be transmitted via various protocols **(Ethernet/IP, Modbus TCP, UDP),** as well as to the logic outputs of the profiler in order to control the actuators and notify about product suitability.

RF62x Basic technical data

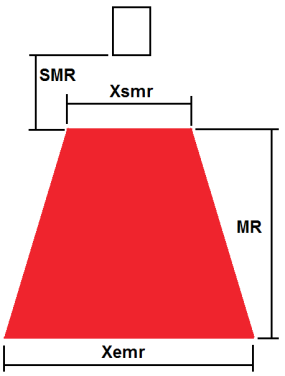
Laser	
Laser	660 nm or 405 nm or 450 nm 808 nm Class 2M по IEC/EN 60825-1:2014 or Class 3B on request
Basic	Ethernet / 1000 Mbps
Synchronization inputs	RS422, 3 channels
Laser on/off hardware input	1
Outputs	RS422, 1 channel
Power supply	9...30 V or 12...36 V for profilers with Blue laser
Power consumption, not more	RF627Smart - 6 W (without a built-in heater) RF627BiSmart - 11 W, RF628 - 17 W RF629 и RF6292 - 17 W

Environment resistance	
Enclosure rating	IP67
Vibration	20 g / 10...1000 Hz, 6 hours for each of XYZ axes
Shock	30 g/6 ms
Operating ambient temperature, °C	-20...+40, or -40...+40 for profilers with built-in heater, or -40...+120 for profilers with built-in heater and cooling system
Relative humidity	5-95% (no condensation)
Storage temperature, °C	-20...+70
Housing/windows material	aluminum/glass

LASER PROFILERS, RF62x SERIES

SMART PROFILERS — RF627Smart Series

Overall specifications								
Sampling rate, Hz	Full range: 485 or 921 (DS mode), ROI: 4884 or 6379 (DS mode)							
Linearity Z, %FS	0.01 or 0.02 for DS mode							
Resolution, X axis	648 or 1296 points (programmable value)							
Range	**MR, mm**	**SMR, mm**	**EMR, mm**	**Xsmr, mm**	**Xemr, mm**	**Size, mm**		**Weight, g**
25/10-8/11	10	25	35	8	11	Fig. 1		0.37
65/25-20/22	25	65	90	20	22	Fig. 2		0.6
75/50-30/41	50	75	125	30	41			
70/100-48/82	100	70	170	48	82			
70/150-58/122	150	70	220	58	122			
95/150-53/106	150	95	245	53	106			
82/200-60/150	200	82	282	60	150			
90/250-65/180	250	90	340	65	180			
180/250-170/278	250	180	430	170	278	Fig. 3	L=326	2
190/300-160/300	300	190	490	160	300		L=283	1.9
220/300-203/330	300	220	520	203	330		L=374	2.1
260/400-210/400	400	260	660	210	400		L=350	2.2
325/500-268/500	500	325	825	268	500		L=415	2.3
400/600-320/600	600	400	1000	320	600		L=490	2.4
475/700-374/700	700	475	1175	374	700		L=558	2.5
545/800-425/800	800	545	1345	425	800		L=627	2.6
615/900-480/900	900	615	1515	480	900		L=696	2.7
690/1000-535/1000	1000	690	1690	535	1000		L=765	2.8
620/1165-430/1010	1165	620	1785	430	1010		L=554	2.5



