

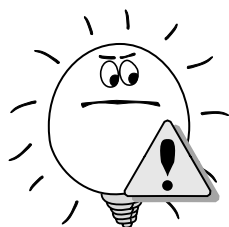
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1 Introduction

These instructions are primarily 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.



ATTENTION

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

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

The term, manufacturer, refers to Parker Hannifin Corporation.

2 Precautions

General safety regulations

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

Mounting, modification, repair and maintenance must be executed in accordance with the manufacturer's regulations. Mounting, modification, repair and maintenance is carried the responsibility of the person performing the work. 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.

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

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.

The customer is responsible for choosing a system solution that corresponds to the safety requirements that are valid in any application where the TOC2 Xpress is to be used.

As much of the welding work on the chassis, as possible 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 should never be placed near the electrical wires of the control system.

Construction regulations

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 for the operator. The machine should be built, if possible, so that the supply voltage is disconnected from the control system's electrical units when the operator leaves the operator's station.

Safety during installation

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

Safety during start-up

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 of the Instructions book for IQAN-TOC2.

Safety during maintenance and fault diagnosis

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

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

3 System description

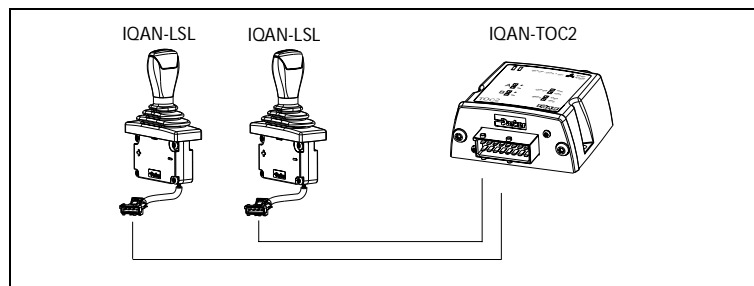
General information

IQAN-TOC2 Xpress is a component based control system. A system consists of a TOC2 unit with a number of lever units. Communication between the TOC2 and other units takes place via the system's wiring harness.

The IQAN-TOC2 default application is able to drive hydraulic valve solenoids in response to a command signal coming from a Parker Hannifin joystick (IQAN-LST, IQAN-LSL, ICM427 & ICL427). The design of the IQAN-TOC2 default application is based on a theoretical machine and does not take all machine industry safety requirements into consideration.

If it is necessary to modify the application, IQANdevelop, a Windows-based program for designing applications for the IQAN control system, is used.

IQAN-TOC2 Xpress systems contain a TOC2 module and one or two levers.



One example of an IQAN-TOC2 Xpress system

IQAN-TOC2

The TOC2 module has a dual amplifier to drive a maximum of two (2) bi-directional hydraulic valve sections. The physical inputs are two voltage inputs (0 - 5V), two digital inputs (0 or >5V) and current or PWM outputs.

IQAN-LST

The LST is a single axis paddle-type joystick. It is supplied 5V from the voltage reference of the TOC2 and has 2 outputs. Output A has a range of 10% - 90% of supply and Output B has an inverted range of 90% - 10% of supply.

IQAN-LSL

The LSL is a single axis joystick. It is supplied 5V from the voltage reference of the TOC2 and has 2 outputs. Output A has a range of 10% - 90% of supply and Output B has an inverted range of 90% - 10% of supply. The LSL also has options for a switch, mechanical center lock and electrical detents in one or both directions.

ICL4

The ICL4 is a dual axis coordinate joystick. It is supplied from the +BAT voltage supply and has 2 outputs. X-axis has a range of 0V - 5V and Y-axis has a range of 0V - 5V. ICL4 also has a neutral position switch, NP+.

4 Applications

Basic function - outputs

The basic idea of the default application is to interface a voltage input from a joystick, which the IQAN-TOC2 module will convert into an output. The output then activates the solenoid of a hydraulic valve.

The two digital inputs in the IQAN-TOC2 module are used to select the different modes (or system layouts) also referred as "Application layout 1, 2 or 3".

Application 1: Safe single lever set-up

Application 1, using an IQAN-LSL or -LST joystick, is focused primarily on safety. One joystick with two output signals (primary and secondary) control one axis. The primary joystick signal 0,5V to 4,5V commands the output, whereas the secondary joystick signal 4,5V to 0,5V is checked against the primary signal value. If the difference between the scaled primary signal and the scaled secondary signal is too high, the output will be disabled.

