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Parker Hannifin Corporation
Electronic Controls Division
Winnipeg, Manitoba Canada

Task oriented controller, valve driver module

IQAN-TOC2 1

Input devices, analog levers

IQAN-LST 2

IQAN-LSL 3

IQAN-LC5-X05 4

MP handle for IQAN-LC5-X05 5

Monitoring devices, sensors

IQAN-SP 6

IQAN-ST 7

IQAN compatible Parker sensors 8

Accessories

IQAN tools, cables and connector kits 10

Terms of sale with Warranty Limitations

Offer of sale 11

General

Weight	0.2 Kg
Operating temperature	-40 to +70 °C
Protection	outdoor use
Voltage supply	9 - 34 VDC
Current consumption (idle)	60 mA (28 VDC) 40 mA (14 VDC)
Data interface	mechanical encoder or RS232 (using IQANdevelop)
VREF output	4.9 - 5.1 VDC 30 mA (28 VDC)

Outputs

Current / PWM outputs	
Number	2 double
Type current mode	current - closed loop
PWM mode	voltage - open loop
Min. threshold	50 mA
Max. load	3000 mA
Dither frequency	25 - 333 Hz
Resolution	1 mA

Inputs

Voltage inputs	
Number	2
Signal range	0 - 5 VDC
Resolution	5 mV
Digital inputs	
Number	2
Signal high	4 VDC - V_{BAT}
Signal low	0 - 1 VDC

Application

The IQAN-TOC2 is a simple task oriented controller in the IQAN product group. This unit is designed for ease of setup, weather resistance, and safety.

The TOC2 is a general purpose unit that can control two bi-directional valve sections or two cartridge solenoids simultaneously. The IQAN-TOC2 communicates with a variety of input and output devices. It has current mode (current closed-loop) or PWM mode (voltage open-loop) output for valve control. The analog inputs accept signals from joysticks or potentiometers. Two digital inputs can be used to read switches.

The IQAN-TOC2 has a simple mechanical interface for calibration. With a preloaded personality from the factory, setup can be easily performed on the machine using a screwdriver. Adjustments possible include threshold, maximum output and slopes. The TOC2 may also be connected to a PC and programmed using IQANdevelop software to change the functionality of the controller. This advanced feature allows the TOC2 to be used in more demanding applications.

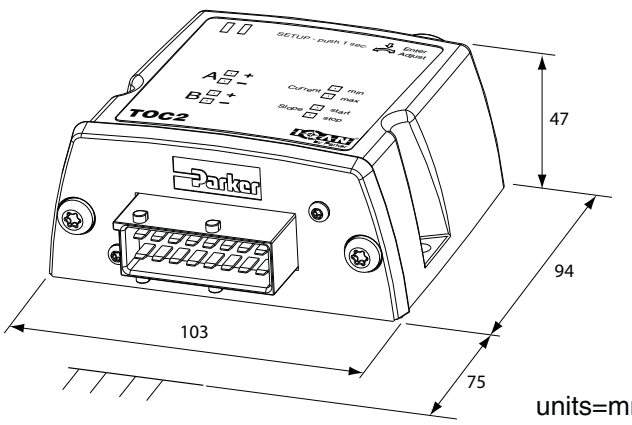
The housing is designed to be rugged, but light and has a sealed, automotive AMP junior-power timer connector. The IQAN-TOC2 has a membrane to prevent condensation inside the housing. This controller is designed for the outdoor environment.

The TOC2 is made using selected components and conforms to strict international requirements.

Diagnostics: If an error is detected an LED on the top of the controller flashes a sequence to indicate the nature of the error.

Description	**Ordering PN**
IQAN-TOC2 (100 hz)	5010028

Consult pricelist for other TOC2 factory preloaded personalities and their ordering part numbers.



units=mm

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Electronic Controls Division
Winnipeg, Manitoba Canada

General

Weight	0.22 Kg
Rated power supply (V_S)	5 Vdc
Load resistive (min.)	1K Ω
Load capacitive (max.)	1 µF
Current consumption	16 mA

Mechanical

Angle of movement	±20°
Expected life (operations)	5 million

Environment

Operating temperature	-40° to 70 °C
Sealing above the flange	IP65
Sealing with DN option	IP44

Analog outputs

Active range (VDC out)	10%-90% V_S
Resolution <2mV	

Digital output option

Handle switch, top	V_{BAT} (+12V, +24V)
Max load current, DOUT	200 mA

Other options

Mechanical detent	Neutral only
Solenoid detents	V_{BAT} (+24V only)

Connectors

-S	Saab (AMP/Tyco JPT)
-D	Deutsch DT04

Application

The IQAN-LSL is an analog lever in the IQAN product group. This lever focuses on compact design, weather resistance and safety.