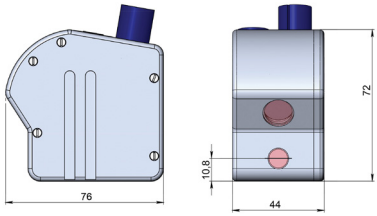


Figure 1

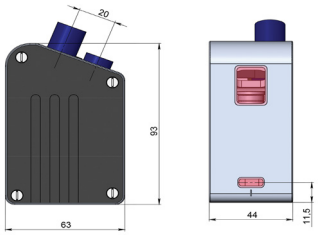


Figure 2

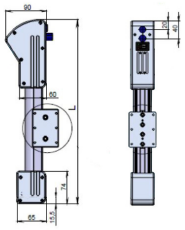
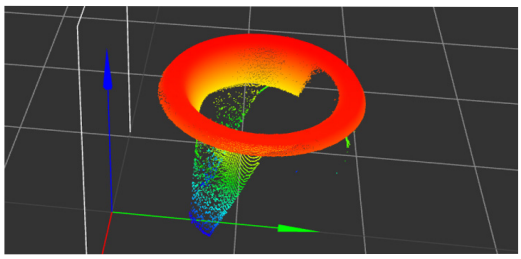


Figure 3

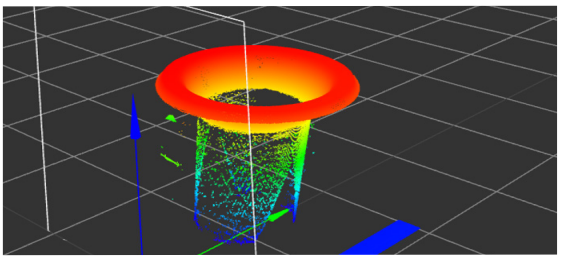
DUAL CAMERA PROFILERS — RF627BiSmart Series

- Profilers with a single laser and two receiving cameras for high-quality 3D model generation
- Sampling rate (full working range) – 520 profiles/s
- Resolution, X axis (combined profile) – 1456 or 2912 points
- Full support for Smart functions

Range	MR, mm	SMR, mm	EMR, mm	Xsmr, mm	Xemr, mm
65/25-20/22	25	65	90	20	22
75/50-30/41	50	75	125	30	41
70/100-48/82	100	70	170	48	82
70/150-58/122	150	70	220	58	122
95/150-53/106	150	95	245	53	106
82/200-60/150	200	82	282	60	150
90/250-65/180	250	90	340	65	180



3D model of a conical hole, monocular profiler



3D model of a conical hole, binocular profiler

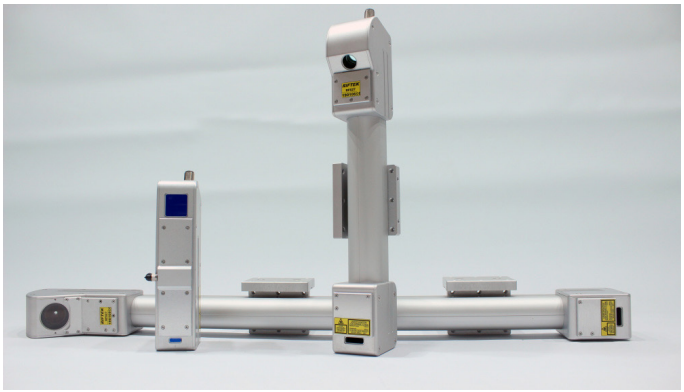
LASER PROFILERS, RF62x SERIES

HIGH SPEED PROFILERS — RF628 Series

- Sampling rate (full working range) > 4000 profiles/sec
- Sampling rate (ROI mode) – up to 16000 profiles/sec
- Linearity, Z axis – 0.01% of the range
- Resolution, X axis – 640 or 1280 points

Range	MR, mm	SMR, mm	EMR, mm	Xsmr, mm	Xemr, mm
65/10-11/12	10	65	75	11	12
75/25-20/22	25	75	100	20	22
90/50-32/44	50	90	140	32	44
125/75-42/58	75	125	200	42	58
150/100-50/74	100	150	250	50	74
150/150-64/112	150	150	300	64	112
210/300-148/276	300	210	510	148	276
285/400-198/376	400	285	685	198	376
370/500-250/466	500	370	870	250	466
450/600-300/556	600	450	1000	300	556
530/700-350/650	700	530	1230	350	650
610/800-400/744	800	610	1410	400	744
685/900-450/836	900	685	1585	450	836
765/1000-500/930	1000	765	1765	500	930

