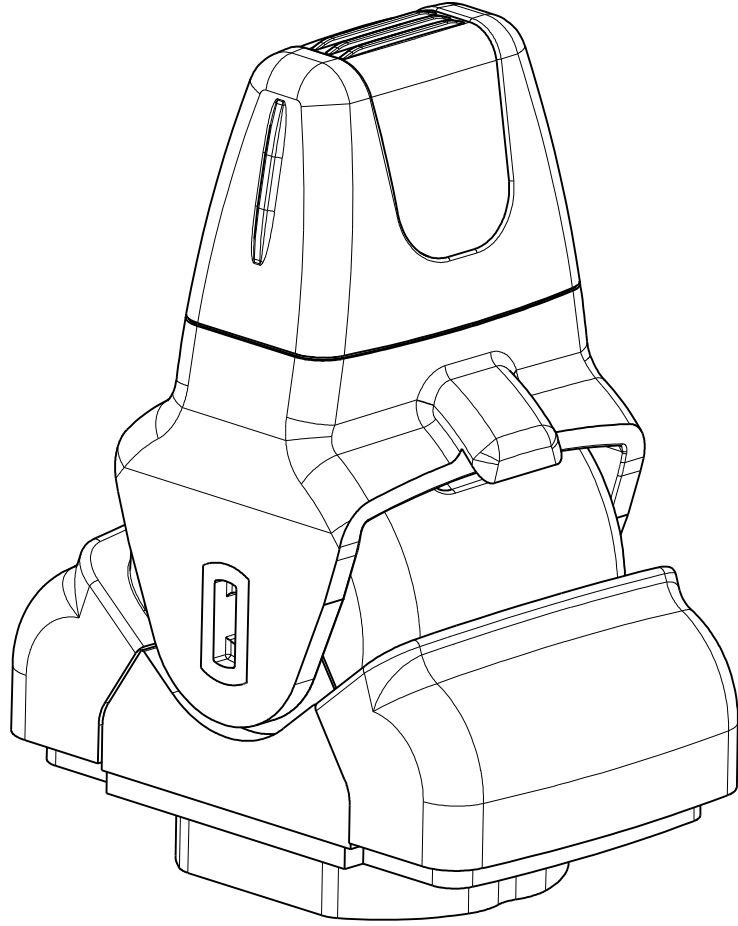




Customer : EHR ELEKTRONİK
Customer Part No : -

Makersan Order No : MO377_V0037
Makersan Config ID : MO377 - H11 - 0 - 5 - 68 - P101 - 00
Part Name : Fingertip Joystick
Hardware : H11 - Full Redundant
Detent : 0 - No Detent
Color : 5 - Blue
Symbol : 68 - 
Program : P101 - Dual Cross - No Detent
Connection : 00 - 250mm Loose Cable (AWG 24)
Special Requirements : 2 pcs. self tapping screw for thermoplastic will be given with product



Please refer to MO377-H11&H17 datasheet for other information.

- Olası bir yay kırılmasında, fingertip joystick kalan yaylar ile kesinlikle kullanılmamalıdır.
In case of a spring break, fingertip joystick must not be used with remaining springs.
- Şok ve darbeye maruz kalan veya yere düşen fingertip joystick hurdaya ayrılmalıdır, kullanılmamalıdır.
Fingertip Joystick must be separated to scrap if it has been exposed to any shock, impact or free fall.
- Fingertip Joystick'e ait datasheet'deki güvenlik talimatlarına uyulmalıdır.
Safety instruction in the Fingertip Joystick datasheet shall be respected.
- Fingertip Joystick'e ait datasheet'deki hata modları, araç üreticisi tarafından dikkate alınmalıdır.
Failure modes in the Fingertip Joystick datasheet should be taken into account by the vehicle manufacturer.
- Fingertip Joystick'e ait kullanım kılavuzundaki uyarı işaretlerine uyulmalıdır.
The warning indications in the Fingertip Joystick user manual shall be respected.

