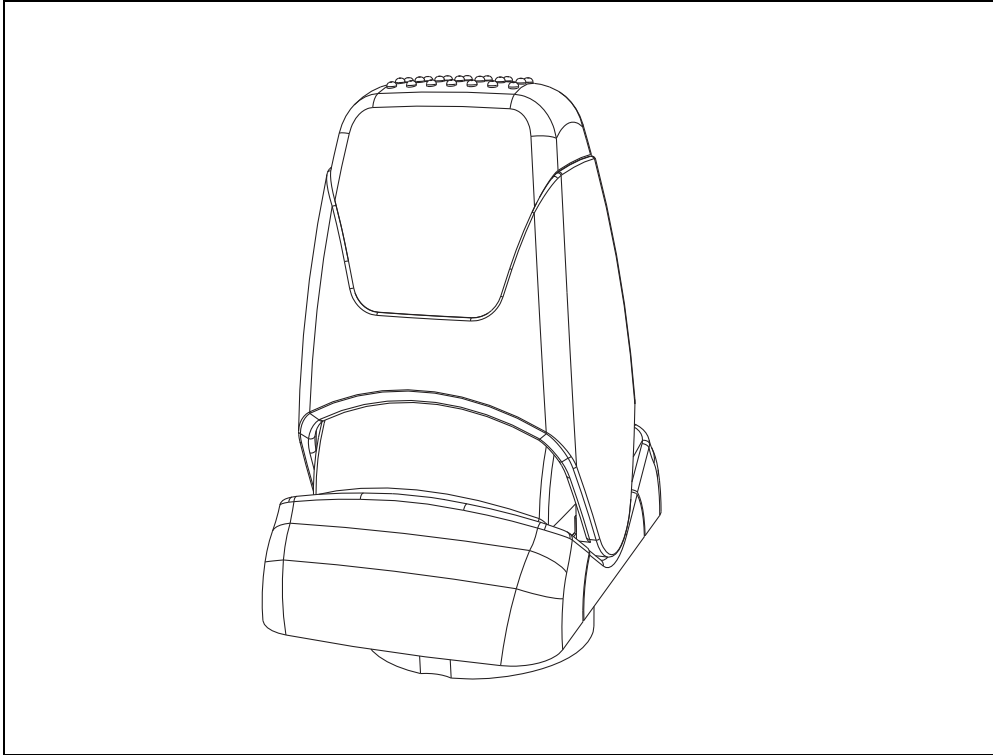


IQAN-LST

Instruction book

Publ no MSG17-8303-IB/UK
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Publication history

The following table provides an overview of the changes made to this document over the course of its publication history.

Revision / date	Description of change
Rev. 001 / 2015-11-19	Updated Appendix A to match SmPC.
Rev. 002 / 2018-09-11	Added 'Safety' chapter, Declaration of Conformity.
Rev. 003 / 2019-05-08	Updated Appendix A with values for 2019 sensor redesign; document shows new values on VOUT antivalent tracking, linearity and MTTFd

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Warning

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1 Introduction

These instructions are to be used as a reference tool for the vehicle manufacturer's design, production, and service personnel.

The user of these instructions should have basic knowledge in the handling of electronic equipment.

Safety symbols

Sections regarding safety, marked with a symbol in the left margin, must be read and understood by everyone using the system, carrying out service work or making changes to hardware and software.

The different safety levels used in this manual are defined below.



WARNING

Sections labeled *WARNING* with a caution symbol in the left margin, indicate that a hazardous situation exists. If precautions are not taken, this could result in death, injury, or property damage.



NOTICE

Sections labeled *NOTICE* with a notice symbol in the left margin, indicate there is important information about the product. Ignoring this could result in less than optimal performance, or damage to the product.

Contact the manufacturer if there is anything you are not sure about or if you have any questions regarding the product and its handling or maintenance.

The term "manufacturer" refers to Parker Hannifin Corporation.

2 Precautions

General safety regulations

Work on the hydraulics control electronics may only be carried out by trained personnel who are well-acquainted with the control system, the machine and its safety regulations.



WARNING

Mounting, modification, repair and maintenance must be carried out in accordance with the manufacturer's regulations. The manufacturer has no responsibility for any accidents caused by incorrectly mounted or incorrectly maintained equipment. The manufacturer does not assume any responsibility for the system being incorrectly applied, or the system being programmed in a manner that jeopardizes safety.