HIGH SPEED PROFILERS WITH INCREASED RESOLUTION — RF629, RF6292 Series



RF629

- Sampling rate (full working range) – 1000 Hz
- Sampling rate (ROI mode) – 16000 Hz
- Resolution, X axis – 1280 or 2560 points
- Linearity, Z axis – 0.01%

Range	MR, mm	SMR, mm	EMR, mm	Xsmr, mm	Xemr, mm
60/25-22/26	25	60	85	22	26
60/50-36/50	50	60	110	36	50
65/100-56/100	100	65	165	56	100
90/150-70/140	150	90	240	70	140
110/200-84/178	200	110	310	84	178
95/250-100/250	250	95	345	100	250
190/300-120/300	300	190	490	120	300
145/400-158/400	400	145	545	158	400
180/500-198/500	500	180	680	198	500
230/600-236/600	600	230	830	236	600
265/700-274/700	700	265	965	274	700
310/800-314/800	800	310	1110	314	800
345/900-352/900	900	345	1245	352	900
375/1000-392/1000	1000	375	1375	392	1000

RF6292

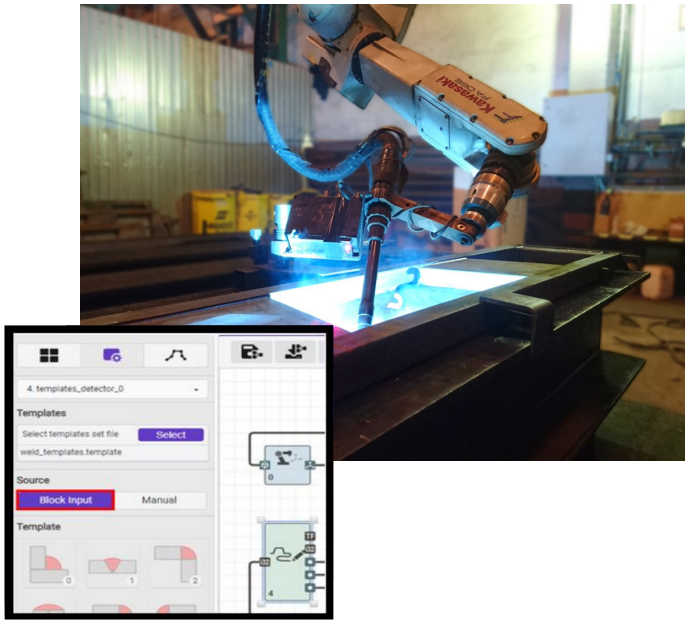
- Specialized profilers with Xend/Z ratio >2/5
- Sampling rate (full working range) > 4000 Hz
- Resolution, X axis – 1280 or 2560 points
- Linearity, Z axis – 0.01%

Range	MR, mm	SMR, mm	EMR, mm	Xsmr, mm	Xemr, mm
70/5-24/24	5	70	80	24	24
80/15-40/44	15	80	95	40	44
95/25-70/81	25	95	120	70	81
135/35-90/105	35	135	170	90	105
170/45-110/130	45	170	215	110	130
170/75-146/194	75	170	245	146	194
220/90-200/256	90	220	310	200	256
355/120-302/376	120	355	575	302	376
455/170-400/500	170	455	625	400	500
550/225-500/624	225	550	775	500	634