The LSL is a single-axis joystick, 0.5 - 4.5 Vdc, intended for the proportional control of one doubleacting hydraulic function. The lever has several options including a manual neutral detent and a switch in the top of the handle. For 24V systems there are solenoid detent options at full stroke in the minus direction or both plus and minus directions. A solenoid detent at 75% in the B (minus) direction is also available. The LSL can be mounted in the armrest or on the dashboard in mobile vehicles. It has a comfortable grip and is easily actuated for good ergonomics.

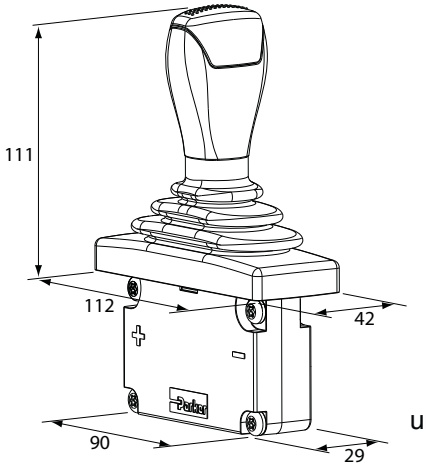
The IQAN-LSL is lightweight with small installation dimensions. The ergonomic design assures a comfortable grip from several angles. Mounting screws are installed from underneath for a clean appearance of dashboard, panel or armrest.

The standard IQAN-LSL has an IP65 rating above the flange and the cable has a choice of either a Saab sealed AMP junior-power timer connector or a Deutsch DT series transportation connector.

The IQAN-LSL is a spring centered, dual sensor device. The optional switch in the top of the handle can be used to detect operator presence. The dual sensors provide 0.5 - 4.5 Vdc and 4.5 - 0.5 Vdc outputs which allows error checking to meet high safety requirements. All inputs and outputs are protected against short circuit to ground. The LSL is well suited as a control unit for a variety of valve drivers.

Description	Ordering PN
IQAN-LSL-E0-//-//-S	20011365
IQAN-LSL-E0-//-//-D	20014069

Consult datasheet and pricelist for other IQAN-LSL options and ordering part numbers.



units=mm

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General

Weight	0.04 Kg
Rated power supply (V_S)	5 Vdc
Load resistive (min.)	4.5K Ω
Load capacitive (max.)	1 µF
Current consumption	16 mA

Mechanical

Angle of movement	±30°
Expected life (operations)	5 million

Environment

Operating temperature	-40° to 70 °C
Sealing	IP66

Analog outputs

Active range (Vdc out)	10%-90% VS
Resolution	<2mV

Connectors

-S	Saab (AMP/Tyco JPT)
-D	Deutsch DT04

Application

The IQAN-LST is a paddle style, analog mini-lever in the IQAN product group. This lever focuses on compact design, weather resistance and safety.

The LST is a small single-axis joystick 0.5 - 4.5 Vdc, intended for the proportional control of one doubleacting hydraulic function. The combination of a minilever and armrest can provide substantial ergonomic benefits. The LST can be mounted in the armrest or on the dashboard in mobile vehicles. It is easily actuated with a fingertip for good ergonomics.

The IQAN-LST is lightweight with small installation dimensions. The LST also has low, well-adapted forces designed in for ease of operation in close quarters.

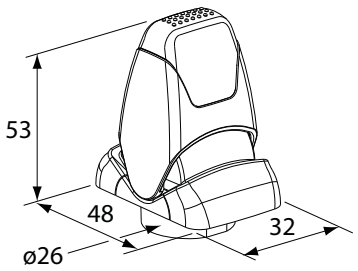
The lever is covered with friction rubber on either side, to prevent the fingers from slipping and to provide a comfortable feel. Mounting screws are installed from underneath for a clean appearance of the dashboard, panel or armrest.

The IQAN-LST is designed for the outdoor environment. The electronics are potted and the cable has a choice of either a Saab sealed AMP junior-power timer connector or a Deutsch DT series transportation connector. These features combine to give the LST an IP66 rating.

The IQAN-LST is a spring centered, dual sensor device. The dual sensors provide 0.5 - 4.5 Vdc and 4.5 - 0.5 Vdc outputs which allows error checking to meet high safety requirements. All inputs and outputs are protected against short circuit to ground. It is well suited as an input device for a variety of valve drivers.

