Instruction book
IQAN-XP2

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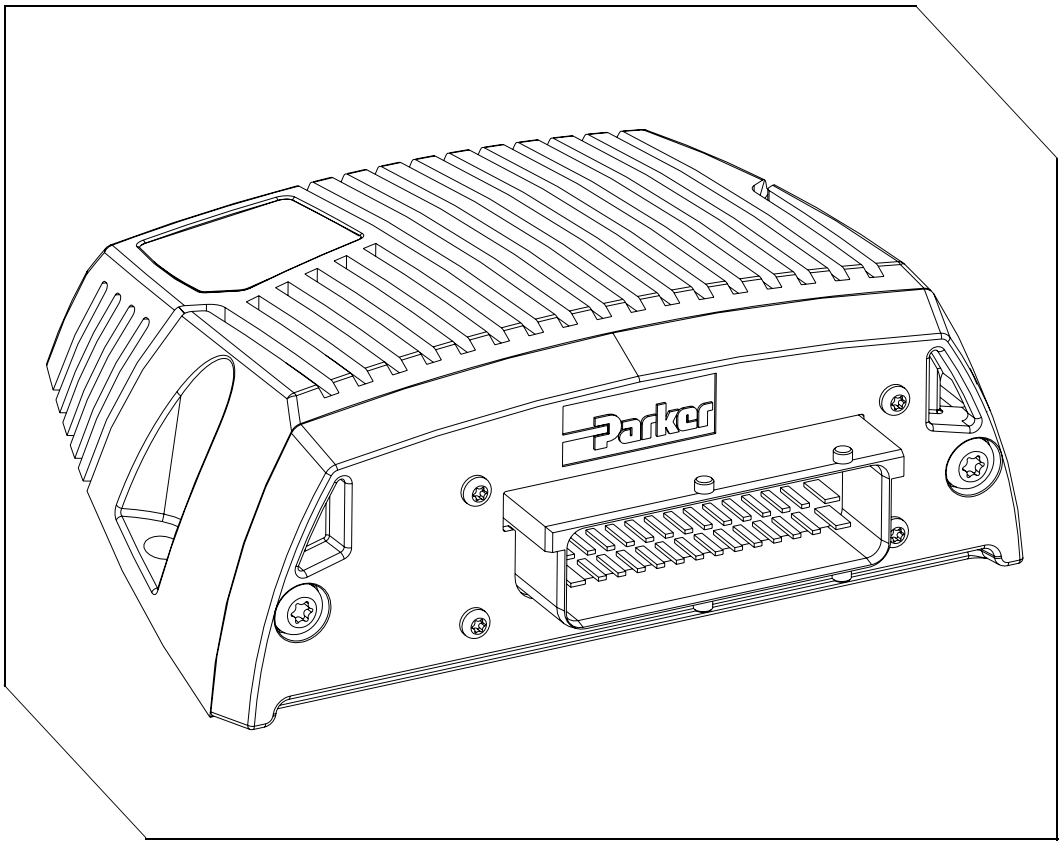


Contents

1 Introduction

These instructions are intended for the vehicle manufacturer’s design, production and service personnel.

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

These instructions describes the products and their correct handling.

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 marked with a warning symbol in the left margin, indicate that a hazardous situation exists. If precautions are not taken, this could result in death, serious injury or major property damage.

CAUTION

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

NOTICE

Sections marked with a notice symbol in the left margin, indicate there is important information about the product. Ignoring this could result in damage to the product.

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

The term "manufacturer" refers to Parker Hannifin Corporation.

2 Precautions

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. These are general safety guidelines only and other safety procedures may apply to individual situations.

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

CAUTION
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

CAUTION
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

CAUTION

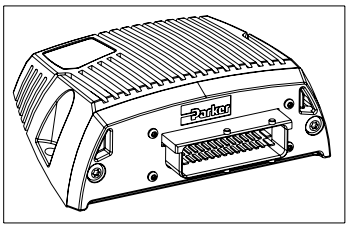
Ensure that the following requirements are fulfilled before any work is carried out on the hydraulic’s control electronics.

- 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-XP2

The IQAN-XP2 is one out of several expansion modules designed for controlling hydraulic systems in vehicles and machinery, using 12/24 Vdc power supply.



The IQAN-XP2 module.

Input

The IQAN-XP2 module has four (4) *voltage inputs* for connecting of 0-5 Vdc signals. VIN A and VIN B can be configurated as *frequency inputs* for measuring frequency. *Voltage inputs* and *frequency inputs*, share positions, see below.

(4) Voltage inputs VINA, VINB,VINC, VIND
or
(2) Frequency inputs FINA, FINB & (2) Voltage inputs VINC, VIND

Output

The IQAN-XP2 module has four (4) double *current outputs* for controlling proportional valves among other things. The module has four (4) double *digital outputs* for on/off valves for instance, or two (2) double *PWM outputs* (Pulse Width Modulation) for controlling pulsar valves. Digital and PWM outputs share positions, see below.

(4) double Current outputs
(4) Digital outputs, or (2) double PWM outputs

In order to increase the performance of current outputs when controlling proportional valves, both the *dither frequency* and the *dither amplitude* can be adjusted.
The *digital output channels* also have *soft start* and *peak & hold* features available.

CAN related functions

The master uses the CAN-bus (CAN = Control Area Network) to communicate with the modules. The CAN-bus is used and well proven within the automotive industry.

4 Safety

General

In order to fulfill high safety demands, the IQAN-XP2 module uses a real-time operating system for fault tolerant embedded systems. The IQAN-XP2 module has an internal watchdog function. If the watchdog detects any software errors, necessary precautions will be activated.

Polarity reversal

The IQAN-XP2 module is protected against power supply polarity reversal, provided an external fuse, max 20 A (Fast) is being used.
If this fuse is not used polarity reversal can be damage the unit.

CAN-bus interruption

The IQAN-XP2 module has special safety functions if the CAN-bus is interrupted. Each module checks for any interruptions in the CAN-bus communication. If an error occurs the master will present a related message on the display. The IQAN-XP2 module will also indicate the error with an error code ref, section System Diagnosis, on page 8.

Input/ output Protection

All inputs on the IQAN-XP2 module are designed to withstand the maximum specified supply voltage. The outputs are protected against short circuit. Furthermore, an error on one in-/output will not influence other in-/outputs.

