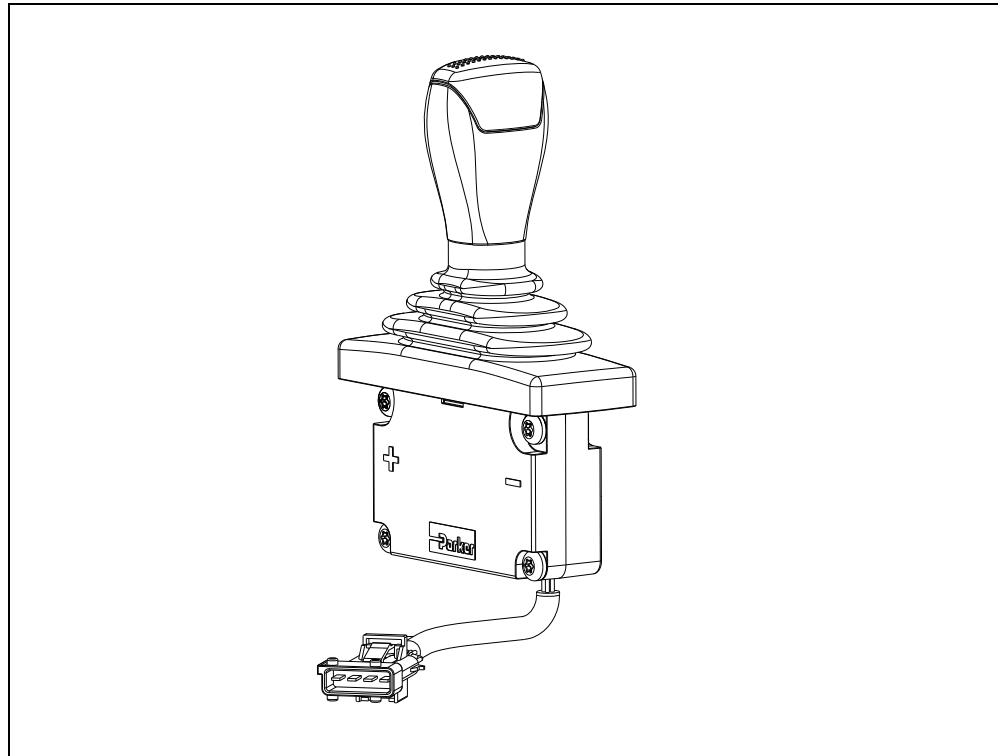


IQAN-LSL

Instruction book

Publ no HY33-8302-IB/UK
Edition 2016-10-28



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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

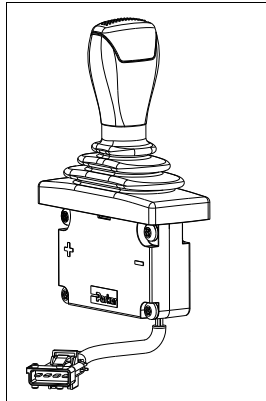
Ensure that the following requirements are fulfilled before any work is carried out on the hydraulics control electronics.

- 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-LSL

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



The IQAN-LSL lever.

Output

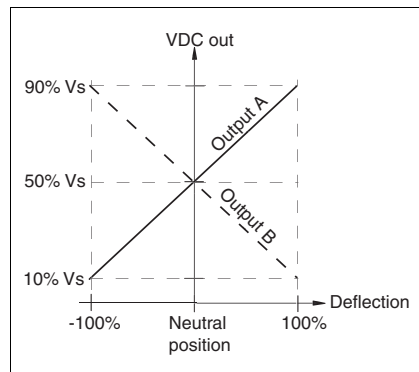
The IQAN-LSL has two (2) contactless hall effect sensors that provide mirrored *voltage outputs* for controlling proportional valve drivers.



NOTICE

In order to increase the safety of the LSL the opposing 10% - 90% V_S and 90% - 10% V_S outputs can be compared to verify center position.