Description Ordering PN

IQAN-LST-S	20011381
IQAN-LST-D	20014070



units=mm

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General (Lever base)

Weight	0.37 kg
Rated power supply (V_S)	5 VDC
Load resistive (min.)	4.5K Ω
Load capacitive (max.)	1 µF
Current consumption	16 mA (5Vdc)

Mechanical (Lever base)

Angle of movement	±18°
Expected life (full stroke cycles)	5 million
Lever force in neutral, XY	0.6 Nm
Full actuated, XY direction	1.4 Nm
One time loading (max.)	100 Nm

Environmental (Lever base)

Temperature range	
Operating, ambient	-40 to +85° C
Storage, ambient	-40 to +100° C
Sealing, above flange	IP65 (with sealed handle and bellow)

Electrical (Lever base)

Over voltage range	11Vdc @ 10 minutes

Connection

Electrical connection	Deutsch DTM, 6 pos.

Analog outputs

Active range (Vdc out)	10%-90% V_S
Resolution	<2 mV

Application

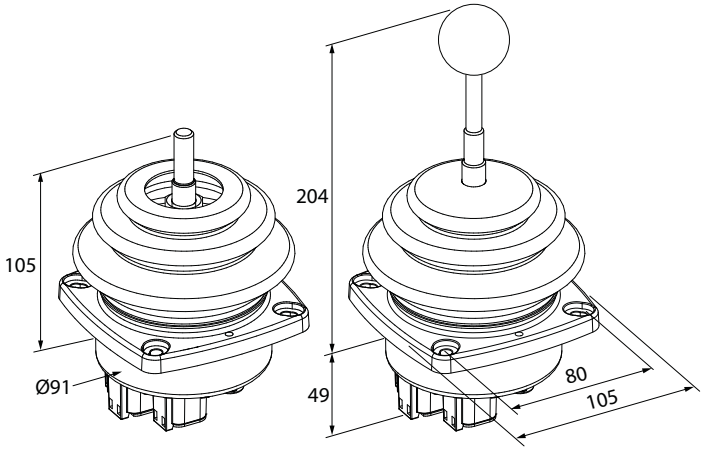
The IQAN-LC5-X05 is a large, coordinate joystick that incorporates ruggedness, functionality, light weight with high flexibility for mobile market applications. The unit is extremely robust, able to withstand aggressive conditions during outdoor use and in outdoor installations, including EMI, vibrations and a wide temperature range. The IQAN-LC5-X05 features a compact ergonomic design making it ideal for armrest and panel installations in mobile equipment. Fourth generation ICL4 type joysticks are easily replaced with the IQAN-LC5-X05.

The joystick base has an integrated Deutsch transportation connector. The handle cable may be routed completely through the non-corrosive housing. This makes field mounting of new handles, or replacing a bellow, very easy to accomplish.

All proportional output signals are of contactless Hall effect type with dual sensors to provide redundancy for high safety and reliability. The primary signal for each axis is 10%-90% of supply voltage. The corresponding secondary signal is 90%-10% of supply voltage.

Description	Ordering PN
IQAN-LC5-X05-U1	20076317
IQAN-LC5-X05-U2	20076318
IQAN-LC5-X05-H1	20076319
IQAN-LC5-X05-N2	20077692
IQAN-LC5-X05-N2T	20077695
IQAN-LC5-X05-N4T	20077694

Consult datasheet and pricelist for other IQAN-LC5-X05 options and ordering part numbers.



units=mm

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General (handle)

Weight	.25 kg
Temperature range	-40 to +85° C
Sealing	outdoor use

Buttons/Trigger

Expected life (electrical)	0.5 million
Expected life (mechanical)	1 million
Travel	1.5 mm
Actuating force	2 - 5 Nm
Switching current (max)	400 mA, 32 VAC, resistive load