LASER SEAM TRACKING SYSTEM FOR WELDING AUTOMATION

LASER PROFILERS FOR WELDING ROBOTS

RF627SMART-WELD SERIES



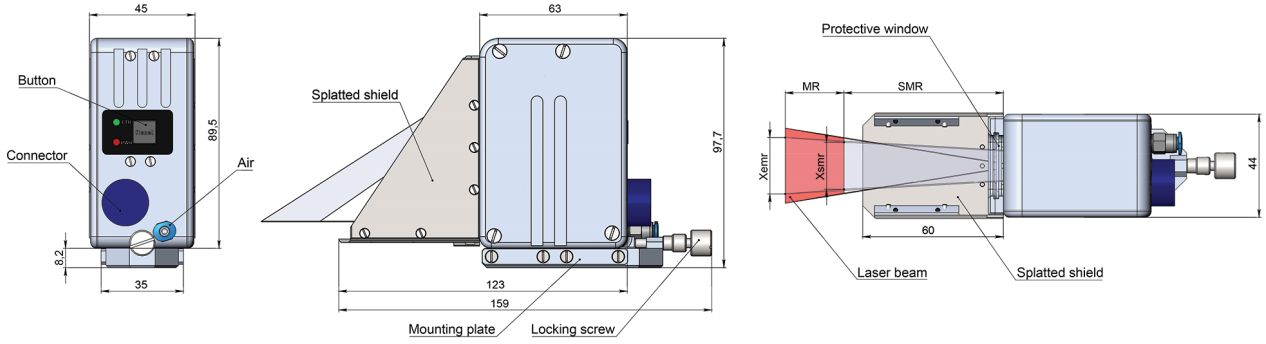
MAIN FEATURES

- RF627Smart-Weld – laser profilers with direct connection to the robot controller
- Real-time recognition, tracking, and measurement
- Works with all surfaces, including shiny ones
- Connection to all common robot controllers

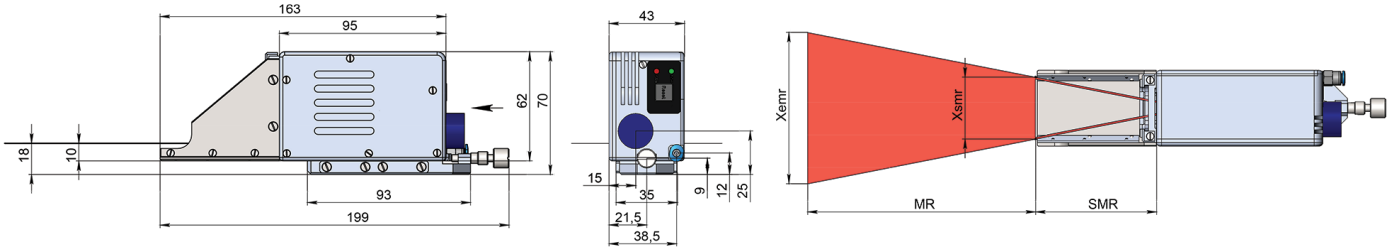
Laser Profilers RF627Smart-Weld Series. Working ranges					
Range	SMR, mm	MR, mm	Xsmr, mm	Xemr, mm	Laser
65/25-20/22	25	65	20	22	Class 2M
70/50-30/41	50	70	30	41	
76/100-48/82	100	76	48	82	
70/130-40/86	130	70	40	86	
250/130-52/76	130	250	52	76	
82/200-60/150	200	82	60	150	
90/250-65/180	250	90	65	180	
For the rest parameters — see RF627Smart Series					

RF627SMART-WELD

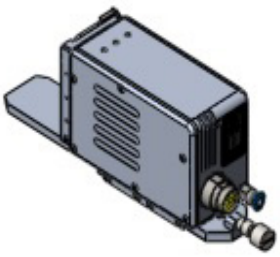
RF627Smart-Weld-68/25-20/22 и RF627Smart-Weld-90/250-65/180