With a 5 Vdc supply the outputs are typically 0,5-4,5Vdc and 4,5-0,5Vdc

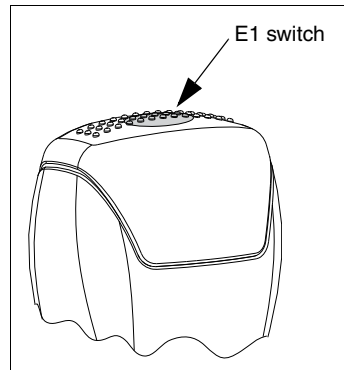


Graph showing dual outputs A and B.

Switch

The IQAN-LSL has a switch option in the top of the handle. The momentary push button can be used for an 'operator present' switch. Supply for the switch is from V_{BAT} .

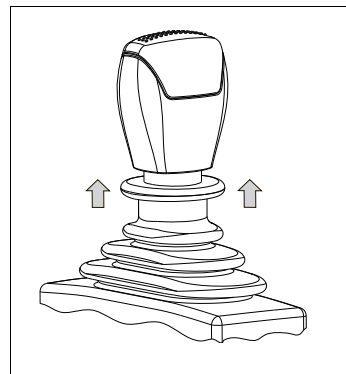
For maximum load current of switch, see Appendix A, on page 11.



Location of switch in handle.

Manual neutral detent

The IQAN-LSL has a handle detent option in the neutral position. The detent lock is released by pulling up on a spring loaded collar. This feature prevents accidental activation of the joystick.



Operation of manual detent.

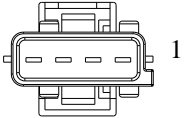
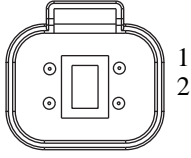
Electrical detents

The IQAN-LSL has solenoid detents available in several configurations. The **L1/L4** options have a detent in the full on minus (-) direction. The **L2/L5** options have detents in the full plus (+) and in the full minus (-) directions. The **L3** option has a detent in the minus (-) direction at 75% of stroke. These detents can be disengaged electrically or by exceeding the holding force applied by the solenoid(s). To engage the detent function, a push/pull force needs to be applied to exceed an increase in spring force at the end of stroke. The **L4/L5** has the same function as the **L1/L2** option but with a higher force.

For detent activation force **L1/L2** and **L4/L5**, see Appendix A, on page 11.

4 Installation

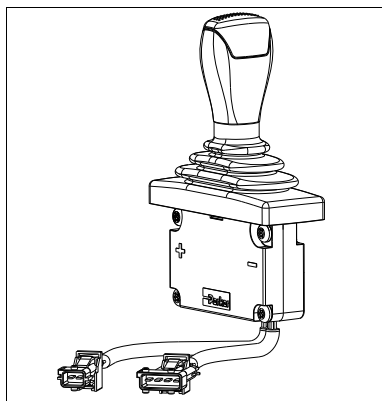
Connector C1

Connector kit	-S (Saab, AMP/Tyco) Parker no. 5031097	-D (Deutsch DT) Parker no. 5031113	-S	
Housing	Amp no. 1-963207-1	DT06-4S-C015	4	
Plane sealing	Amp no. 963208-1	-		
Pin type	Amp no. 929940-1	Deutsch 1062-16-122		
Wedge	-	W4S-P012		
Cable	0,75-1,0 mm ²	0,75-1,0 mm ²	-D	
Wire seals	Amp no. 828904-1	-	4	
Plugs, empty pos.	Amp no. 828922	Deutsch no. 11431	3	
IQAN crimping tool references	Red handle, pos. A Yellow extraction tool	-		
IQAN tool kit	Parker no. 5031061	-		

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

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

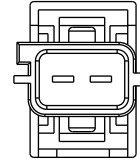
The IQAN-LSL has more than one cable depending on the specified options. When the -S connector type is specified, the additional cable for the switch or electrical detent option will have a 2 position Saab, AMP/Tyco connector. When the -D connector type is specified, the appropriate number of pin positions Deutsch DT housing will be used.