Current check

For the *current outputs*, a current check is performed. The IQAN-XP2 module compares the return current with the output's set-value. If current deviation occurs, the user will be notified through an error message on the display and the module's LED will show an appropriate error code.

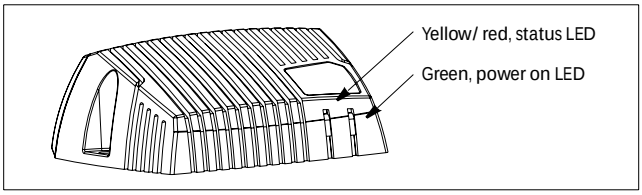
If the IQAN-XP2 module detects short-circuit to +BAT, the module will shut-off the outputs in order to increase the safety.

Memory test

The IQAN-XP2 module will execute a self-test during operation to verify the software. The test includes a CAN- bus verification, processor and memory verification and an internal signal verification. If any software error is detected, appropriate precautions will be activated.

System Diagnosis

The yellow blinking LED on the top of the module indicates normal status. If there is an error detected, the master will present a message on the display. The IQAN-XP2 module also indicates *error status* through the red blinking LED as shown below. This gives an immediate diagnosis as to the nature of the error that has occurred.



The location of the LED indicators on the IQAN-XP2 module.

The green LED indicates power on. The yellow/red LED, will be blinking red when an error has been detected. To get futher information about the error messages, see Appendix B, on page 28

LED indicator showing different IQAN-XP2 modes

Status	Blink (yellow light)
Normal (no errors)	

Error code	Error	Blink (red light)
1	I/O and voltage errors	
2	High temperature	
3	CAN error	
4	Hardware error	
5	Address error	
6	Software error	

A small recommendation...

You can use the internal diagnostics in the IQAN-MDM to get more information about the IQAN-XP2 module. Then following values are measured:

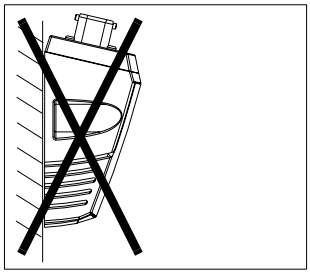
Internal temperature [°C]
Power supply [V]
Reference voltage A, B [V]
Reference voltage C, D [V]

5 Mounting

Mounting the module

The IQAN-XP2 module should be mounted according to the following instructions:

- Locate the module eliminating the risk for the cabling to be folded, crushed or damaged in any other way. Ensure the cabling cannot induce force on the connector.
- Locate the module so that severe physical impact is avoided, e.g impact from falling objects or the module being used as a step.
- Locate the module so that air can circulat to eliminate excess heat. Ensure that no external heat, e.g. from the engine or heater, is transferred to the module.
- Locate the module protecting it from high pressure washing or similar.
- Locate the module so that the cable connector is facing down .
- Locate the module so that the LEDs are visible.



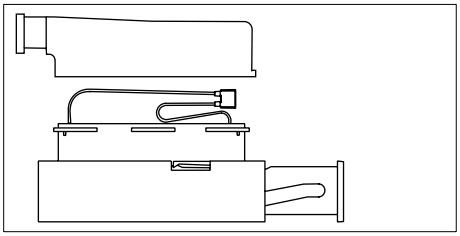
Non approved placing.

NOTICE

The IQAN-XP2 module must not be placed in any marine related or similar continuously damp environment without external protection.

Assembling of the Id-Tag

The Id-Tag will be placed in the connector in order to address/ terminate the module, ref section IQAN-XP2 addressing/terminating, on page 13.
The Id-Tag will be mounted under the connector casing. Bend the Id-Tags´ cables towards the opposite side, where the other cables enter the connector.

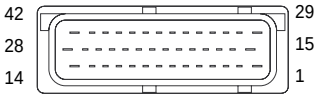


Assembling of the Id-Tag.

6 Installation

Connector C1

Connector kit	**Parker 5031063**	
Housing	Amp no. 1-963226-1	
Casing	Amp no. 0-965643-1	
Plane sealing, 42 p	installed in module	
Connector types*	Amp no. 963711-2 (MT)	Amp no. 929929-1 (JPT)
Cables	0,75-1,0 mm² (MT)	1,5-2,5 mm² (JPT)
Scat sealing	Amp no. 963530-1 (MT)	Amp no. 828905-1 (JPT)
Scat plug	Amp no. 963531-1 (MT)	Amp no. 828922 (JPT)
IQANtool kit[a]	Parker 5031061	



*= The connector contains two types of terminals; MP (Micro Timer) and JTP (Junior Power Timer).

a.Further information about IQANtool kit see, datasheet IQAN accessories.

Pos	**Signal**	**Pos**	**Signal**	**Pos**	**Signal**
1	ADDR-H	15	-BAT	29	-BAT2
2	+VREF-A	16	CAN-H	30	CAN-L
3	VIN-A/FIN-A	17	COUT-A	31	COUT-A
4	-VREF-A	18	CRET-A+	32	CRET-A-
5	+VREF-B	19	COUT-B	33	COUT-B
6	VIN-B/FIN-B	20	CRET-B+	34	CRET-B-
7	-VREF-B	21	DOUT-A/ PWMOUT-A	35	DOUT-C/ PWMOUT-C
8	+VREF-C	22	DOUT-B/ PWMOUT-B	36	DOUT-D/ PWMOUT-D
9	VIN-C	23	COUT-C	37	COUT-C
10	-VREF-C	24	CRET-C+	38	CRET-C-
11	+VREF-D	25	COUT-D	39	COUT-D
12	VIN-D	26	CRET-D+	40	CRET-D-
13	-VREF-D	27	CAN-H	41	CAN-L
14	ADDR-L	28	+BAT (+12V, +24V)	42	+BAT2 (+12V, +24V)

Unshaded positions are Junior Power Timer pins. Shaded positions are Micro Timer II pins. See above for wire, seal, pin number and crimping tool information. The IQAN tool kit is found in the 'IQAN accessories' datasheet.