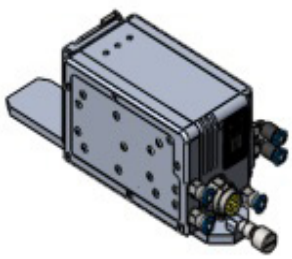
RF627Smart-Weld-70/130-40/86



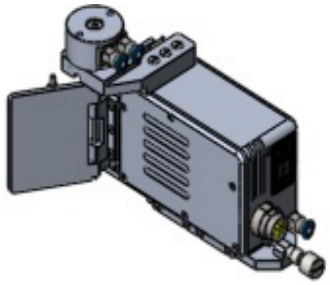
RF627SMART-WELD CONFIGURATIONS



Profiler for welding robot



Profiler for welding robot with cooling



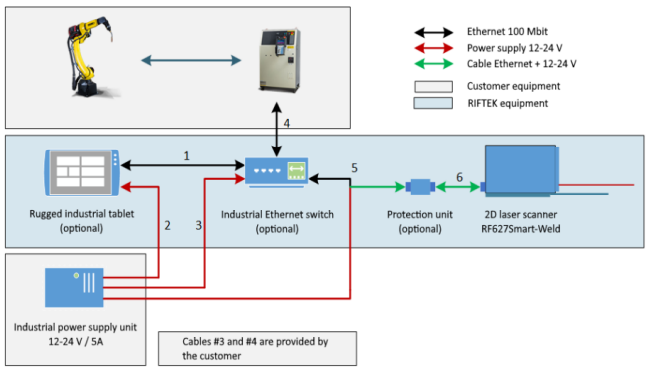
Profiler for welding robot with protective shutter

LASER SEAM TRACKING SYSTEM FOR WELDING AUTOMATION

HOW IT WORKS

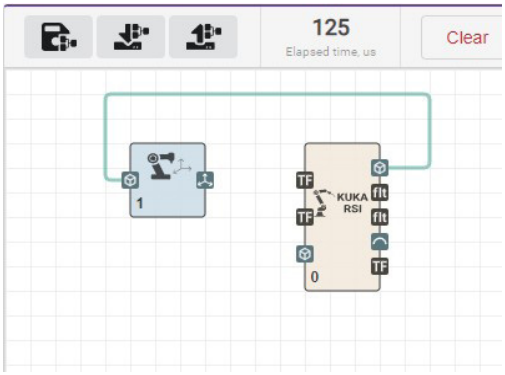
STEP 1

Connect the equipment according to the functional diagram:



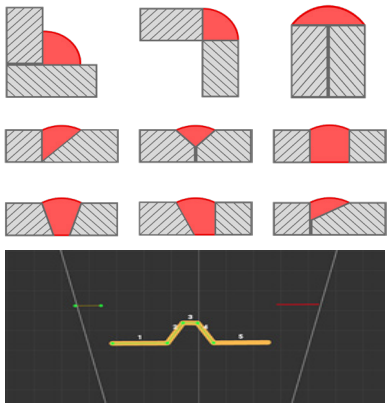
STEP 2

Calibrate the profiler relative to the robot.



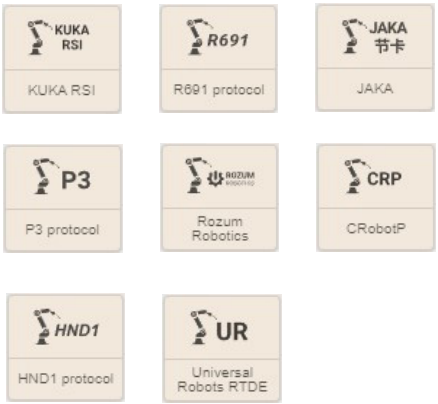
STEP 3

Using the profiler web interface, create a computation graph from the library of ready-made blocks, taking into account the features of the equipment, namely:



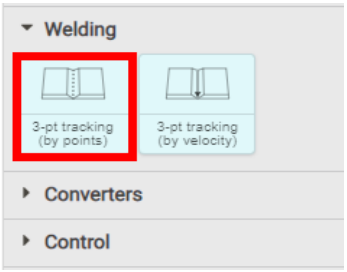
Select a tracking template or create your own using the template editor.