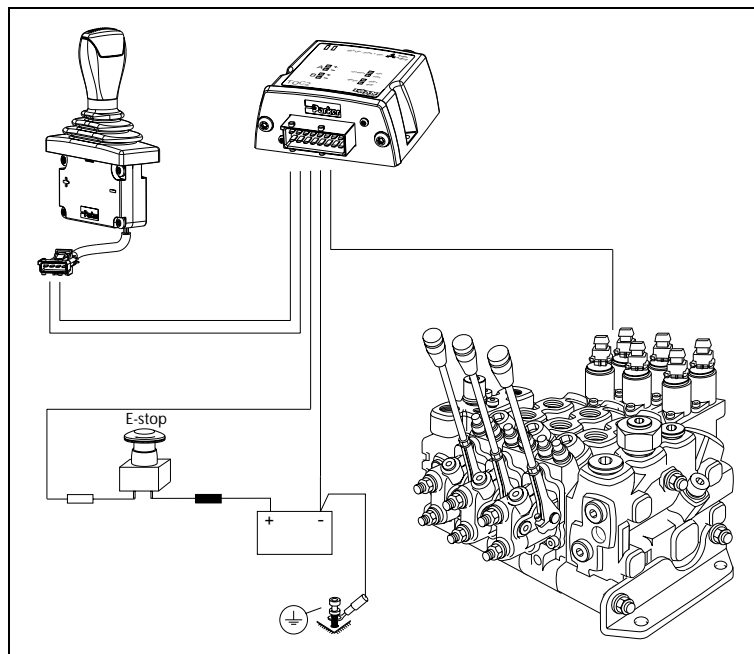
During power up of the IQAN-TOC2 module, the joystick signal must have a neutral value ($2,5V \pm 10\%$). If the joystick signal is inside the start up safety window, the output is then enabled until the IQAN-TOC 2 is turned off.

To select Application layout 1:

Connect input DIN A (output enable) directly to +BAT or by means of an enable switch such as a door or seat switch.

Note: COUT A will be commanded from the primary signal and COUT B is blocked. Input DIN B is NOT connected.

When wiring, refer to appropriate Electrical diagrams and Installation sheets.



Safe, single lever TOC2 Xpress system

Application 2: Dual lever set-up

Application layout 2, using Parker IQAN-LSL or -LST joysticks, is primarily focused on input and output optimisation.

The joystick A's primary signal is used to command output A and joystick B's primary signal is used to command output B.

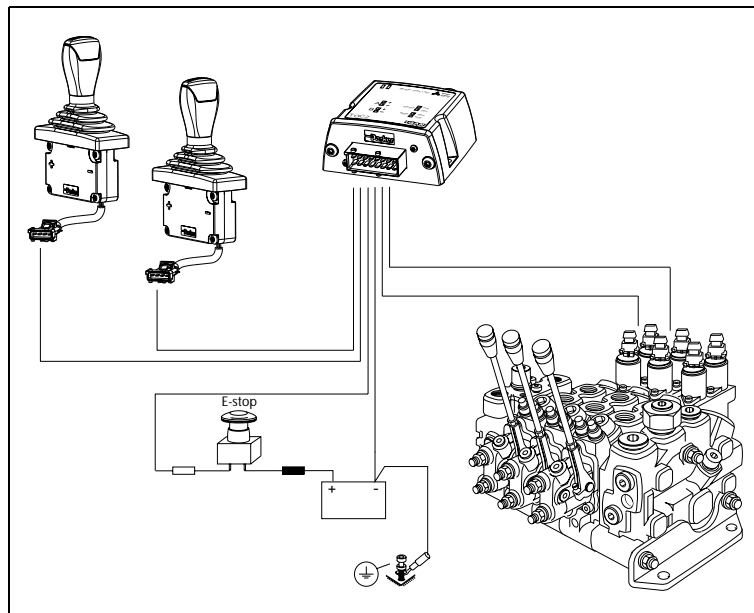
During power up of the IQAN-TOC2 module, the joystick signals must have a neutral value ($2,5V \pm 10\%$). If the joystick signals are inside the start up safety window, the outputs are then enabled until the IQAN-TOC2 is turned off.

To select Application layout 2:

Connect input DIN A (output enable) directly to +BAT or by means of an enable switch such as a door or seat switch.

DIN B (Diff. Check disable) must be connected to +BAT, to enable driving of the two current outputs independently.

When wiring, refer to appropriate Electrical diagrams and Installation sheets.