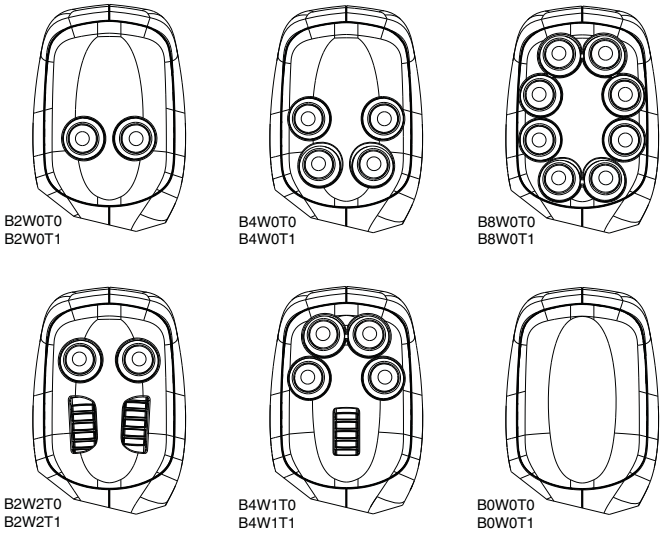
Thumb wheel

Rated power supply (Vs)	5 Vdc
Load resistive (min)	4.5 kΩ
Load capacitive (max)	1 uF
Current consumption (typ)	16 mA
Analog output active range	10%-90% Vs
Resolution	< 2 mV
Angle of movement	± 25 degrees
Expected life (operations)	5 million

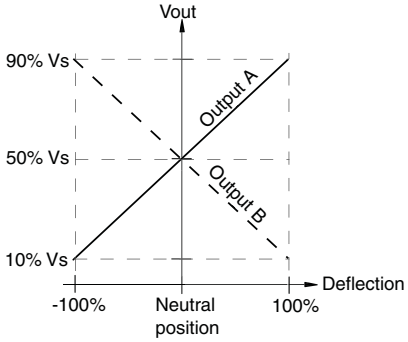
Connection

B0W0T1 / B2W0T0 / B2W0T1 / B4W0T0	Deutsch DTM, 6 p.
B4W0T1 / B4W2Tx / B2W4Tx / B8W0Tx	Deutsch DTM, 12 p.

MP standard faceplate configurations



-MP thumbwheel Deflection vs. output diagram



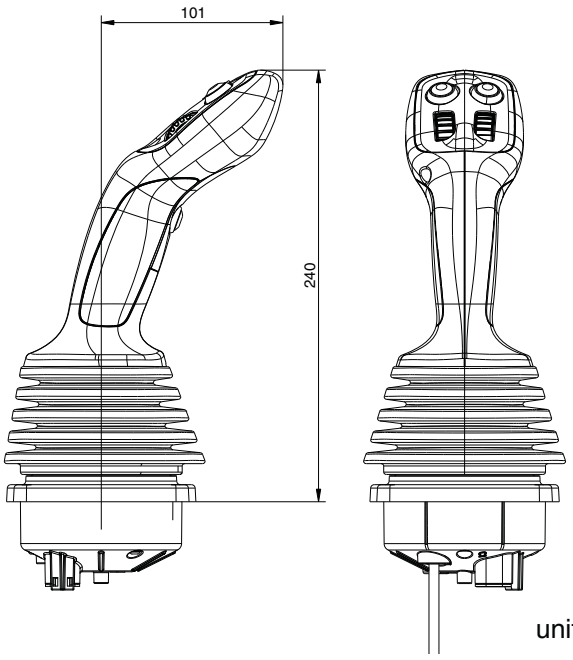
Application

The MP handle option provides a variety of control interfaces in an ergonomic, multi-function handle that comfortably fits your hand. The handle is a robust design, able to withstand heavy use in outdoor installations, including exposure to a wide range of automotive chemicals. The handle has the capability to have a maximum of 8 buttons or 2 proportional thumb wheels in the faceplate. Combinations of buttons, thumb wheels, and trigger are also possible. The MP handle will be assembled to the IQAN-LC5-X05 base, and the cables are routed through the base. The push buttons and thumb wheel are easily connected to the vehicle wire harness by a Deutsch DTM connector.

The MP handle is made to fit either the right or left hand, reducing inventory part numbers. The buttons are large, and have a nice tactile feel. The proportional thumb wheel has dual sensors providing 2 crossed outputs that may be compared in IQAN modules for safe operation.

Description	Ordering PN
IQAN-LC5-X05-MPB2W0T0	20076320
IQAN-LC5-X05-MPB2W0T1	20076321
IQAN-LC5-X05-MPB2W2T1	20076323
IQAN-LC5-X05-MPB4W0T0	20076324
IQAN-LC5-X05-MPB4W0T1	20076325
IQAN-LC5-X05-MPB4W1T1	20076327
IQAN-LC5-X05-MPB8W0T1	20076329

Consult datasheet and pricelist for other IQAN-LC5-X05-MP options and ordering part numbers.



units=mm

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Winnipeg, Manitoba Canada

General

Weight	0.060 kg
Connectors	
-B	Bosch (AMP Junior Timer)
-D	Deutsch DT04-4P
Threaded interfaces	
-B type only	G1/4 DIN 3852-E with integral FKM face seal
-D type only	9/16”-18 UNF, SAE 6 with NBR o-ring seal
Operating temperature	-40 to +125°C
Enclosure	IP65