Supply voltage

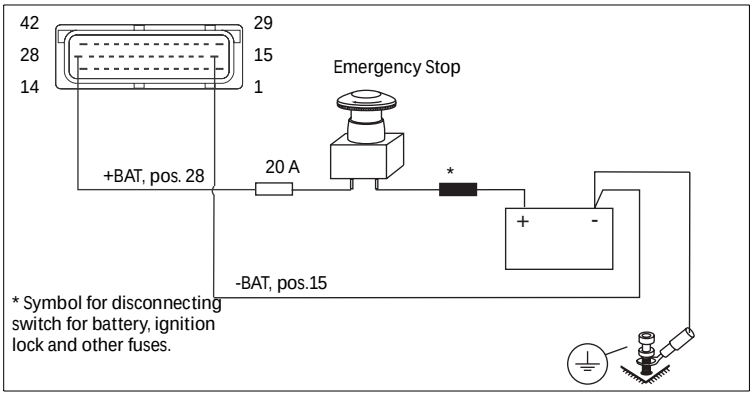
Before any installation of the IQAN system can take place, make sure the ignition lock is turned off and the battery is disconnected.

Emergency stop

Make sure an *Emergency Stop* disconnecting the power supply, is easily accessible at any time. Further relavent regulations are to be found in Machinery Directives 9837/EC. The figure below shows how to connect the emergency stop.

Connecting of Supply Voltage

The supply voltage, should be within the operating interval, see Appendix A, on page 25. Connect the supply voltage to +BAT, position 28 and -BAT, position 15. Protect the module by using a fuse. Requisite fuse level should be 20 A, fast (F).



Connecting the emergency stop and voltage supply.

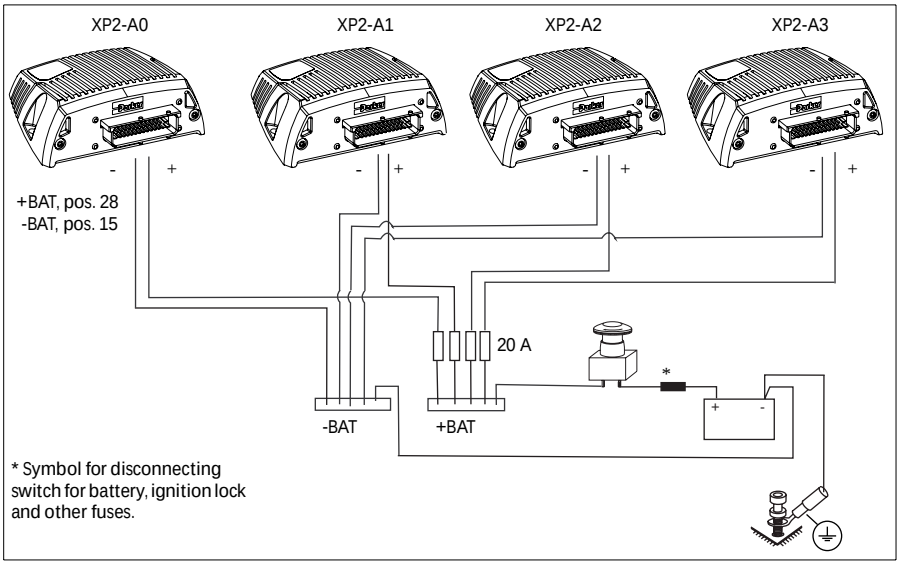
NOTICE

Do not use the chassis as the negative terminal.

Multiple modules connected to voltage supply

When connecting several IQAN-XP2 modules, each and every one of those will have to be separately connected to the battery voltage and protected with a fuse. Requisite fuse level should be 20 A, fast (F).

EXAMPLE

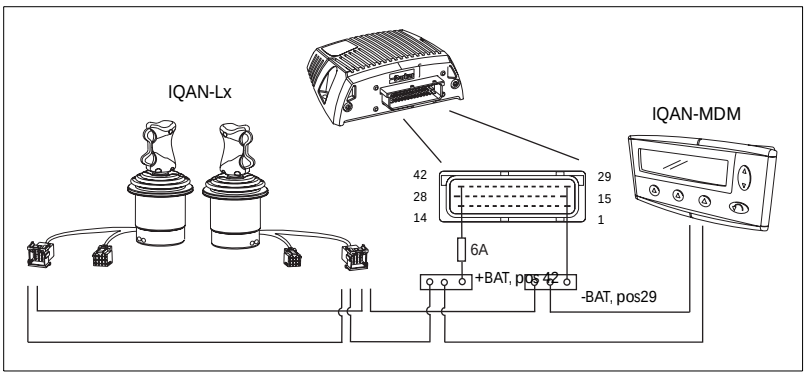


Connecting several modules to the power supply.

Supply system

The IQAN-XP2 module is designed to feed other modules with power. In order to eliminate double crimping use the BAT2 positions. Maximum allowed load should be 6 A, use 6A fuse, fast (F).

EXAMPLE



Voltage supply fed to the system via the IQAN-XP2.

IQAN-XP2 addressing/terminating

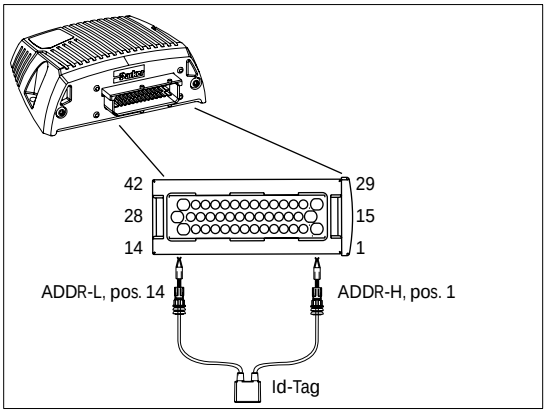
Addressing

Each IQAN-XP2 module will have a specific address, enabling the *master module* to communicate with the modules through the CAN-bus. Practically, the system distinguishes between different modules through firstly verifying the module type and then, secondly, through the modules having unique addresses.

EXAMPLE

If having an IQAN-XP2 module with address 0, the system will denote this one as IQAN-XP2-A0, The letter "A" refers to CAN-bus A.

The maximal number of similar modules in a system is four or eight depending on the master module, denoted in the first case as addresses 0, 1, 2, 3 respectively. In order to assign any IQAN-XP2 module a unique CAN-address, an *Id-Tag* will have to be connected to the positions ADDR-H and ADDR-L.



Connecting of Id-Tag.

Terminating

To eliminate interference in the communication, through the CAN-bus, the CAN-bus must be terminated. Because the master module always is located at the beginning of the bus, the master is provided with an internal termination.
You just need to terminate the end of the bus.

If an IQAN-XP2 is located at the end of the CAN-bus then use an Id-tag having a combined address and terminating function. This is denoted with a "T" for terminating, after the appropriate address such as; 0T, 1T, 2T...