STEP 3.1



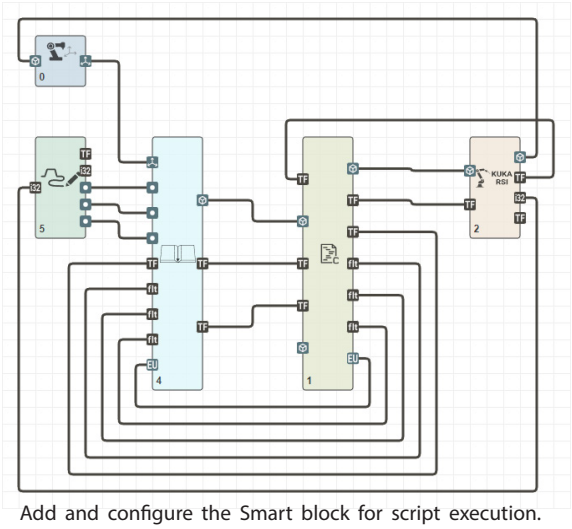
Select a Smart-block of the robot communication protocol.

STEP 3.2



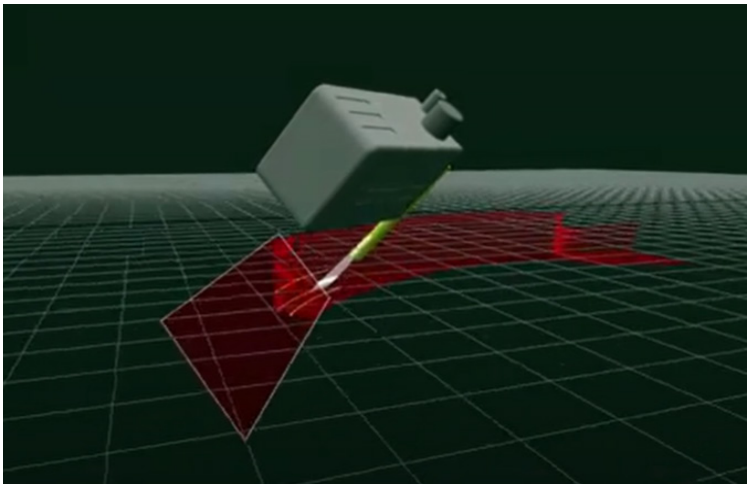
Select a Smart-block for the type of tracking:
1. Output values of the smart block – points and angles to which the actuator should move.
2. Output values of the smart-block – linear and angular velocities with which the actuator should move.

STEP 3.3



Add and configure the Smart block for script execution. Complete the construction of the tracking graph.

STEP 4 START WORKING

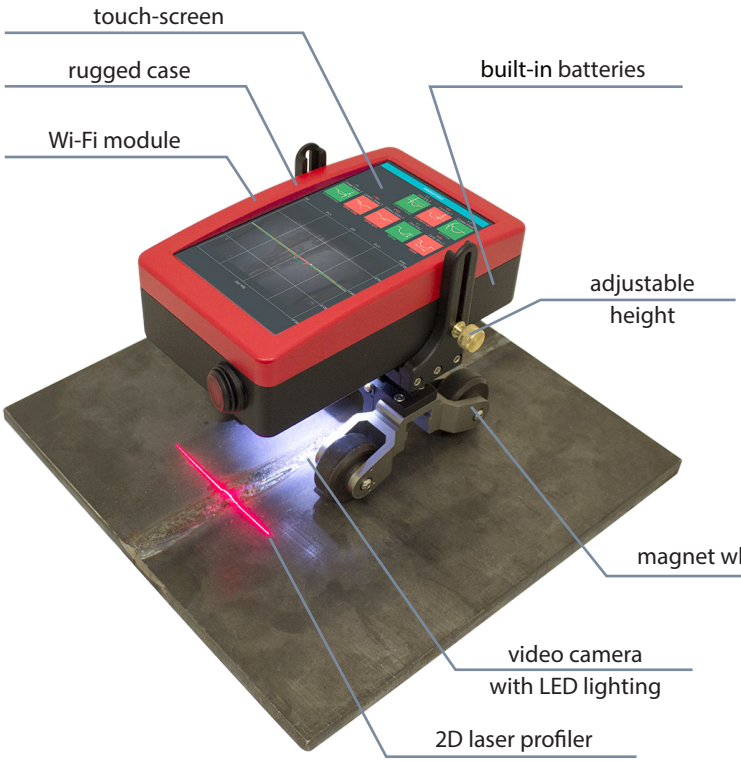


Observe the process on the computer screen.

