Electronic Control Systems Components
Catalog HY33-1800/US
North American Product Offering
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</table>
Task oriented controller, valve driver module

Components

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

IQAN-TOC2 (100 hz) 5010028

Consult pricelist for other TOC2 factory preloaded personalities and their ordering part numbers.
Input devices, analog lever

Components

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

```markdown
<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQAN-LSL-E0-//--/--S</td>
<td>20011365</td>
</tr>
<tr>
<td>IQAN-LSL-E0-//--/--D</td>
<td>20014069</td>
</tr>
</tbody>
</table>
```

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

<table>
<thead>
<tr>
<th>S</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saab (AMP/Tyco JPT)</td>
<td>Deutsch DT04</td>
</tr>
</tbody>
</table>
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 mini-lever 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

| Input devices, analog mini-lever Components |

### Application

- **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-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**

<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQAN-LC5-X05-U1</td>
<td>20076317</td>
</tr>
<tr>
<td>IQAN-LC5-X05-U2</td>
<td>20076318</td>
</tr>
<tr>
<td>IQAN-LC5-X05-H1</td>
<td>20076319</td>
</tr>
<tr>
<td>IQAN-LC5-X05-N2</td>
<td>20077692</td>
</tr>
<tr>
<td>IQAN-LC5-X05-N2T</td>
<td>20077695</td>
</tr>
<tr>
<td>IQAN-LC5-X05-N4T</td>
<td>20077694</td>
</tr>
</tbody>
</table>

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

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**Input devices, analog joystick**

### Components

#### General (Lever base)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>0.37 kg</td>
</tr>
<tr>
<td>Rated power supply ($V_s$)</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Load resistive (min.)</td>
<td>4.5K Ω</td>
</tr>
<tr>
<td>Load capacitive (max.)</td>
<td>1 μF</td>
</tr>
<tr>
<td>Current consumption</td>
<td>16 mA (5Vdc)</td>
</tr>
</tbody>
</table>

#### Mechanical (Lever base)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle of movement</td>
<td>±18°</td>
</tr>
<tr>
<td>Expected life (full stroke cycles)</td>
<td>5 million</td>
</tr>
<tr>
<td>Lever force in neutral, XY</td>
<td>0.6 Nm</td>
</tr>
<tr>
<td>Full actuated, XY direction</td>
<td>1.4 Nm</td>
</tr>
<tr>
<td>One time loading (max.)</td>
<td>100 Nm</td>
</tr>
</tbody>
</table>

#### Environmental (Lever base)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td></td>
</tr>
<tr>
<td>Operating, ambient</td>
<td>-40 to +85° C</td>
</tr>
<tr>
<td>Storage, ambient</td>
<td>-40 to +100° C</td>
</tr>
<tr>
<td>Sealing, above flange</td>
<td>IP65 (with sealed handle and bellow)</td>
</tr>
</tbody>
</table>

#### Electrical (Lever base)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over voltage range</td>
<td>11Vdc @ 10 minutes</td>
</tr>
</tbody>
</table>

#### Connection

- Electrical connection: Deutsch DTM, 6 pos.

### Analog outputs

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active range (Vdc out)</td>
<td>10%-90% $V_s$</td>
</tr>
<tr>
<td>Resolution</td>
<td>&lt;2 mV</td>
</tr>
</tbody>
</table>

---

[Diagram of IQAN-LC5-X05 joystick]
Input devices, analog joystick

Components

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 μF
- 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
- B4W0T1 / B4W2Tx / B2W4Tx / B8W0Tx

Deutsch DTM, 6 p.
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

<table>
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<tr>
<th>Description</th>
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<tr>
<td>IQAN-LC5-X05-MPB2W0T0</td>
<td>20076320</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB2W0T1</td>
<td>20076321</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB2W2T0</td>
<td>20076323</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB4W0T0</td>
<td>20076324</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB4W0T1</td>
<td>20076325</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB4W1T0</td>
<td>20076327</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB8W0T0</td>
<td>20076329</td>
</tr>
<tr>
<td>IQAN-LC5-X05-MPB8W0T1</td>
<td>20076329</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering PN</th>
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<tbody>
<tr>
<td>IQAN-SP035-B</td>
<td>5020026</td>
</tr>
<tr>
<td>IQAN-SP500-B</td>
<td>5020027</td>
</tr>
<tr>
<td>IQAN-SP035-D</td>
<td>2820008</td>
</tr>
<tr>
<td>IQAN-SP500-D</td>
<td>2820009</td>
</tr>
</tbody>
</table>

Electrical specifications
- Output at FS: 4.5 VDC
- Zero output: 0.5 VDC
- Supply Voltage (Vs): 5.0 ±10% VDC
- Current supply: Max 12.5 mA
- Load resistor: Min 5k ohm
- Load capacitor: Max 0.1 μF

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

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 5±0.5 Vdc
Max 6 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
### Ferrous proximity sensors

**01695**
FP2000 proximity sensor is a normally open, ferrous proximity sensor with max. .20" air gap.
cable length: 12 inches
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
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
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
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
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
cable length: 12 inches
connector: Deutsch DTM04-6P