Performance

Pressure range	0 - 35 bar, 0 - 500 bar
Total error (-40°C to 105°C)[1]	Max 4.0 % FS
Total error (40°C to 80°C)[1]	Max 1.0 % FS
Response time[2]	5.0 msec
Over pressure SP035	Max 100 bar
Over pressure SP500	Max 1050 bar
Burst pressure SP035	Min 150 bar
Burst pressure SP500	Min 1500 bar

1) Total accuracy includes non- linearity, hysteresis, repeatability and temperature effects.
2) Measured from initial value to output at 90%.

Electrical specifications

Output at FS[3]	4.5 VDC
Zero output[3]	0.5 VDC
Supply Voltage(Vs)	5.0 ±10% VDC[4]
Current supply	Max 12.5 mA
Load resistor	Min 5k ohm
Load capacitor	Max 0.1 µF

3) The output is ratiometric to supply voltage (Vs)
4) The max supply voltage with sensor operating is 6 Volt. (switch off app. 6.2 Volt)

Application

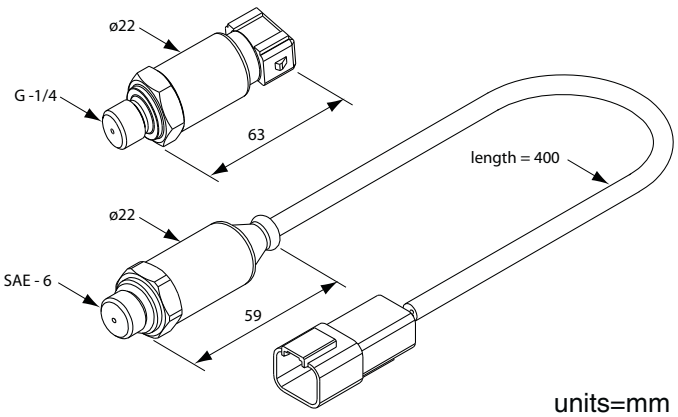
The IQAN-SP pressure transducers belong to the family of IQAN accessories developed to complement IQAN control systems. IQAN-SP is a range of 0-5V pressure transducers for mobile hydraulic applications. These transducers are available in two pressure ranges; 35 bar (500 psi) and 500 bar (7300 psi).

The IQAN-SP has stainless steel construction for strength. The sensor cells use thin film technology with no internal o-rings or fluid. The sensors are very robust and able to withstand heavy vibrations.

The design of the IQAN-SP has an EMI cap that separates the sensor electronics from the connector to ensure a high level of EMI protection.

The two interface types of the IQAN-SP are well designed for the mobile hydraulics industry. The first type, -B, has a G1/4 thread. The hex of the transducer has an integrated face seal to eliminate sealing washers. The integral 3 pin connector is a sealed AMP Junior Power Timer type designed for automotive use. The second type, -D, has a SAE 6 (9/16"-18) thread. The connector on this type is a 4 pin Deutsch DT style and is attached via a short cable. Both connector types give the sensors IP65 protection for exposed outdoor applications.

Description	Ordering PN
IQAN-SP035-B	5020026
IQAN-SP500-B	5020027
IQAN-SP035-D	2820008
IQAN-SP500-D	2820009



units=mm

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General

Weight	50 g
Operating temperature	-50 to 150°C
Protection	outdoor use
Pressure rating	
G (1/4 BSP)	Max 700 bar
M (M10)	Max 350 bar
U (SAE 6)	Max 1000 bar
Electrical	
Voltage supply VS Max 6 Vdc	5±0.5 Vdc
Current consumption	5.0 µA Max 7.5 µA
Total error (25°C)	1%
Total error (-40 to 150°C)	4%

Output

FS (150°C)	4.75 Vdc
Zero (-50°C)	0.25 Vdc
Span	4.50 Vdc
Ratiometricity	1%
Linearity	1% FS

Threaded interfaces

-G	G1/4 DIN 3852-E with integral FKM face seal
-M	M10 x 1, with integral face seal
-U	9/16”-18 UNF, SAE 6 with NBR o-ring seal