The IQAN-LSL-E1-// lever and cables.

Connector C2, -S Saab, AMP/Tyco (option E1, switch or Lx, detent)

Connector kit	Parker no. 5031098		
Housing	Amp no. 1-963210-1	2	1
Plane sealing	Amp no. 963209-1		
Pin type	Amp no. 929940-1		
Cable	0,75-1,0 mm ²		
Wire 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

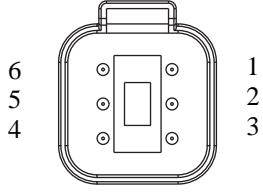
E1 pin definitions

Pos	Signal name
1	DOUT
2	VBAT _{SW} (+12V, +24V)

Detent pin definitions

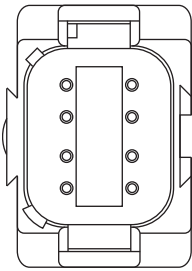
Pos	Signal name
1	-BAT (GND)
2	VBAT _{DT} (+24V only)

Connector C1 -D Deutsch (option E1, switch or Lx, detent)

Connector kit	-D (Deutsch DT) Parker no. 5035014	
Housing	DT06-6S-CE06	
Pin type	Deutsch 1062-16-122	
Wedge	W6S-P012	
Cable	0,75-1,0 mm ² (18AWG)	
Plugs (empty pos.)	Deutsch no. 11431	

Pos	E1 Signal name	Pos	Lx Signal name
1	GND	1	GND
2	V _S (+5Vdc)	2	V _S (+5Vdc)
3	VOUT-A	3	VOUT-A
4	VOUT-B	4	VOUT-B
5	DOUT	5	-BAT (GND)
6	VBAT _{SW} (+12V, +24V)	6	VBAT _{DT} (+24V only)

Connector C1 -D Deutsch (options E1, switch and Lx, detent)

Connector kit	-D (Deutsch DT) Parker no. 5035015	
Housing	DT06-08SA-CE06	
Pin type	Deutsch 1062-16-122	
Wedge	W8S-P012	
Cable	0,75-1,0 mm ² (18AWG)	
Plugs (empty pos.)	Deutsch 11431	

Pos	Signal name
1	GND
2	V _S (+5Vdc)
3	VOUT-A
4	VOUT-B
5	DOUT
6	VBAT _{sw} (+12V, +24V)
7	-BAT (GND)
8	VBAT _{DT} (+24V only)

Appendix A

IQAN-LSL Technical Overview

Absolute maximum ratings¹

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

Parameter	Remark
Ambient temperature	-40 to 85 °C
Storage temperature	-40 to 100 °C
Maximum overvoltage on VS and VOUT pins	8.5 V (14V for max 10 minutes)
External magnetic field	2.5 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 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

Parameter	Remark
Climate environment Enclosure, water & dust protection Standard -DN option Salt mist Damp heat cyclic Damp heat steady state Heat, operation Heat, storage Cold Change of temperature	IEC 60529:2001, IP65 (with sealed handle and bellow) IEC 60529:2001, IP44 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 environment Random vibration Bump	IEC 60068-2-64:2008 Fh, 15 - 1000 Hz, 11.6 Grms, 3 x 10 h IEC 60068-2-27:2008 Ea, 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 11452-4:2005, 1 - 200 MHz, 1 kHz, 80% AM, 100 mA ISO 11452-2:2004, 200-2000 MHz, 1kHz, 80% AM, 100 V/m ISO 7637-3:2007, Level 3 ISO 10605:2001, 8 kV (contact), 25 kV (air) ISO 10605:2001, 4 kV (contact)

System

$-40\text{ }^{\circ}\text{C} < T_A < +70\text{ }^{\circ}\text{C}$, $V_S = 5,0\text{V}$ (unless otherwise specified)