Optimised dual lever TOC2 Xpress system

Application 3: Coordinate (2-axis) lever set-up

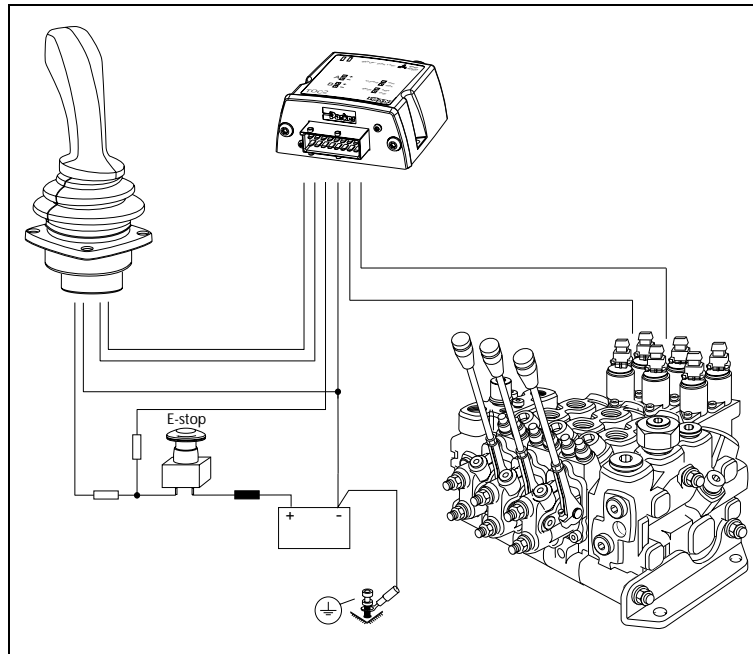
Application layout 3 is primarily focused on input and output optimisation with a Parker ICL4 type coordinate joystick featuring a neutral position sensor. Power for the ICL4 joystick is supplied from +BAT (12V, 24V). The dual-axis joystick provides one voltage output channel for the X-axis and a second voltage output channel for the Y-axis. Both joystick output signals range between 0,5 and 4,5 volts. The X-axis signal is used to command output A and the Y-axis signal is used to command output B.

During power up of the IQAN-TOC2 module, the joystick signal must have a neutral value ($2,5V \pm 10\%$). If the joystick signals are inside the start up safety window, the outputs are then enabled until the IQAN-TOC 2 is turned off.

To select Application layout 3:

DIN A (output enable) is recommended to use the +NP signal (neutral position signal) from the coordinate joystick to enable the IQAN-TOC2 outputs. DIN B (Diff. Check disable) must be connected to +BAT.

When wiring, refer to appropriate Electrical diagrams and Installation sheets.



Optimised coordinate lever TOC2 Xpress system



Safety in the applications

In order to increase safety when controlling the machine, the system should be equipped with a switch, connected to DIN A which allows a signal at the outputs. This switch is called a *System Enable Switch, SES* and must be activated (high) in order to allow a signal at the outputs. If the switch is inactive (low signal), the outputs are disabled.

Examples of the engagement of the *System Enable Switch* include seat or door switches or switches in the joystick.

Default application frequencies

The basic application is designed to be used with a variety of proportional valve types. The factory default frequency is set to 100 hz and the outputs are setup in current mode (current closed loop).

Changing the frequency or the type of channels and how they are used may be required for certain systems and is easily accomplished using IQANdevelop software.

5 Settings via the HMI

The TOC2 control has a mechanical interface for adjusting the min., max. and ramp properties of the outputs. Only properties that are set as adjustable in the application can be adjusted.

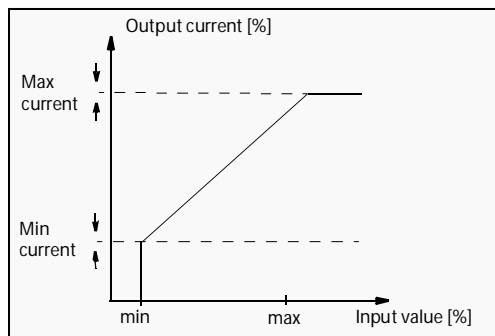
The procedure for making adjustments is found in the IQAN-TOC2 Instruction book.

Adjusting currents

The min. current for each output should be set so that the function starts smoothly without too much deadband. The min. and max. currents for the outputs may be set using the HMI.

Current outputs

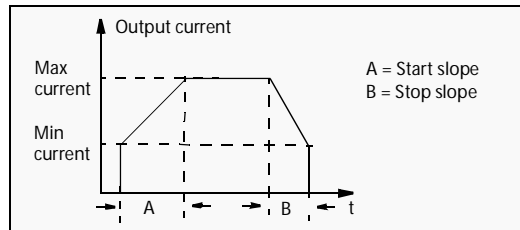
Max. setting of Minimum current	750 mA
Max. setting of Maximum current	3000 mA
Default minimum current setting	200 mA
Default maximum current setting	750 mA



Adjusting the minimum and maximum currents for each output.