LASER PROFILERS, RF62x SERIES

SPECIALIZED SCANNING SYSTEMS FOR WELDS, WELDED JOINTS AND EDGE PREPARATION

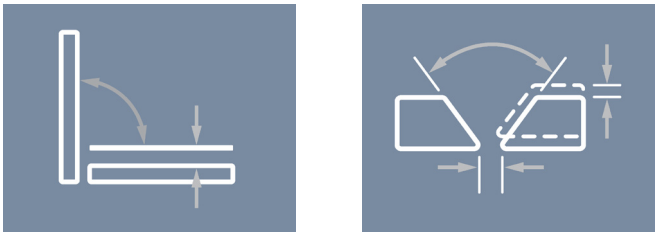
RF627AVIKScan



- Integrated in one system:
  - 2D profiler for measurement control automation
  - video camera for visual control automation
- Sampling rate — more than 2000 profiles/s
- Linear parameters measurement error — ±0.05 mm for 100 mm range
- Defect detection (porosity, cracks)
- Real time OK/NOK analysis
- Systems mounted on the robot
- Interchangeable measuring heads with different ranges

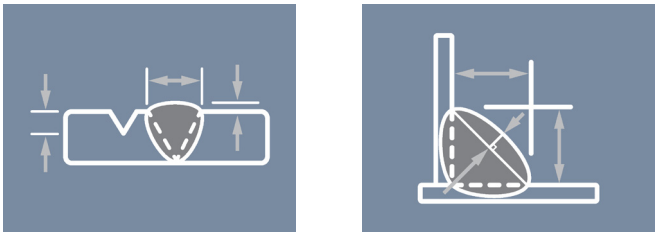
Parameter	Value
2D profiler VOF, mm	Z - 120, X - 30...110
Sampling frequency, profiles/s	>2000
Measurement error, mm	±0.05
X resolution, mm	0.025...0.08
Color camera resolution	1296 x 976
Camera speed, frames/s	120
Laser	red (660 nm) or blue (405 нм), Class 2
Working temperature, °C	-40...50
Measured parameters	width, height, angles, mismatch, undercut and so on

EDGE PREPARATION CONTROL



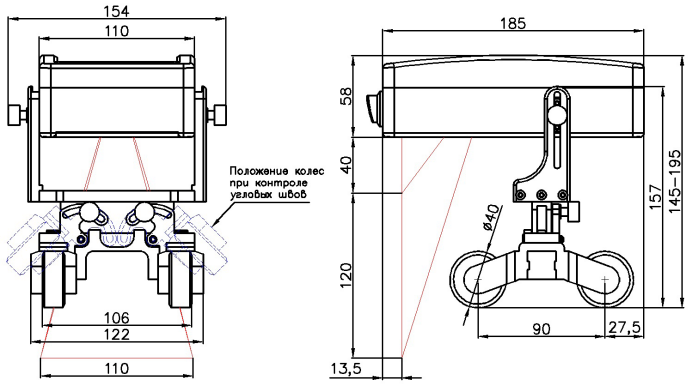
MEASUREMENT OF OFFSET, JOINT ANGLE, GAP WIDTH AND ETC.

WELD CONTROL



MEASUREMENT OF WELD HEIGHT AND WIDTH, CUTTING DEPTH, CAMBER AND ETC.

DESIGN



3D VISUALIZATION SOFTWARE