Selecting appropriate Id-Tag

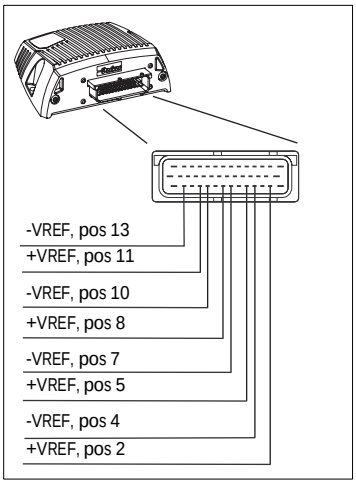
- Check the address number of the module.
- If the module is located at the end of the CAN-bus then select the appropriate *Id-Tag* denoted with a "T".

NOTICE

The CAN-bus must not be terminated using an external regular terminating resistor, due to the fact that terminating is made from within the IQAN-XP2 module in conjunction with each *Id-Tag*.

Reference voltage, VREF

The IQAN-XP2 module is internally equiped with two voltage regulators to generate the reference voltages *VREF A, B* and *VREF C,D*. These reference voltages will feed different kinds of sensors. In order to eliminate double crimping and to make trouble shooting easier there is one VREF for each voltage input: *VREF A, VREF B, VREF C, VREF D.*



VREF positions.

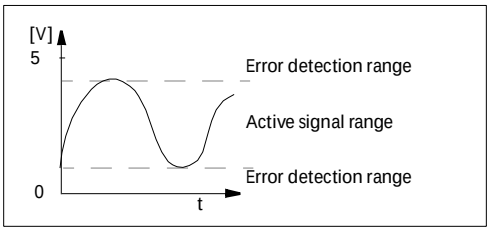
OBSERVE

Maximun load for the VREF A, B and VREF C, D is different according to 12/24 Vdc power supply, see Appendix A, on page 25.

Voltage inputs

Connecting sensors to the voltage inputs

The sensor signal range must be 0-5 Vdc. To detect signal errors such as short circuits or interruptions the active signal range be within 0.5-4.5 Vdc.



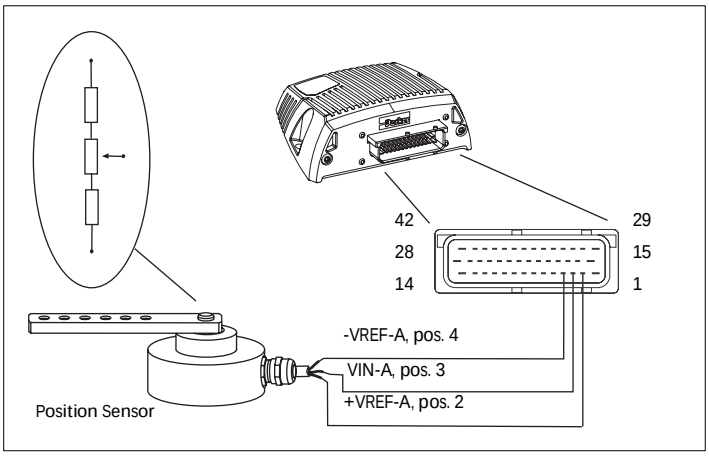
Active signal range.

The current consumption related to the voltage input is negligible.

The positive terminal of the sensor is connected to the +VREF position and the corresponding negative terminal to the -VREF position. The sensor signal is connected to appropriate VIN position.

EXAMPLE

Connect the positive and negative terminals of the position sensor to +VREF-A, position 2, and -VREF-A, position 4, respectively. Then connect the sensor signal to VIN-A, position 3.



Connecting VREF-A and sensor signal VIN-A.

NOTICE

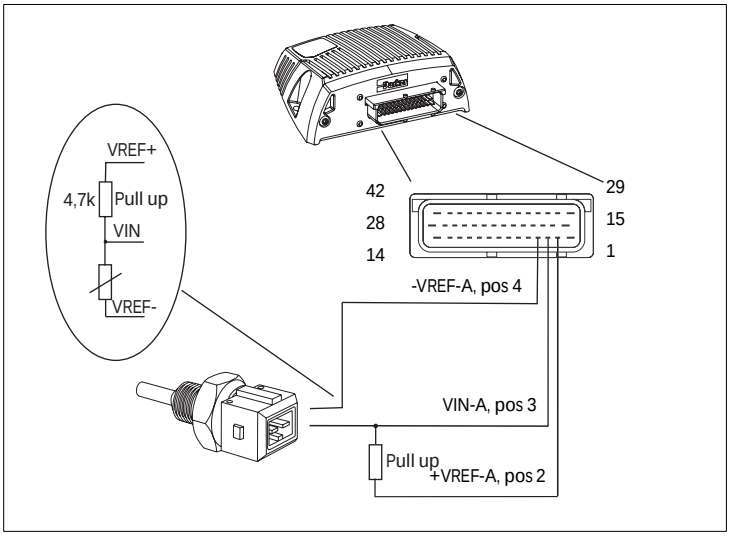
The negative terminal of the sensor must not be connected to the chassis.
Maximum load for each VREF position see Appendix A, on page 25.

Connecting a temperatur sensor to voltage in

When you connect a temperatur sensor you may need to use a pull up resistor on the input signal. Please, check the technical data for the specific temperatur sensor.

EXAMPLE

Connect the negative terminal of the temperature sensor to -VREF-A, position 2, and the signal to VIN-A, position 3. The pull up resistor will be connected between VIN-A, position 3 and +VREF-A, position 4.



Connecting -VREF-A and temperatur sensor signal VIN-A.

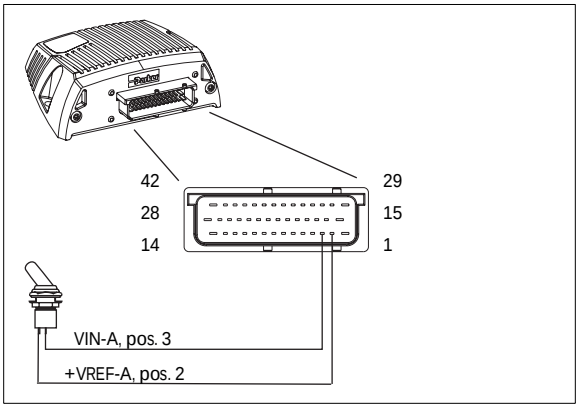
The pull up resisor is 4,7 kΩ.