Connectors

-B	Bosch (AMP Junior Timer)
-D	Deutsch DT04-4P

Application

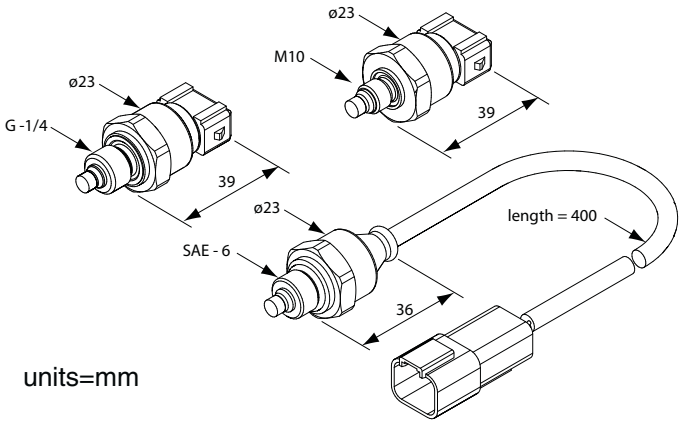
The IQAN-ST temperature transducer belongs to the family of IQAN accessories developed to complement IQAN control systems. IQAN-ST is a 0-5V output temperature transducer for mobile hydraulic applications. This transducer is available in three interface types; G1/4 BSP, M10 and 9/16”-18 UNF SAE 6. The G1/4 BSP and M10 sensors have an integral Bosch automotive connector. The SAE 6 sensor has a short cable-mounted Deutsch connector.

The IQAN-ST has stainless steel construction for strength. The PT100 sensor uses thin film technology with internal amplification. All versions of the sensor have high pressure capability. The IQAN-ST is very robust and able to withstand heavy vibrations.

The design of the IQAN-ST has an EMI cap that separates the sensor electronics from the connector. This ensures a high level of EMI protection.

The IQAN-ST is well designed for the mobile hydraulics industry. The 3 pin integral Bosch connector is a sealed AMP Junior Timer type. The Deutsch connector is the DT04 type. Both connectors are designed for automotive use. These connectors give the sensor IP65 protection for exposed outdoor applications. The hex of the G1/4 BSP and M10 versions of the transducer have integrated face seals to eliminate loose sealing washers. The SAE 6 sensor type has a factory installed o-ring. These features provide for easy installation and removal, even in field conditions.

Description	Ordering PN
IQAN-ST-G-B	20073657
IQAN-ST-M-B	20073659
IQAN-ST-U-D	20073658



units=mm

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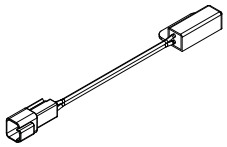
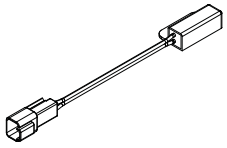
Ferrous proximity sensors

01695
FP2000 proximity sensor is a normally open, ferrous proximity sensor with max. .20" air gap.
cable length: 12 inches
connector: Deutsch DTM04-2P

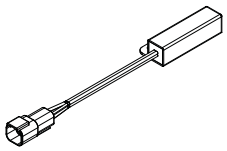


01699
FP3000 proximity sensor is a normally open, ferrous proximity sensor with max. .40" air gap.
cable length: 12 inches
connector: Deutsch DTM04-2P



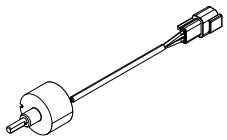
01778
same as FP3000 proximity sensor except with a vertical, adjustable mounting style case.
cable length: 12 inches
connector: Deutsch DTM04-2P

01703
FP4000 proximity sensor is a NO/NC, high power, ferrous proximity sensor with max. .25" air gap.
cable length: 12 inches
connector: Deutsch DTM04-4P

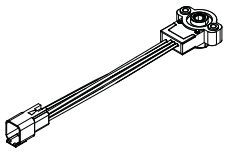


Rotary sensors

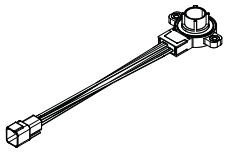
01705
RF50 rotary friction sensor is a 0.5-4.5Vdc output, Ø1/4" shaft, non-contact, friction lock rotary control.
cable length: 12 inches
connector: Deutsch DTM04-3P



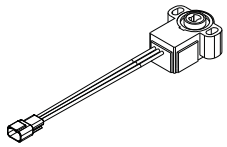
01707
RS70 rotary sensor is a 0.5-4.5Vdc, dual output, 5/16" hex coupling, non-contact 170° rotary sensor.
cable length: 12 inches
connector: Deutsch DTM04-6P



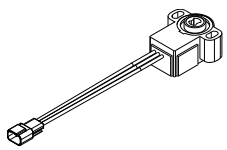
01708
RS60 rotary sensor is a 0.5-4.5Vdc, dual output, Ø7/8" through hole coupling, non-contact 120° rotary sensor.
cable length: 12 inches
connector: Deutsch DTM04-6P