WARNING

Damaged product may not be used. If the control system shows error functions or if electronic modules, cabling or connectors are damaged, the system shall not be used.



WARNING

Electronic control systems in an inappropriate installation and in combination with strong electromagnetic interference fields can, in extreme cases, cause an unintentional change of speed of the output function.



NOTICE

As much as possible of the welding work on the chassis should be done before the installation of the system. If welding has to be done afterwards, the electrical connections on the system must be disconnected from other equipment. The negative cable must always be disconnected from the battery before disconnecting the positive cable. The ground wire of the welder shall be positioned as close as possible to the place of the welding. The cables on the welding unit shall never be placed near the electrical wires of the control system.

Construction regulations



WARNING

The vehicle must be equipped with an emergency stop which disconnects the supply voltage to the control system's electrical units. The emergency stop must be easily accessible to the operator. The machine must be built if possible, so that the supply voltage to the control system's electrical units is disconnected when the operator leaves the operator's station.

Safety during installation



WARNING

Incorrectly positioned or mounted cabling can be influenced by radio signals which can interfere with the functions of the system.

Safety during start-up



WARNING

The machine's engine must not be started before the control system is mounted and its electrical functions have been verified.

Ensure that no one is in front, behind or nearby the machine when first starting up the machine.

Follow the instructions for function control in the Start-up section.

Safety during maintenance and fault diagnosis



WARNING

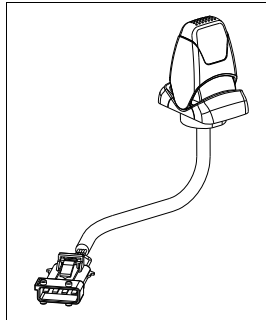
Ensure that the following requirements are fulfilled before any work is carried out on the hydraulics control electronics.

- The machine cannot start moving.
- Functions are positioned safely.
- The machine is turned off.
- The hydraulic system is relieved from any pressure.
- Supply voltage to the control electronics is disconnected.

3 Product description

IQAN-LST

The IQAN-LST is one of several single axis joysticks designed for controlling hydraulic functions in vehicles and machinery, using 0,5-4,5Vdc outputs.



The IQAN-LST lever.

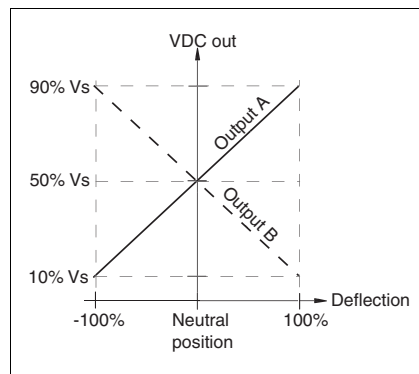
Output

The IQAN-LST has two (2) contactless hall effect sensors that provide mirrored *voltage outputs* for controlling proportional valve drivers.



NOTICE

In order to increase the safety of the LST the opposing 10% - 90% V_S and 90% - 10% V_S outputs can be compared eg. to verify center position. With a 5 Vdc supply the outputs are typically 0,5-4,5Vdc and 4,5-0,5Vdc



Graph showing dual outputs A and B.

Markings/Approvals



Declaration of Conformity

We: Parker Hannifin Manufacturing Sweden AB
Mobile Hydraulic Systems Division

Located at: Mölnlycke Fabriker 14
S-435 35 Mölnlycke, SWEDEN
Tel. +46 31 750 44 00

Declare that the products identified herein comply with the essential requirements of the following EU directives:

2014/30/EU **EU EMC Directive**

Harmonized standards:

ISO 14982:2009	Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria
EN 13309:2010	Construction machinery - Electromagnetic compatibility of machines with internal electrical power supply
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Trade Name: Electrohydraulic Control Systems

Products: **IQAN-LST**

Signature of responsible party:

A handwritten signature in blue ink, appearing to read "Håkan Jisland".

Printed name of responsible party: Håkan Jisland
Position of responsible party: Business Unit Manager

Executed on August 21th 2018, at Mölnlycke, Sweden

4 Safety

IQAN-LST

Primary and secondary signals

The IQAN-LST has two signal outputs. The signals are antivalent, meaning that the secondary output when correct will be the "mirror image" of the primary output. It is recommended to compare the signals in the controller to detect fault and protect against unwanted movement.