Connecting switches to the voltage inputs

Switches could be connected to the voltage inputs, to create a digital on/off signal. The switches should be connected to +VREF and VIN respectively. The current consumption for the voltage input is negligible.

EXAMPLE

Connect the positive and negative terminals of the switch to +VREF-A, position 2, and VIN-A, position 3, respectively.



Connecting a switch to VIN-A.

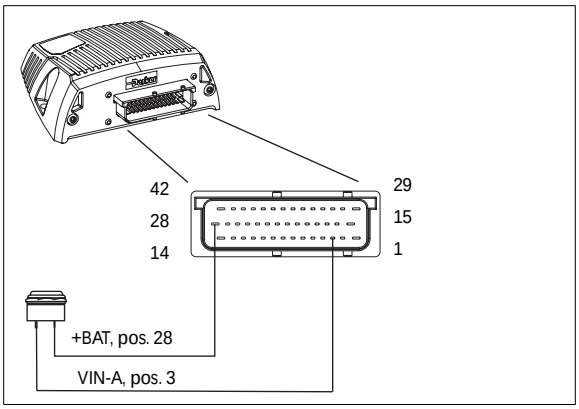
NOTICE

Maximum load for each VREF position, see Appendix A, on page 25.

It is possible to connect system voltage +BAT to the voltage input through a switch.

EXAMPLE

Connect the positive and negative terminals of the switch to +BAT and VIN-A, position 3, respectively.



Connecting a switch to VIN-A and +BAT..

Frequency inputs

Connecting sensors to the frequency inputs

The frequency ranges for the input is 1 Hz to 10 kHz. The signal amplitude must be > 4,0 V. The trigger levels for the input signal are defined according to the following table:

Trigger level < 2,0 V	Trigger level > 4,0 V
"Low"	"High"

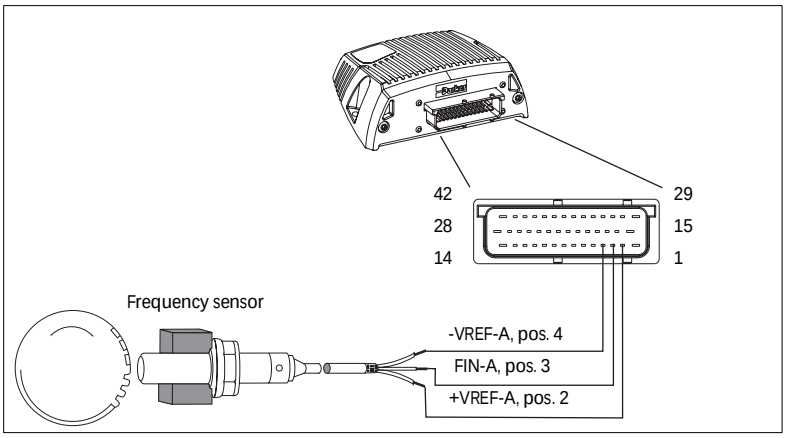
Simple frequency sensor

The positive terminal of the frequency sensor is connected to the +VREF and the negative terminal to the -VREF respectively. The sensor signal is connected to the FIN position.

If the current consumption for the sensor exeeds the maximum load for the VREF, the sensor could be connected to the BAT positions.

EXAMPLE

Connect the positive and negative terminals of the frequency sensor to +VREF-A, position 2, and -VREF-A, position 4, respectively. Then connect the sensor signal to FIN-A, position 3.



Connecting of frequency sensor.

NOTICE

The negative terminal of the sensor must not be connected to the chassis.

Maximum load for each VREF position, see Appendix A, on page 25.

Current outputs

The current output signals control proportional valves among other things. . The current range see Appendix A, on page 25.

Dither frequency and amplitude

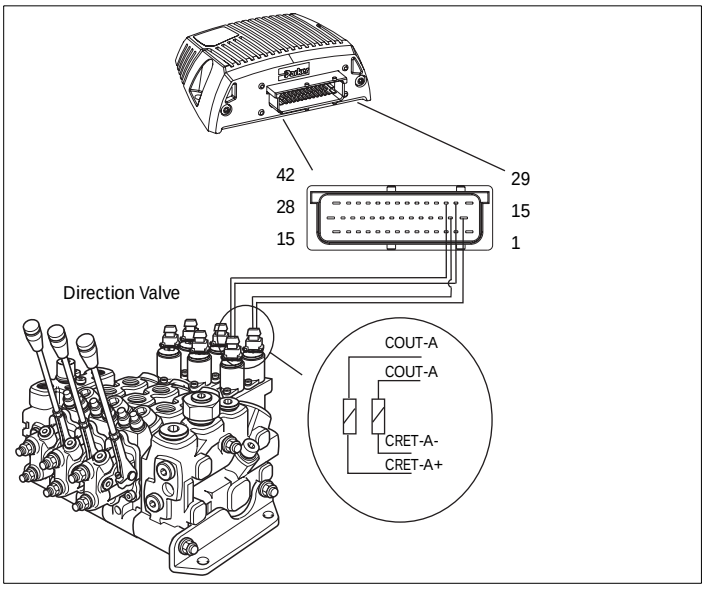
To obtain the best performance from proportional valves the module produces a direct current direct current (DC) with a dither. The *dither frequency* and the *dither amplitudes* can be adjustibed in IQANdevelop. Depending of what kind of valveis to be used, a certain recommended dither frequency/amplitude set-up can be supplyed by Parker Hannifin Corporation, in order to obtain an optimized valve hysteresis. Both frequency and amplitudes will then be set in IQANdevelop.

Connecting loads to current outputs

Connecting a load, e.g. one proportional valve, to the current output is done by using the COUT/CRET pair positions.

EXAMPLE

Positive direction:
Connect the proportional valve to the COUT-A, position 17 and the CRET-A+, position 18 respectively.
Negative direction:
Connect the proportional valve to the COUT-A, position 31 and the CRET-A- , position 32 respectively.



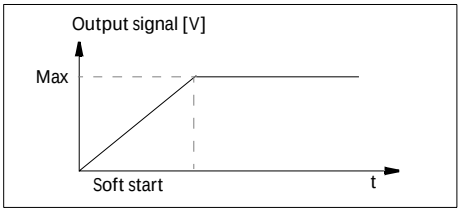
Connecting a load to the current output.