01709
RS52 rotary sensor is a 0.5-4.5Vdc, single output, non-contact, 90° rotary sensor.
cable length: 12 inches
connector: Deutsch DTM04-3P

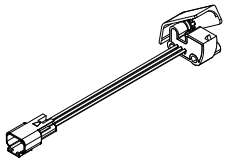


01825
RS53 rotary sensor is a 0.5-4.5Vdc, single output, non-contact, 360° rotary sensor.
cable length: 12 inches
connector: Deutsch DTM04-3P



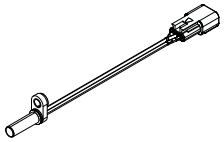
Linear sensors

01710
ADS50 sensor is a 25mm [1.0”] travel, lever actuated, 0.5-4.5Vdc linear output, non-contact, analog sensor.
cable length: 12 inches
connector: Deutsch DTM04-3P

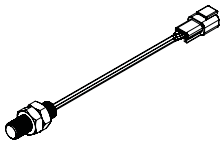


Speed sensors

01711
GS50 geartooth sensor is a digital output, non-contact, flange mount, ferrous sensor.
cable length: 12 inches
connector: Deutsch DTM04-3P

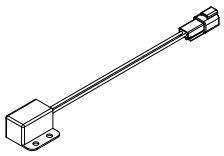


01712
GS60 geartooth sensor is a digital output, non-contact, threaded barrel mount, ferrous sensor.
cable length: 12 inches
connector: Deutsch DTM04-3P

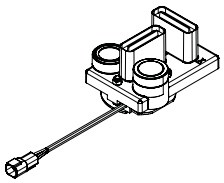


Tilt sensors

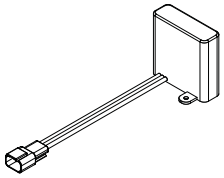
01715
RM50 rolling magnet switch is a one axis tilt switch.
sensitivity: ±10 degrees
cable length: 12 inches
connector: Deutsch DTM04-2P



01716
ATS90 dual axis sensor is a two axis, 0.5-4.5Vdc, non-contact, Hall effect angle/tilt sensor.
range: ±10 degrees each axis
cable length: 12 inches
connector: Deutsch DTM04-4P

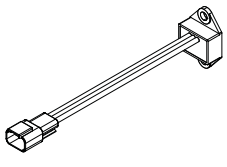


01759
ATS50 single axis sensor is a one axis, 0.5-4.5Vdc, non-contact, Hall effect angle/tilt sensor.
range: ±10 degrees
cable length: 12 inches
connector: Deutsch DTM04-3P



Acceleration sensors

01767
ACC50 acceleration sensor is a 0.5-4.5 Vdc output accelerometer used to sense vibration, impact, tilt and motion.
sensitivity: ±1.5g
cable length: 12 inches
connector: Deutsch DTM04-3P



Parker Hannifin Corporation
Electronic Controls Division
Winnipeg, Manitoba Canada

Tools

5031061
Medium duty service kit
contents: 3 crimping tools
1 5031057 pin box
1 5035003 extractor set
crimping tools not sold separately

5031057
Pin box, JPT and MT parts

contents: qty	AMP/Tyco PN
100	962945-2
100	963531-1
100	963530-1
100	963711-2
50	927779-1
25	927777-1
25	828922-1
25	929938-1
50	929940-1
25	2-963745-1
50	828904-1
25	828905-1

AMP parts not sold separately

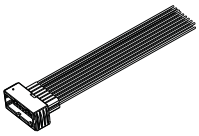
5035003
Set of 3 extraction tools, stamped
contents: 1 JPT extractor (yellow)
1 MT extractor (blue)
1 pin extractor (red)
stamped tools not sold separately

12000199
Extraction tool, hardened alloy
contents: 1 MT extractor (blue)

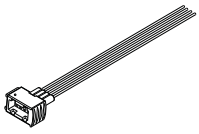
12003099
Extraction tool, hardened alloy
contents: 1 JPT extractor (yellow)

Prototype installation cables

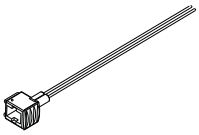
5030090
C1-cable, with seals
length: 2,5 meters
use with: IQAN-TOC2



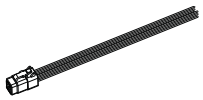
5030094
C1-cable, with seals
length: 2,5 meters
use with: IQAN-LST, -LSL