Parameter	Remark
Weight	200 g
Operating ambient temperature, T_{ROC}	-40 to 70 °C

Electrical characteristics (Base)

$-40\text{ }^{\circ}\text{C} < T_A < +70\text{ }^{\circ}\text{C}$, $V_S = 5,0\text{V}$ (unless otherwise specified)

Parameter	Remark
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	
VOUT minimum position, $V_S = 5\text{V}$	500 mV \pm 100 mV (over expected life)
VOUT centre position, $V_S = 5\text{V}$	2500 mV \pm 150 mV (over expected life)
VOUT maximum position, $V_S = 5\text{V}$	4500 mV \pm 100 mV (over expected life)
VOUT maximum linearity error	300 mV
VOUT antivalent tracking	375 mV (over expected life)
VOUT resolution	12 bits = 1.22 mV
Response time	typ. 6 ms
Minimum resistive load	4.5 kohm
Maximum capacitive load	1 μF
Maximum continuous voltage	5.5 V
Protection	SCG

Mechanical characteristics (Base)

$-40\text{ }^{\circ}\text{C} < T_A < +70\text{ }^{\circ}\text{C}$, $V_S = 5,0\text{V}$ (unless otherwise specified)

Parameter	Remark
Angle of movement	
Expected life	5x10 ⁶ cycles (One cycle: Center pos. to full +direction and back, center pos. to full -direction and back)
One time loading	25 Nm
Neutral deflection moment L1, L2, L3, L4, L5	typ. 0.2 Nm
Operating moment before index L1, L2, L4, L5	typ. 0.39 Nm
Index moment for electrical detent variants L1, L2 L4, L5	typ. 0.90 Nm typ. 1.30 Nm
Full stroke deflection moment Variants without index L1, L2 L4, L5	typ. 0.60 Nm typ. 1.25 Nm typ. 1.60 Nm

Electrical detent

$-40\text{ }^{\circ}\text{C} < T_A < +70\text{ }^{\circ}\text{C}$, $V_S = 5,0\text{V}$ (unless otherwise specified)

Parameter	Remark
Voltage supply, $V_{BAT_{DT}}$	24 to 32 V
Current supply, $V_{BAT_{DT}}$	typ. 51mA @ 28V
Locking moment L1, L2, L4, L5 Nominal locking moment -L1 Nominal locking moment -L2 Nominal locking moment -L4 Nominal locking moment -L5	3.0 to 7.5Nm @ 28V typ. 4.9 Nm typ. (-)5.4Nm , (+) 4.7Nm typ. 4.5Nm typ. (-) 5.0Nm, (+) 4.2Nm
Locking moment L3 Nominal locking moment -L3	3.0 to 6.5Nm @ 28V typ. 4.2 Nm
VOUT index position VOUT index position low VOUT index position high	1000 mV +300/-200 mV @ Index moment 4000 mV +200/-300 mV @ Index moment
VOUT detent position L1, L2, L4, L5 VOUT detent position low VOUT detent position high	max. 800 mV, typ. 650 mV min. 4200 mV, typ. 4350 mV
VOUT detent position L3 VOUT detent position low VOUT dsetent position high	max. 1200 mV, typ. 1000 mV min. 3800 mV, typ. 4000 mV
Number of electrical deactivations	2×10^6 cycles
Number of manual deactivations	min. 50000