Use of limited signal range

The analog outputs of the IQAN-LST use limited signal range to provide an additional method for error detection. The operating signal range for primary and secondary outputs are 10%-90% V_s and 90%-10% V_s respectively. V_s (power supply) is 5 Vdc. This allows the controller to detect if a wire is pulled loose or making contact with a powered wire. Detecting wiring faults can protect against unintended movement.

EN 13849-1

MTTFd values specified in Appendix A are calculated based on FMEDA, for additional details on failure mode effect and failure mode distribution, please contact Parker.



WARNING

Risk of injury! Do not use in areas with high magnetic fields.

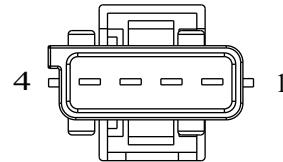
The IQAN-LST is based on hall effect sensors. The LST is designed with magnetic deflection to reduce the influence of external magnetic fields, but exposure to high external magnetic fields may lead to unwanted activation of the output signals.

For maximum allowed external magnetic field, see Appendix A, on page 9.

5 Installation

Connector C1 (-S)

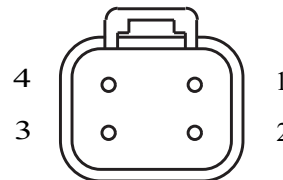
Connector kit	Parker no. 5031097
Housing	Amp no. 1-963207-1
Plane sealing, 4 p	Amp no. 963208-1
Pin type	Amp no. 929940-1
Cable	0,75-1,00 mm ²
Seals	Amp no. 828904-1
Plugs (empty pos.)	Amp no. 828922
IQAN crimping tool references	Red handle, pos. A use Yellow extraction tool
IQAN tool kit	Parker no. 5031061



The IQAN tool kit is found in the 'IQAN accessories' datasheet

Connector C1 (-D)

Connector kit	Parker no. 5031113
Housing	Deutsch no. DT06-4S-C015
Wedge	Deutsch no. W4S-P012
Pin type	Deutsch no. 1062-16-0122
Cable	0,75-1,00 mm ²
Plugs (empty pos.)	Deutsch no. 114017
Crimp tool	Deutsch no. DTT-16-01

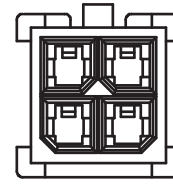


Pinout for -S and -D connector types

Pos	Signal name
1	GND
2	V _S (+5Vdc)
3	VOUT-A
4	VOUT-B

Connector C1 (-MF)

Connector kit	Parker no. tbd		
Housing	Molex no. 430200401	4	3
Pin type	Molex no. 4300310001	2	1
Cable	0,50 mm ²		
Crimp tool	Molex no. 638190000		



Pinout for -MF connector type

Pos	Signal name
1	V _S (+5Vdc)
2	VOUT-A
3	GND
4	VOUT-B

Appendix A

IQAN-LST Technical Overview

Absolute maximum ratings

$T_A = +25\text{ °C}$ (unless otherwise specified)

Ambient temperature, T_A	-40 to 85 °C
Storage temperature	-40 to 100 °C
Max, overvoltage on V_S and VOUT pins	8.5 V (14V for max 10 minutes)
External magnetic field	1.13 mT

The “Absolute maximum ratings” table lists the maximum limits to which the device can be subjected without damage. This doesn't imply that the device will function at these extreme conditions, only that, when these damage. This doesn't imply that the device will function at these extreme conditions, only that, when these conditions are removed and the device operated within the “Recommended Operating Conditions”, it will still be functional and its useful life won't have been shortened.

Environmental ratings

Climate Enclosure, water & dust protection Standard Salt mist Damp heat cyclic Damp heat steady state Heat, operation Heat, storage Cold Change of temperature	IEC 60529:2001, IP65 IEC 60068-2-52:1996 Kb, 72 h IEC 60068-2-30:1985 Db, +55°C, 95% RH, 6 cycles IEC 60068-2-78:2001, +40°C, 93% RH, 21 days IEC 60068-2-2:1993-01 Bb, +85°C, 72 hours IEC 60068-2-2:1993-01 Bb, +100°C, 72 hours IEC 60068-2-1:1993-02 Ab, -40°C, 16 hours IEC 60068-2-14:1984 Nb, - 30°C to +85°C, 100 x 4 hours
Mechanical Random vibration Bump	IEC 60068-2-64, 10 - 250 Hz, 0.4 G2, 30 h IEC 60068-2-29:1987 Eb, 40 g, 6 ms, 1000 * 6 dir
EMC Radiated emission Conducted susceptibility Radiated susceptibility Conducted transients susceptibility ESD, Operation ESD, Handling	ISO 13766/ISO 14982 ISO 11452-4, 1 - 200 MHz, 1 kHz, 80% AM, 100 mA ISO 11452-2, 200-2000 MHz, 1kHz, 80% AM, 100 V/m ISO 7637-3, Level 3 ISO 10605:2001, 8 kV (contact), 25 kV (air) ISO 10605:2001, 4 kV (contact)