5030095
C2-cable, with seals
length: 2,5 meters
use with: IQAN-LSL-E1 option

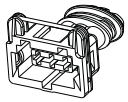


5030127
C1-cable, Deutsch DTM
length: 2,5 meters
use with: IQAN-LC5

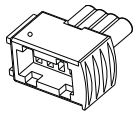


Connector kits

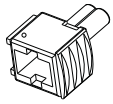
5031086
C1-connector, 3 position
use with: IQAN-SP, -ST (-B)



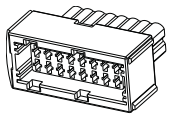
5031097
C1-connector, 4 position
use with: IQAN-LST, -LSL



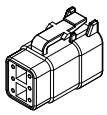
5031098
C2-connector, 2 position
use with: IQAN-LSL-E1 option



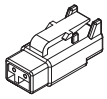
5031105
C1-connector, 16 position
use with: IQAN-TOC2



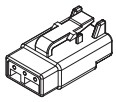
20072408
DTM connector, 6 position
including 6 sealing plugs
use with: IQAN-LC5



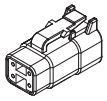
01786
DTM connector, 2 position
use with: sensors



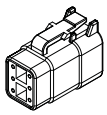
01787
DTM connector, 3 position
use with: sensors



01788
DTM connector, 4 position
use with: sensors



01789
DTM connector, 6 position
use with: sensors



Consult "IQAN accessories" datasheet and pricelist for other accessory items and ordering part numbers.

Parker Hannifin Corporation
Electronic Controls Division
Winnipeg, Manitoba Canada

Terms of Sale with Warranty Limitations

Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, Hydraulics Group, and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods or work described will be referred to as "Products".

1. Terms and Conditions. Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is expressly conditioned on Buyer's assent to these Terms and Conditions and to the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional term or condition of Buyer's order or any other document issued by Buyer.

2. Price Adjustments; Payments. Prices stated on the reverse side or preceding pages of this document are valid for 30 days. After 30 days, Seller may change prices to reflect any increase in its costs resulting from state, federal or local legislation, price increases from its suppliers, or any change in the rate, charge, or classification of any carrier. The prices stated on the reverse or preceding pages of this document do not include any sales, use, or other taxes unless so stated specifically. Unless otherwise specified by Seller, all prices are F.O.B. Seller's facility, and payment is due 30 days from the date of invoice. After 30 days, Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Delivery Dates; Title and Risk; Shipment. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon tender to the carrier at Seller's facility (i.e., when it's on the truck, it's yours). Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's changes in shipping, product specifications or in accordance with Section 13, herein.

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the warranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.

1/09

Parker Hannifin Corporation
Electronic Controls Division
Winnipeg, Manitoba Canada

Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 1 800 272 7537

AEROSPACE

Key Markets

- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products

- Flight control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes

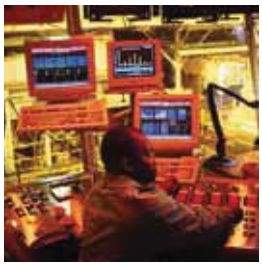
CLIMATE CONTROL

Key Markets

- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products

- CO^2 controls
- Electronic controllers
- Filter driers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves



ELECTROMECHANICAL

Key Markets

- Aerospace
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products

- AC/DC drives & systems
- Electric actuators, gantry robots & slides
- Electrohydrostatic actuation systems
- Electromechanical actuation systems
- Human machine interface
- Linear motors
- Stepper motors, servo motors, drives & controls
- Structural extrusions

FILTRATION

Key Markets

- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products

- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators

FLUID & GAS HANDLING

Key Markets

- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products

- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects

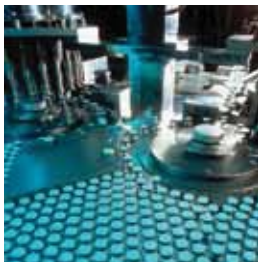
HYDRAULICS

Key Markets

- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products

- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



PNEUMATICS

Key Markets

- Aerospace
- Conveyor & material handling
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Brass fittings & valves
- Manifolds
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves & controls
- Quick disconnects
- Rotary actuators
- Rubber & thermoplastic hose & couplings
- Structural extrusions
- Thermoplastic tubing & fittings
- Vacuum generators, cups & sensors

PROCESS CONTROL

Key Markets

- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products

- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds

SEALING & SHIELDING

Key Markets

- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductor
- Telecommunications
- Transportation

Key Products

- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management

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