Digital outputs

The digital outputs control relays and on/off valves among other things.
Maximum load per output see Appendix A, on page 25.

Soft start

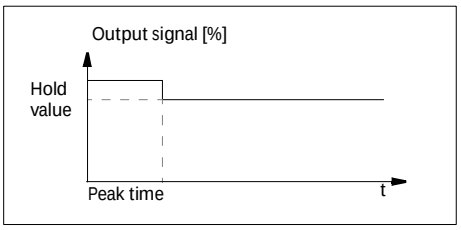
Soft start is used whenever start-up is required to be smoother than the normal procedure offers. A desired ramp function secures the smoother start-up according to the figure below. The ramp function is set up from within IQANdevelop.



The Soft start function.

Peak and Hold

The *Peak and Hold* feature makes it possible to decrease the voltage to the magnetic valve. Shortly after a valve has been activated, the voltage can be decreased to a lower level, sufficient to maintain the position of the valve, but also reducing the heat generated in the valve due to this lower voltage. The reducing of heat, is the primary reason for selecting the *Peak and Hold* feature. Both the peak time and the hold value are set up from within
IQANdevelop.



The Peak and Hold valve voltage graph.

Connecting loads to digital outputs

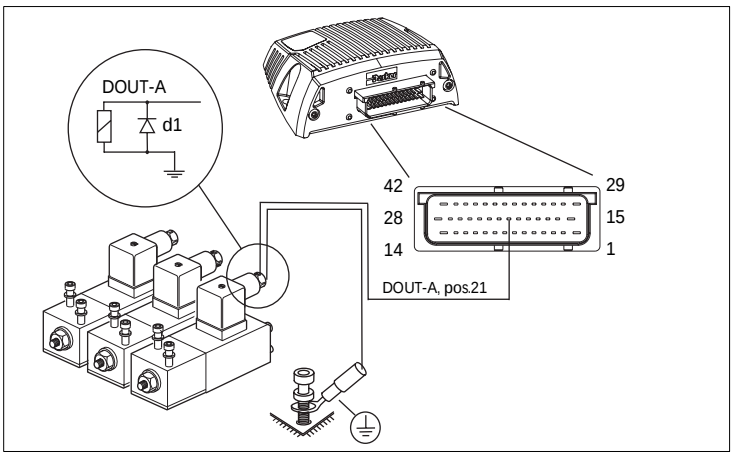
Connecting of loads to the digital outputs such as on/off valves is done by using the DOUT positions and chassis as ground.

Protection against voltage trancients

A clamping diode must be placed between the digital output and ground,as close to the load as possible, to protect the output against high voltages trancients.
Use the diode: 1N5408 (3A/1000V).
Depending on load, other clamping diodes might be used instead.

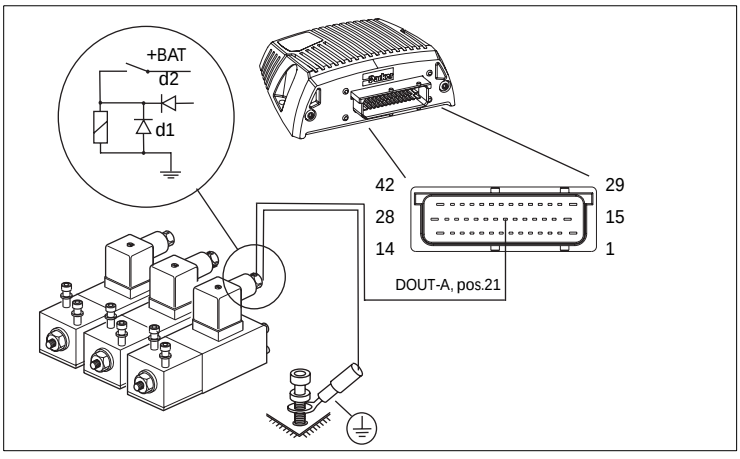
EXAMPLE

Connect the on/off valve to the digital output using the DOUT-A, position 21, and the chassis as ground.
A clamping diode must be placed as close to the load as possible, see figure below.



Connecting a load to the digital output.

If the load is controlled in parallel with another system, the digital output shall be protected with a diode.



Digital output protected with a diode.

PWM outputs

The PWM output (Pulse Width Modulation) control pilot valves. Maximum load should not exceed 3,0 A per output.

Connecting loads to PWM outputs

The load is connected between the PWMOUT and the chassie, ground.
Maximum load per output, see Appendix A, on page 25.

Protection against voltage transients

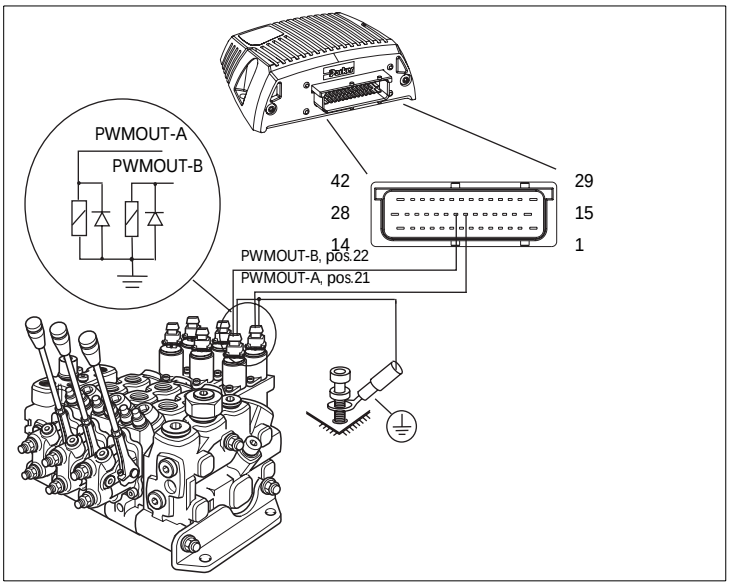
An clamping diode must be placed between the output and ground, as close to the load as possible, to protect the output against high voltages trancients.
Use the diode: 1N5408 (3A/1000V).
Depending on load, other clamping diodes might be used instead

EXAMPLE

Positive direction:
Connent the load between the PWMOUT-A, position 21, and the chassis as ground.

Negative direction:
Connent the load between the PWMOUT-B, position 22, and the chassis as ground.

A clamping diode will be placed as close to the pilot valve as possible.



Connecting a load to the PWM output.