Bu dökümanın tüm hakları MAKERSAN Mak. Otom.San. Tic.Ltd.Şti.'ye aittir. İzinsiz kısmen veya tamamen kullanılamaz, çoğaltılamaz veya üçüncü şahıslara verilemez. Değişiklik yapma hakkını saklı tutar. MAKERSAN Mak. Otom.San. Tic.Ltd.Şti. owns all the rights of this document. It is forbidden to use or copy this document partly or completely, and/or to give third persons without any permission. MAKERSAN has the right of change the document without any prio information

REVIZYON REVISION	TARİH DATE	26-Jan-25 03:30:00 PM	KONTROL CHECKED BY	Levent ERKOCAK	ACIKLAMA DESCRIPTION		
Belirtilmeyen toleranslar / Unspecified tolerances according to TS 1980-1 (DIN ISO 2768-1)			v		MALZEME/MATERIAL	YUZEY/AREA_mm2 -	AGIRLIK/MASS_kg -
CİZEN DRAWN BY	O.BAYDEMİR	TARİH/DATE	25/11/20		YUZEY İSLEM/FINISH	İSİL İSLEM/HEAT TREATMENT	
OLCEK/SCALE 2,000	A3			PARCA ADI /PART NAME		MAKERSAN	
PARCA /PART NO				Fingertip Joystick		www.makersan.com	
MO377_HXX_X_X_XX_PXXX_XX							



Product Characteristics

Technology Service Life

Contactless Hall Measuring Principle, Full Redundant - Redundant
½ Million for Detent Hold & Detent Return & Detent Single Side
1 Million for Rocker & Back Turn & Back Turn with Detent
2 Million for Friction & Friction with Middle Detent
5 Million for No Detent:

Lever Operating Angle

±35° max. for No Detent, Detent Hold, Detent Return, Detent Single Side,
Rocker, Friction and Friction with middle Detent;
70° max. for Back Turn, Back Turn with Detent

Lever Vertical Load Max Options

Self Centering

50 N

Actuation Type Operating Temperature Ingress Protection

Customized Output Signal Program, Customized Wire Harness, Customized Color Options

Single Axis

-40°C ... +85°C

IP6K9K Electronic / IP54 Mechanical

Electrical Data

Supply Voltage Supply Current Output Output Voltage Output Current Output Short Circuit Current Output Load Load Capacity Output Resolution Total Error Linearity Hysteresis Reverse Battery Protection

8-32 VDC
8 mA (typical) per channel (Total Consumption: 16mA)
Analog or PWM
Non Ratiometric Analog Output, Programmable 0 - 5 V / PWM (100-500 Hz - 5V)
1 mA (max.)
15 mA
10 kOhm (typical)
4,7 nF
12 bit
±0,15 V
±1 degree
0,5 %
Provided

Environment

Chemical Load

ISO 16750-5 : Diesel, engine oil, hydraulic fluid, grease, brake fluid, antifreeze fluid, urea, windscreen washer fluid, vehicle washing chemicals, cola, coffee, NPK fertilizer.

Damp Heat Steady Damp Heat, Cyclic Cold Dry Heat Change of Temperature Mechanical Shock Vibration Sinusoidal Vibration Random Free Fall Water Jet Dust Immersion Salt Spray

DIN EN 60068-2-78 : 40°C, 85% RH, 96h
DIN EN 60068-2-30 : Between 25 / 55°C, 95% RH, 24h/cyc, 6cyc
DIN EN 60068-2-1 : -40°C, 48h
DIN EN 60068-2-2 : +85°C, 48h
DIN EN 60068-2-14 : Between -40 / 85°C, 8h/cyc, 30cyc
DIN EN 60068-2-27 : 40g, 6ms, 1000 times per plane x, y, z
DIN EN 60068-2-6 : 40g, 0,32m/s, 8h per plane x, y, z
DIN EN 60068-2-64 : 5,8g, 10-2000Hz, 8h per plane x, y, z
DIN IEC 60068-2-32 : 1m free fall to concrete ground, 2 times per plane x, y, z
DIN 40050 Part 9 : Electronic IP 6K9K, Mechanical IP 54
DIN 40050 Part 9 : Electronic IP 6K9K, Mechanical IP 54
DIN 40050 Part 9 : Electronic IP 67
DIN EN 60068-2-11 : 504 hours

EMC/ESD

EMC ESD Load Dump

ECE-R10 Rev.5
ISO 10605
ISO 7637-2 Pulse 5b

All the tests specified above were performed in Makersan's in-house testing facility for the purpose of design verification except EMC. The in-house testing facility does not hold an accreditation.