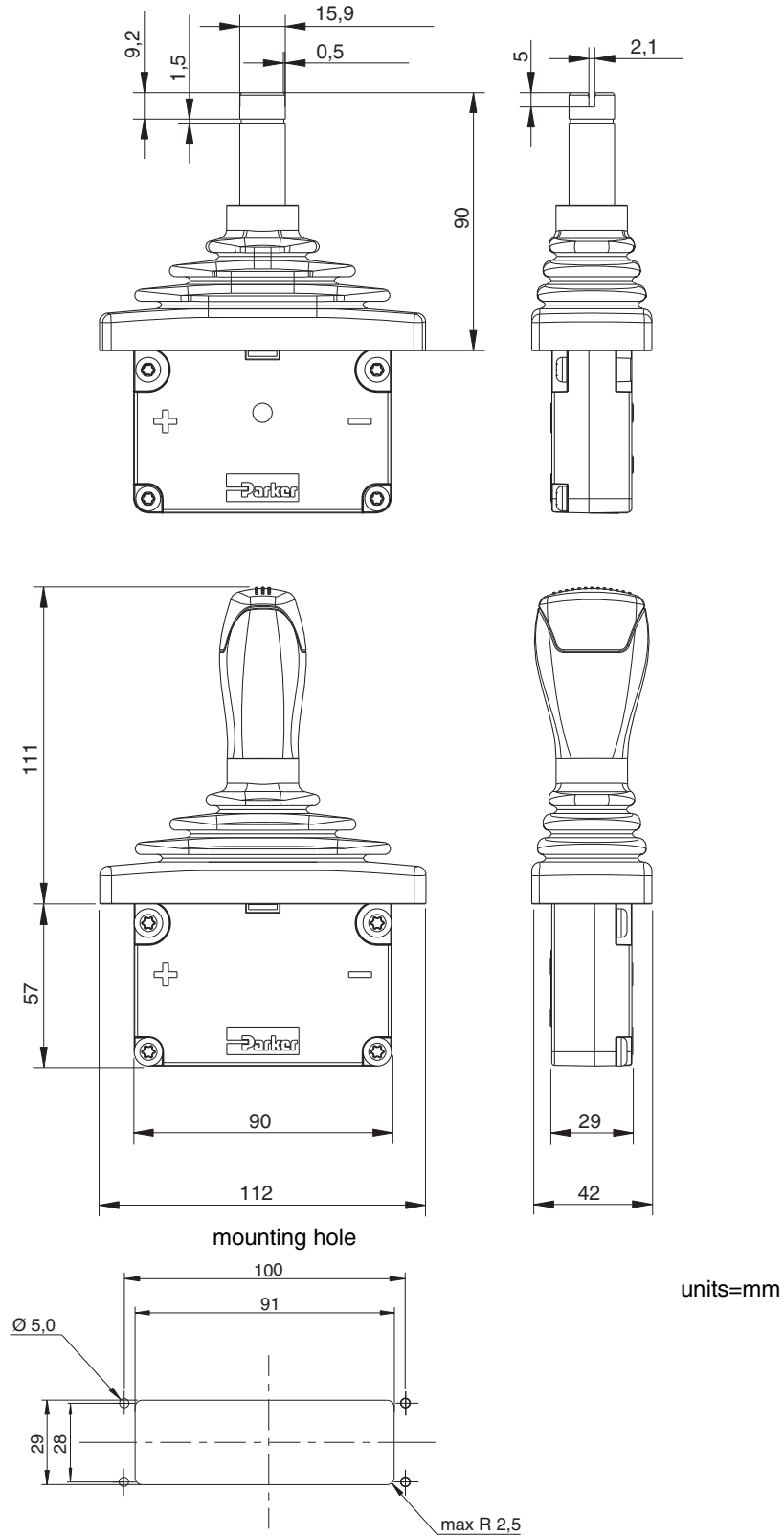
Switch

$-40\text{ }^{\circ}\text{C} < T_A < +70\text{ }^{\circ}\text{C}$, $V_S = 5,0\text{V}$ (unless otherwise specified)

Parameter	Remark
Voltage supply, $V_{BAT_{SW}}$	9 to 32 V
Maximum current	200 mA @ 32 V
Operating force	2 to 5 N
Expected life	0.5×10^6 cycles

Appendix B

Dimensioning of the IQAN-LSL



For latest information visit our website www.iqan.com

Information in this instructionbook is subject to change without notice

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Publ no HY33-8302-IB/UK
Edition 2016-10-28