7 Start-up

Start-up procedures

This chapter contains instructions for action to be taken in connection with the initial start, for example, setting values, calibrating and testing the system.

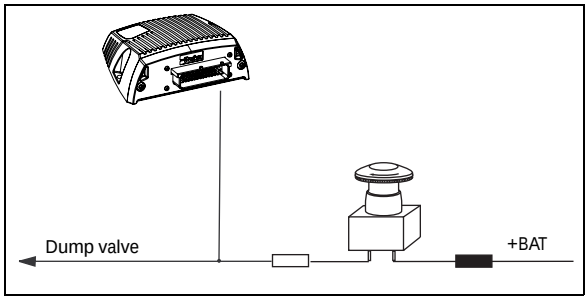
WARNING

Risk of injury!
If the control system is not fitted properly, the machine could move uncontrollably. The machine's engine shall not be started before the control system is completely fitted and its signals are verified.

Starting the control system

Start the control system as follows:

- Prior to start, all modules and cables are to be fitted correctly.
- Check fuses, i.e. make sure that the supply voltage to the modules is equipped with the correct fuse.
- Make sure that connections for supply voltage and return lines are correct in the cable's conductor joint.
- Make sure that the ID-tag is connected properly.
- Make sure the emergency stop works.
  The emergency stop should disconnect the supply voltage to all modules.



Emergency stop.

Alternatively, the emergency stop may also shut off the diesel engine or a dump valve, and with that depressurize the hydraulic system.

Prepare for system start

WARNING
Make sure no one is in dangerous position to the vehicle to avoid injuries when it starts.

Prepare for the initial system start as follows:

- The engine for the hydraulic system's pump shall be in off position.
- Make sure that all connectors are properly connected.
- Turn on the control system.
- Make sure that voltage is being supplied to all modules, the green diode shall be illuminated on all modules. Also make sure that master is in contact with all modules by reading the master's display. Error messages are displayed if the master is not in contact with one/some of the modules.
- Make sure the emergency stop is functioning properly.

Start the system

Start the system as follows:

- Start the engine for the hydraulic system's pump, assuming that the above mentioned inspections have been carried out and shown correct values.
- Calibrate and adjust input and output signals according to the instructions related to the master menu system and check each and every output function carefully.
- In addition to these measures, the machine shall also meet the machine directives for the country in question.

Appendix A

IQAN-XP2 Technical Overview

Absolute maximum ratings[a]

Parameter	Limit values			Unit	Remark
	min.	typ.	max.		
Operating ambient temperature, T_A Storage temperature	– 40 – 40		+80 +100	°C	
Voltage supply, V_{BAT}	6		36	V	
Analog input levels, VIN	-36		36	V	
Load current, COUT				A	internally limited
Load current, DOUT				A	internally limited
Load current, total all outputs			20	A	

a.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
EMI EN 61000-4-3 EN 50204-4-3	 50V/m 50V/m
ESD EN 61000-4-2 (external)	 15 KV
CAN-bus length[a]	100m
Mechanical environment IEC 60068-2-64:1993 Fh, Random vibration IEC 60068-2-29:1987 Eb, Bump	 0.1 g²/Hz, 15- 250 Hz, 30 hours 40g, 6 ms,1000 in each direction
Climate environment IEC 60529:2001, Enclosure protection DIN 40050 Part 9:1993, Enclosure protection IEC 60068-2-30:1985 Db, Damp heat cyclic IEC 60068-2-78:2001, Damp heat, steady state IEC 60068-2-14:1984 Nb, Change of temperature	 IP66: 100 l/min, 3min IP6K9K: 1000kPa, +80°C, 30sec 55°C, 6 cycles 40°C, 93% RH, 21 days -40°C to 70°C, 100 cycles
Chemical environment IEC 60068-2-52:1996 Kb, Salt mist	 3 days

a.Maximum length between the two any modules, unshielded twisted pair cable.

Operation[a]

-40 °C < T_A <+70 ° C (unless otherwise specified)

Parameter	Limit values			Unit	Remark
	min.	typ.	max.		
Ambient temperature (no load), T_A	– 40		+75	°C	
Voltage supply, V_{BAT}	9		34	V	
Output voltage, VREF	4.9	5.0	5.1	V	
Maximum load current, VREF A, B V_{BAT} =14V V_{BAT} = 28V			 50 20	mA	VREF A+ VREF B
Maximum load current, VREF C, D V_{BAT} =14V V_{BAT} = 28V			 50 20	mA	VREF C+ VREF D
Current supply V_{BAT} =14V V_{BAT} =28V		 90 105		mA	outputs = off

a.Recommended operating conditions are given for maximum and minimum conditions where normal performance is still available from the device. Once the normal operating conditions are exceeded, the performance of the device may suffer.

I/O

-40 °C < T_A< +70 °C (unless otherwise specified)

Parameter	Limit values			Unit	Remark
	min.	typ.	max.		
VIN (Voltage input)					
Signal range low		0	0.05	V	
Signal range high	4.9	5.0	5.1	V	
Input resistance		62		kΩ	
Signal resolution		5		mV	
Total unadjusted error		15	35	mV	(vref as source)
FIN (Frequency input)					
Trigger level high	4.0			V	@1kHz
Trigger level low			1.8	V	@1kHz
Frequency range	1		10000	Hz	5V source
Frequency range	1		30000	Hz	>10V source
Pulse width	10			µs	
Frequency resolution < 1kHz < 5kHz < 10kHz		 0,8 20 80		Hz	$\frac{f^2}{1,25 \cdot 10^6}$

I/O

-40 °C < T_A < +70 °C (unless otherwise specified)

Parameter	Limit values			Unit	Remark
	min.	typ.	max.		
DOUT (Digital output)					
Load current each channel active (A,B,C,D)			3	A	
Load current one channel in each group (A or B, C or D)			4	A	The DOUT are divided into two groups.
Voltage drop (V_{BAT} -V_{DOUT}) load I_L = 0,5A load I_L = 3A		0.2 0.8		V	
Short Circuit current limit		6		A	
PWMOUT (Pulse Width Modulation output)					
Load current each channel active (A,B,C,D)			3	A	
Load current one channel in each group (A or B, C or D)			4	A	The PWMOUT are divided into two groups.
Voltage drop (V_{BAT} -V_{DOUT}) load I_L = 0,5A load I_L = 3A		0.2 0.8		V	
Short Circuit current limit		6		A	
PWM frequency	25		2000	Hz	
COUT (Current out)					
Signal range	60		1800	mA	
Resolution		0.7		mA	
Load	4			Ω	
Relative accuracy[a]			±30	mA	PVC25-12V PVC25-24V
Deviation from Mean[b]			TBD	mA	PVC25-12V PVC25-24V
Temperature error			TBD	mA	T_A= -40°C to 70°C PVC25-12V PVC25-24V
Power supply rejection V_{BAT}= 9... 18V V_{BAT}= 24... 34V		1 1		mA	R_L=6 Ω -25 Ω
Load regulation V_{BAT}=14V, R_L=4... 9 Ω V_{BAT}=28V,R_L=22... 34 Ω		±1 ±3		mA	
Dither frequency	25		150	Hz	
Dither amplitude	0		500	mA	

a.Deviation of the output current at any command from its theoretical value (command value).
b.Deviation between any value and mean value with same command and load.