Electrical Connection



H11 - Full Redundant Sensor - Dual									
Sensor 1	1	Vs 1	Red	8-32V					
	2	Signal 1	Yellow	Analog	PWM	[0-5V]			
	3	Gnd 1	Black						
Sensor 2	4	Vs 2	Orange	8-32V					
	5	Signal 2	White	Analog	PWM	[0-5V]			
	6	Gnd 2	Green						

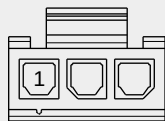
H11 - Single Sensor									
Sensor 1	1	Vs 1	Red	8-32V					
	2	Signal 1	Yellow	Analog	PWM	[0-5V]			
	3	Gnd 1	Black						

H17 - Redundant Sensor - Dual									
Sensor 1	1	Vs 1	Red	8-32V					
	2	Signal 1	Yellow	Analog	PWM	[0-5V]			
Sensor 2	4	Signal 2	White	Analog	PWM	[0-5V]			
	3	Gnd 1	Black						

Connector Options

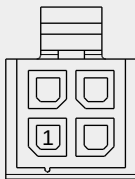
MOLEX CONNECTOR

Molex - Micro Fit-3



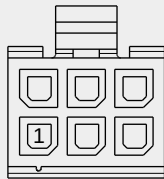
Mating Connector:
43640-0300

Molex - Micro Fit-4



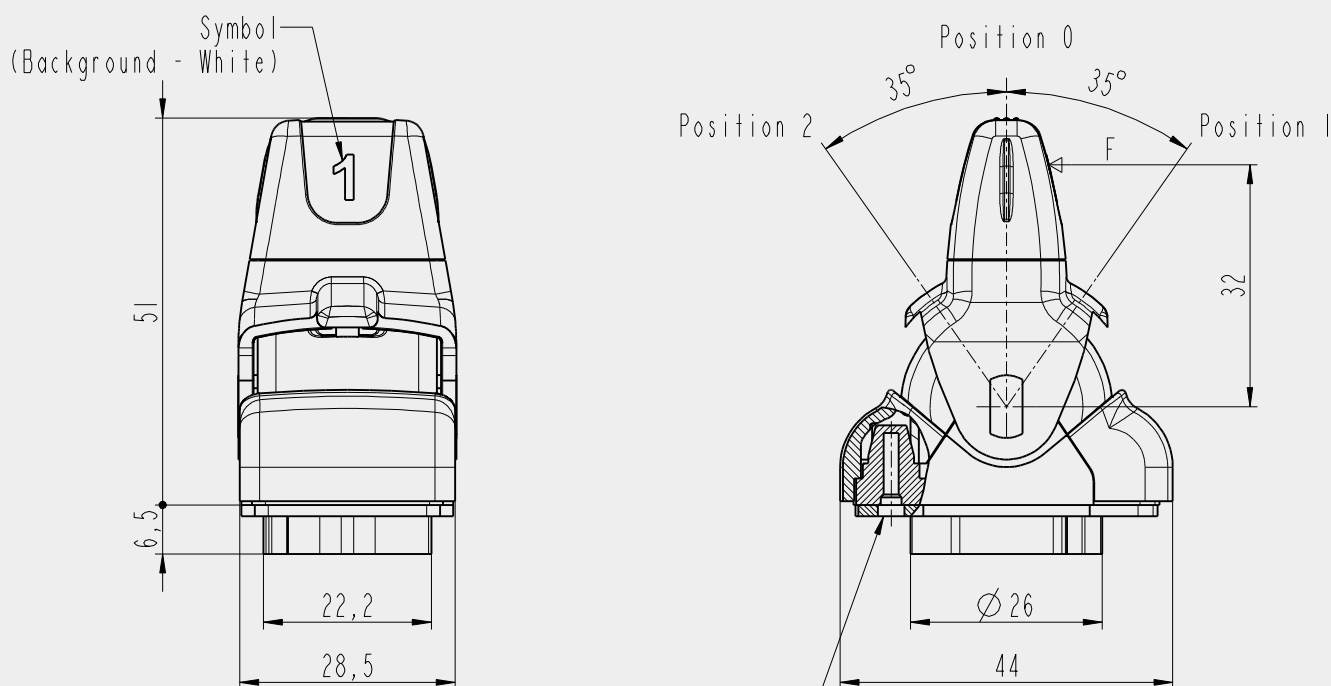
Mating Connector:
43020-0400

Molex - Micro Fit-6

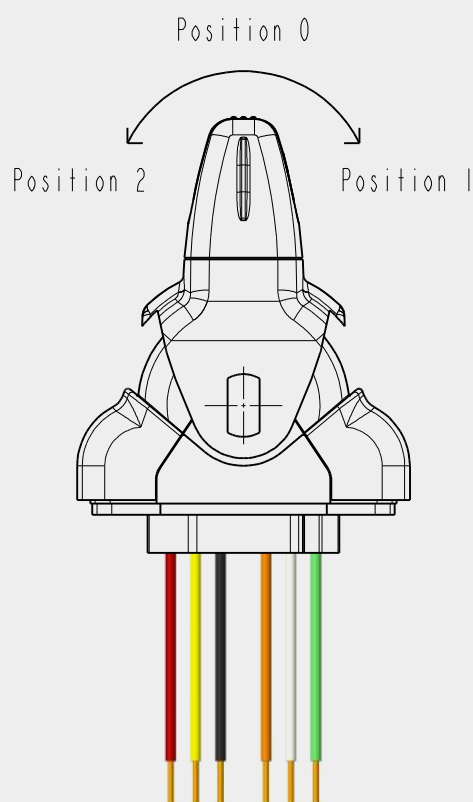
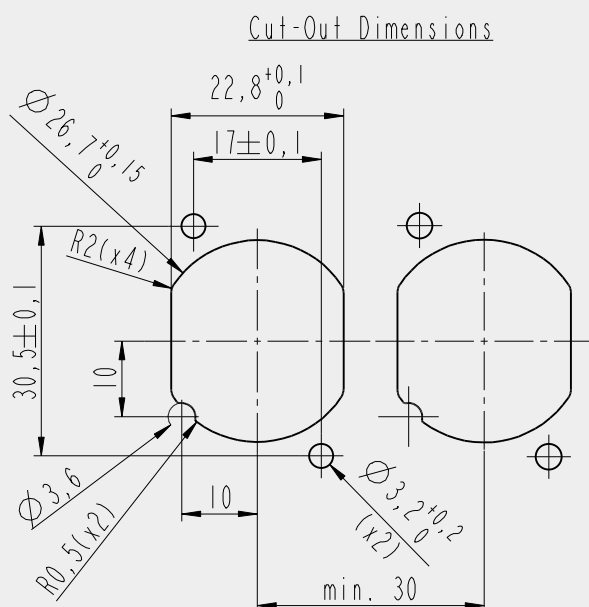