System

$T_A = -40$ to $+70\text{ °C}$, $V_S = 5\text{ V}$ (unless otherwise specified)

Weight	40 g
Operating ambient temperature, T_{ROC}	-40 to 70 °C

Base - Electrical characteristics

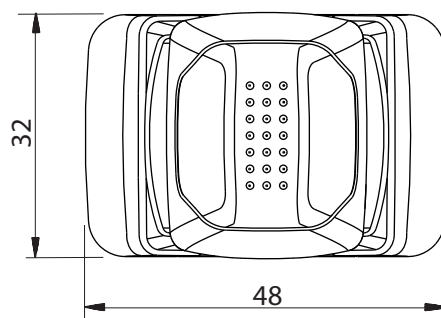
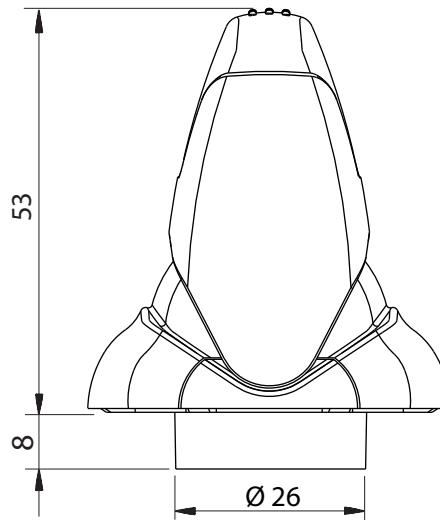
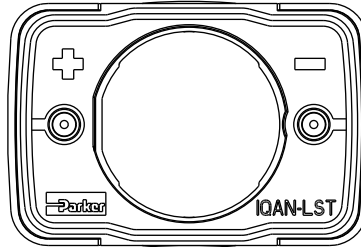
Voltage supply, V_S	4.5 to 5.5 V
Current supply, V_S	max. 23 mA, typ. 16 mA @ 5V
Number of VOUT	2 antivalent signals
VOUT signal <i>minimum position</i> <i>centre position</i> <i>maximum position</i>	500 mV \pm 150 mV @ 2×10^6 cycles 500 mV \pm 200 mV @ 5×10^6 cycles 2500 mV \pm 150 mV @ 2×10^6 cycles 2500 mV \pm 150 mV @ 5×10^6 cycles 4500 mV \pm 150 mV @ 2×10^6 cycles 4500 mV \pm 200 mV @ 5×10^6 cycles
VOUT maximum linearity error	200 mV
VOUT A-B maximum difference	200 mV
VOUT resolution	12 bits = 1.22 mV
Response time	typical 6 ms
Minimum resistive load	4.5 kohm
Maximum capacitive load	0.6 μ F
Maximum continuous voltage	5.5 V
Protection	SCG
MTTFd <i>VOUT-A (standard)</i> <i>VOUT-B (standard)</i> <i>VOUT-A (A05)</i> <i>VOUT-B (A05)</i>	4797 [y] 4722 [y] 4535 [y] 4535 [y]

Base - Mechanical characteristics

Angle of movement	$\pm 30^\circ$
Deflection moment (standard option) <i>Neutral, M_{DN}</i> <i>Operating, M_{DO}</i>	typ. 0,08 Nm typ. 0,14 Nm
Deflection moment (strong option) <i>Neutral, M_{DN}</i> <i>Operating, M_{DO}</i>	typ. 0.1 Nm typ. 0.18 Nm
One time loading	Max. 4 Nm
Expected life	standard deflection option 5×10^6 cycles strong deflection option 2.5×10^6 cycles One cycle: Center pos. to full +direction and back, center pos. to full -direction and back

Appendix B

Dimensioning of the IQAN-LST



units=mm

For latest information visit our website www.iqan.com

Information in this instructionbook is subject to change without notice

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