Appendix B

Error codes, messages and actions

If one of the following error is detected, a message will be presented on the display together with an error code on the module. In some cases, the module will turn off or at least shut down the outputs, to increse the safety.

WARNING

Don't use the machine if an error message or error code is activated.

The following sections will present what measures to take for different error situations put into appropriate context.

LOW/ HIGH SUPPLY VOLTAGE

Situation	Error code	Action IQAN-XP2	Comment
+BAT < 8,5 V	Error 1	-	Check voltage supply
+BAT > 34 V	Error 1	-	Check voltage supply

VREF ERROR

Situation	Error code	Action IQAN-XP2	Comment
VREF < 4,9 V	Error 1	-	Check voltage
VREF > 5,1 V	Error 1	-	Check voltage

MODULE IS OFFLINE

Situation	Error code	Action IQAN-XP2	Comment
CAN-bus off	Error 3	All outputs shuts off.	Check CAN-bus
ADDR-H < 4,9 V	Error 5	-	Check voltage ADDR-H
ADDR-H > 5,1 V	Error 5	-	Check voltage ADDR-H
ADDR-L < 0,5 V	Error 5	During start up: The module turns off.	Check voltage ADDR-L
ADDR-L > 4,5 V	Error 5	During start up: The module turns off.	Check voltage ADDR-L
Software error	Error 6	The module turns off.	Contact supplier.

HIGH TEMPERATURE

Situation	Error code	Action IQAN-XP2	Comment
Internal temperature > max temp	Error 2	-	Check ambient temperature
Internal temperature sensor error	Error 4	-	Contact supplier

ERROR: PARAMETER

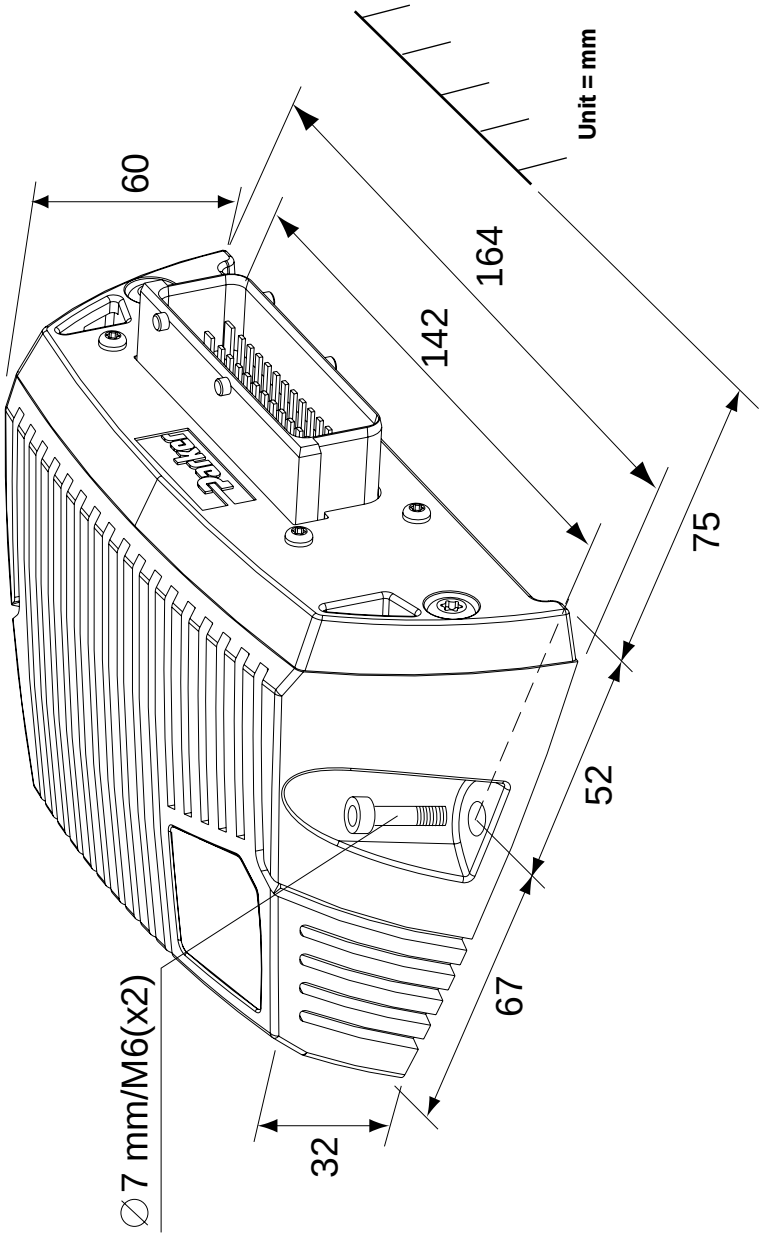
Situation	Error code	Action IQAN-XP2	Comment
Parameter error	Error 6	No calibration of signals.	Contact supplier

ERROR: OUTPUT HIGH

Situation	Error code	Action IQAN-XP2	Comment
COUT: Current return low	Error 1	Active output shuts off.	Check load
COUT: Current return high	Error 1	In current check activated: Active output shuts off.	Check load
DOUT: Overload	Error 1	Active output shuts off.	Check load
COUT/DOUT: Internal driver failure	Error 4	Active output shuts off.	Contact supplier

Appendix C

Dimensioning of the IQAN-XP2 module



For the latest information visit our website www.iqan.com

Information in this instructionbook is subject to change without notice

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