**01708**
RS60 rotary sensor is a 0.5-4.5Vdc, dual output, 9/8" through hole coupling, non-contact 120° rotary sensor.
cable length: 12 inches
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
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
cable length: 12 inches
connector: Deutsch DTM04-3P
<table>
<thead>
<tr>
<th><strong>Linear sensors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>01710</strong></td>
</tr>
<tr>
<td>ADS50 sensor is a 25mm [1.0&quot;] travel, lever actuated, 0.5-4.5Vdc linear output, non-contact, analog sensor.</td>
</tr>
<tr>
<td>cable length: 12 inches</td>
</tr>
<tr>
<td>connector: Deutsch DTM04-3P</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Speed sensors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>01711</strong></td>
</tr>
<tr>
<td>GS50 geartooth sensor is a digital output, non-contact, flange mount, ferrous sensor.</td>
</tr>
<tr>
<td>cable length: 12 inches</td>
</tr>
<tr>
<td>connector: Deutsch DTM04-3P</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>Tilt sensors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>01712</strong></td>
</tr>
<tr>
<td>GS60 geartooth sensor is a digital output, non-contact, threaded barrel mount, ferrous sensor.</td>
</tr>
<tr>
<td>cable length: 12 inches</td>
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<tr>
<td>connector: Deutsch DTM04-3P</td>
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<table>
<thead>
<tr>
<th><strong>Acceleration sensors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>01759</strong></td>
</tr>
<tr>
<td>ATS50 single axis sensor is a one axis, 0.5-4.5Vdc, non-contact, Hall effect angle/tilt sensor.</td>
</tr>
<tr>
<td>range: ±10 degrees each axis</td>
</tr>
<tr>
<td>cable length: 12 inches</td>
</tr>
<tr>
<td>connector: Deutsch DTM04-3P</td>
</tr>
</tbody>
</table>
## IQAN tools, cables and connectors

### Accessories

#### Components

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5030127</td>
<td>C1-cable, Deutsch DTM</td>
<td>length: 2.5 meters, use with: IQAN-LC5</td>
</tr>
<tr>
<td>5031086</td>
<td>C1-connector, 3 position</td>
<td>use with: IQAN-SP, -ST (-B)</td>
</tr>
<tr>
<td>5031097</td>
<td>C1-connector, 4 position</td>
<td>use with: IQAN-LST, -LSL</td>
</tr>
<tr>
<td>5031098</td>
<td>C2-connector, 2 position</td>
<td>use with: IQAN-LSL-E1 option</td>
</tr>
<tr>
<td>5031105</td>
<td>C1-connector, 16 position</td>
<td>use with: IQAN-TOC2</td>
</tr>
<tr>
<td>20072408</td>
<td>DTM connector, 6 position</td>
<td>including 6 sealing plugs, use with: IQAN-LC5</td>
</tr>
<tr>
<td>01786</td>
<td>DTM connector, 2 position</td>
<td>use with: sensors</td>
</tr>
<tr>
<td>01787</td>
<td>DTM connector, 3 position</td>
<td>use with: sensors</td>
</tr>
<tr>
<td>01788</td>
<td>DTM connector, 4 position</td>
<td>use with: sensors</td>
</tr>
<tr>
<td>01789</td>
<td>DTM connector, 6 position</td>
<td>use with: sensors</td>
</tr>
</tbody>
</table>

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

### Tools

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5031061</td>
<td>Medium duty service kit</td>
<td>contents: 3 crimping tools, 1 5031057 pin box, 1 5035003 extractor set</td>
</tr>
<tr>
<td>5031057</td>
<td>Pin box, JPT and MT parts</td>
<td>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</td>
</tr>
</tbody>
</table>

AMP parts not sold separately

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5035003</td>
<td>Set of 3 extraction tools, stamped</td>
<td>contents: 1 JPT extractor (yellow), 1 MT extractor (blue), 1 pin extractor (red)</td>
</tr>
</tbody>
</table>

stamped tools not sold separately

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>12000199</td>
<td>Extraction tool, hardened alloy</td>
<td>contents: 1 MT extractor (blue)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>12003099</td>
<td>Extraction tool, hardened alloy</td>
<td>contents: 1 JPT extractor (yellow)</td>
</tr>
</tbody>
</table>

Prototype installation cables

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5030090</td>
<td>C1-cable, with seals</td>
<td>length: 2.5 meters, use with: IQAN-TOC2</td>
</tr>
<tr>
<td>5030094</td>
<td>C1-cable, with seals</td>
<td>length: 2.5 meters, use with: IQAN-LST, -LSL</td>
</tr>
<tr>
<td>5030095</td>
<td>C2-cable, with seals</td>
<td>length: 2.5 meters, use with: IQAN-LSL-E1 option</td>
</tr>
</tbody>
</table>
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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, losses, 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 without prior 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 their entire 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 Severality. Failure to enforce any provision of this agreement will not waive that provision or null 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 claim, by order of any court, or by bankruptcy act, and may also terminate this agreement without asserting 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 the sale of the products shall be commenced within three years of the date of delivery to Buyer 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.

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 to submit 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 any infringement of any patents, trademarks, copyrights, trademarks, service marks, 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, trademarks, trade secrets 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 not relieve Buyer of Seller’s sole and exclusive liability and Seller’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. 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 250-50.4, are hereby incorporated.
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- Industrial machinery
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- Tube fittings & adapters
- Quick disconnects

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- Metal & plastic retained composite seals
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