Mating Connector:
43020-0600

Technical Drawing

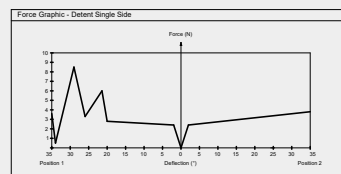
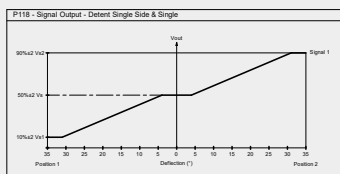
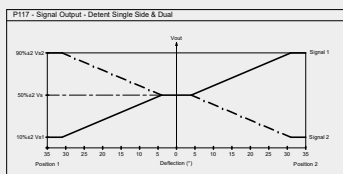
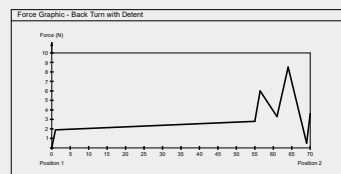
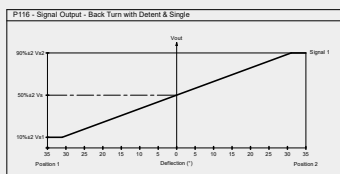
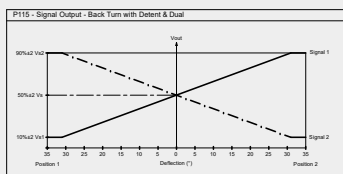
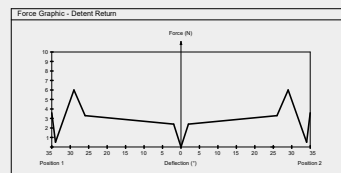
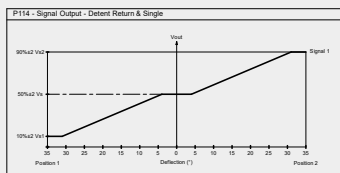
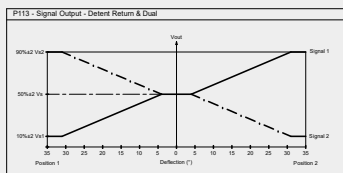
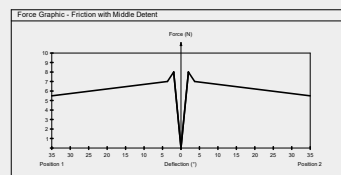
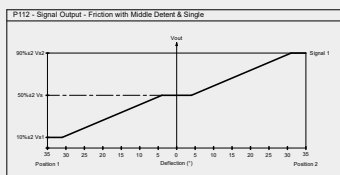
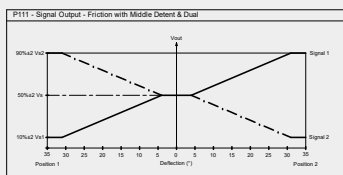
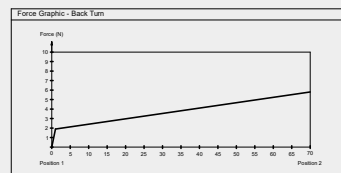
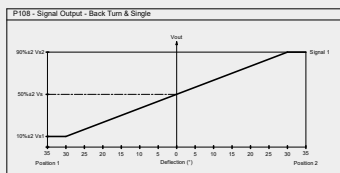
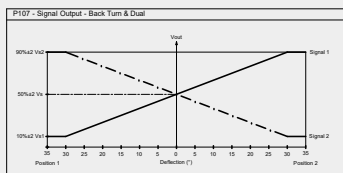
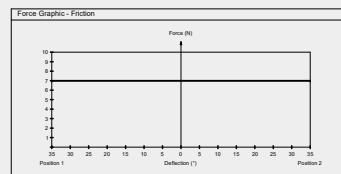
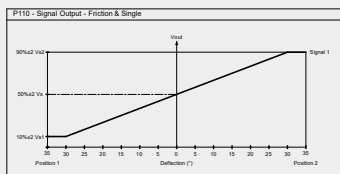
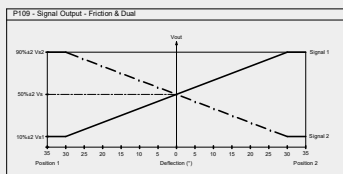
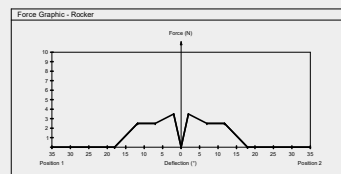
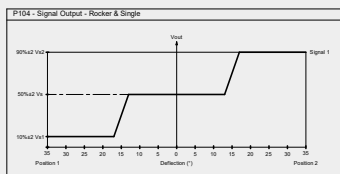
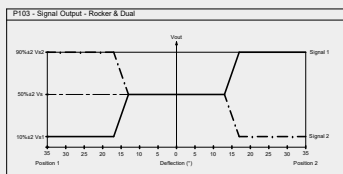
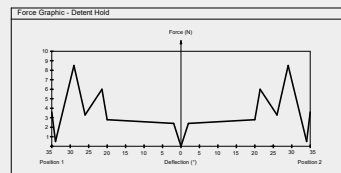
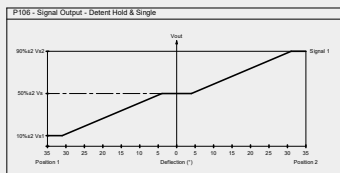
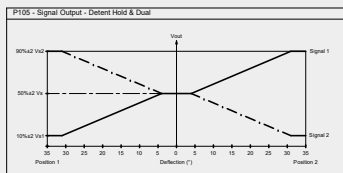
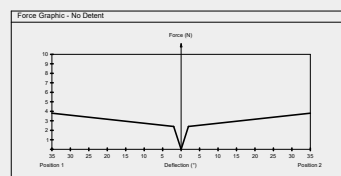
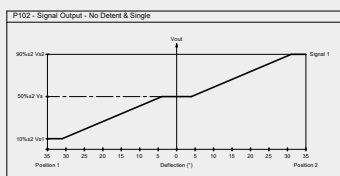
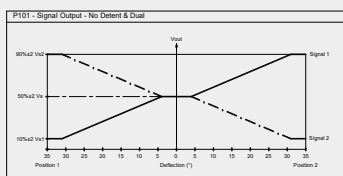


2,5x10 (x2) Plastic Screw
Support Thickness up to 4 mm
Safe Tightening Torque: $0,75 \pm 0,1$ Nm



*Red cable side is Position 2. Please check cable color for direction for mounting.

Signal Outputs & Force Graphs



DATASHEET
MO 377.H11&H17

Symbol Options

*For Symbol Graphics; Please see 377_Symbol_Table.dwg file.

Color Options



1- Red
RAL 3001



2 - Green
RAL 6010



3 - Yellow
RAL 1023



4 - Black
RAL 9005



5 - Blue
RAL 5005



6 - Orange
RAL 2010



7 - Gray
RAL 7043

Ordering Code

MO 377 - HXX - X - X - XX - PXXX - XX

Hardware Configuration
H11- Full Redundant
H17- Redundant

Detent
0- No Detent
1- Detent Hold
2- Rocker
3- Friction
4- Back Turn
5- Friction with Middle Detent
6- Detent Return
7- Back Turn with Detent
8- Detent Single Side

Color
1- Red
2- Green
3- Yellow
4- Black
5- Blue
6- Orange
7- Gray

Symbol
00- No symbol
XX- Symbol

*See symbol table for symbol codes.

*

Program
P101- Dual Cross - No Detent
P102- Single - No Detent
P103- Dual Cross - Rocker
P104- Single - Rocker
P105- Dual Cross - Detent Hold
P106- Single - Detent Hold
P107- Dual - Back Turn
P08- Single - Back Turn
P109- Dual - Friction
P110- Single - Friction
P111- Dual - Friction with Middle Detent
P112- Single - Friction with Middle Detent
P113- Dual - Detent Return
P114- Single - Detent Return
P115- Dual - Back Turn with Detent
P116- Single - Back Turn with Detent
P117- Dual - Detent Single Side
P118- Single - Detent Single Side

Connection
00- 250mm Loose Cable (AWG 24)
01- Molex Micro-Fit Connector 250mm Cable

**

* No symbol is standard, other symbols are available upon request with minimum order quantity.

** 250mm loose cable is standard, Deutsch DTM seal connectors available with minimum order quantity.

Example: MO 377-H11-0-1-00-P101-00 is Fingertip Joystick, Full Redundant S:8-32V / O:0-5V, No Detent, Red, No Symbol, Dual Cross - No Detent Program and 250mm Loose Cable.

Fault Condition Behaviors

Test Conditions

Sensor 1:

Broken Ground (GND) [Pull-down load < 10 kOhm]
Broken Ground (GND) [Pull-up load > 1kOhm]
Broken Supply (Vs) [Pull-down load > 1kOhm]
Broken Supply (Vs) [Pull-up load > 1kOhm]
Short Sensor Signal to Supply (Vs)
Short Sensor Signal to Ground (GND)
Short Sensor Supply to Ground (GND)

Sensor 2:

Broken Ground (GND) [Pull-down load < 10 kOhm]
Broken Ground (GND) [Pull-up load > 1kOhm]
Broken Supply (Vs) [Pull-down load > 1kOhm]
Broken Supply (Vs) [Pull-up load > 1kOhm]
Short Sensor Signal to Supply (Vs)
Short Sensor Signal to Ground (GND)
Short Sensor Supply to Ground (GND)

377.H11

< 0.5V
> 4V
< 0.1V
-
Sensor Damage (if Vs > 18V)
< 0.1V
< 0.1V

< 0.5V
> 4V
< 0.1V
-
Sensor Damage (if Vs > 18V)
< 0.1V
< 0.1V

Safety Instructions

- *Do not use sensor in hazardous and explosive environment.
- *Keep the sensor away from magnets and radio equipment . Hall sensors are sensitive to external magnetic fields.
- *Do not place the sensor to the direct air flow of vehicles heating cooling air duct due to the high temperature stress.
- *Screen with the vehicle's ground the electric cables connected to sensor.Far away the sensor cable from power-conducting lines.
- *Provide a clean power supply to the sensor. Otherwise voltage transients may damage the sensor.
- *Do not direct the pressure washing jet to sensor.
- *Unplug connectors from the sensor during electrical welding operations.
- *Damages which result from improper use, all warranty and liability claims with respect to the manufacturer void.
- *To perform a risk analysis of the system is customer's responsibility at use in safety-related functions of the sensor.
- *These products are ESD (Electrostatic Discharge) sensitive devices. ESD may cause permanent damage. When handling these devices please observe standard ESD precautions.

Makersan reserves the right to make corrections, enhancements, improvements and other changes to its products at any time and without notice.