Slope times

A slope is the amount of time it should take for the output to rise from minimum to maximum current and fall from maximum to minimum current respectively. The times can be adjusted using the HMI.



Start and stop slope.

Start and stop slopes

Max. setting of start slope	1000 ms
Max. setting of stop slope	1000 ms
Default start slope setting	0 ms
Default stop slope setting	0 ms

Error messages

See the IQAN-TOC2 Instruction book for error codes and meanings.

6 Installation

There are installation sheets for the TOC2 and each type of lever. Please refer to these documents which contain a brief description of the procedure for installing the different components.

More complete instructions can be found in the Instruction books for the respective components. Electrical diagrams are available for each of the three application examples. Check our website www.iqan.com for the latest versions.

Wire connection

The connector kits for the TOC2 and the LST or LSL levers are sealed, AMP Junior Power Timer, automotive type.

The ICL4 lever has a non-terminated (flying lead) cable that may be joined to a wiring harness or hooked directly to the TOC2 mating connector.

Medium duty crimping tools suitable for service technicians are available in the IQAN toolkit.

The connector kit part numbers and IQAN toolkit information are found in the IQAN accessories datasheet.

Three system wire harnesses are available that correspond to IQAN-TOC2 Xpress application types 1, 2 and 3. Refer to sales brochure HY17-8299/UK for part numbers.

7 Start-up

Start-up procedures

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



ATTENTION

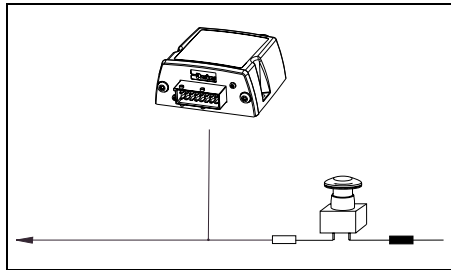
Risk of injury! If the control system is not fitted properly, the machine could move uncontrollably. The machine's motor shall not be started before the control system is completely fitted and its signals are verified.

Starting the control system

Start the control system as follows:

- Prior to start, the control and cables are to be fitted correctly.
- Check fuses, i.e. make sure that the supply voltage to the unit 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 the emergency stop works.

The emergency stop should disconnect the supply voltage to the control.



Emergency stop.

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

Start the hydraulic system

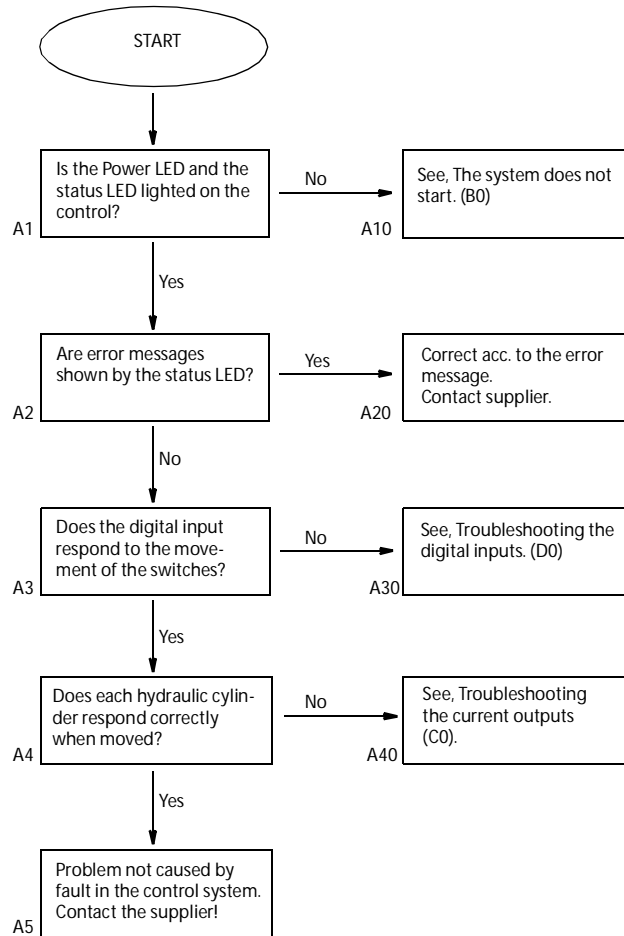
Start the system as follows:

- Start the motor for the hydraulic system's pump, after the above mentioned inspections have been carried out.
- Inspect the function of the switches that activate all outputs (i.e. System Enable Switch).
- Make sure that the movements of the hydraulic cylinders correspond with the movements of the control levers. Adjust speed and slopes as needed.
- In addition to these measures, the machine shall also meet the machine directives for the country in question.

8 Troubleshooting

Troubleshooting the TOC2 system (A0)

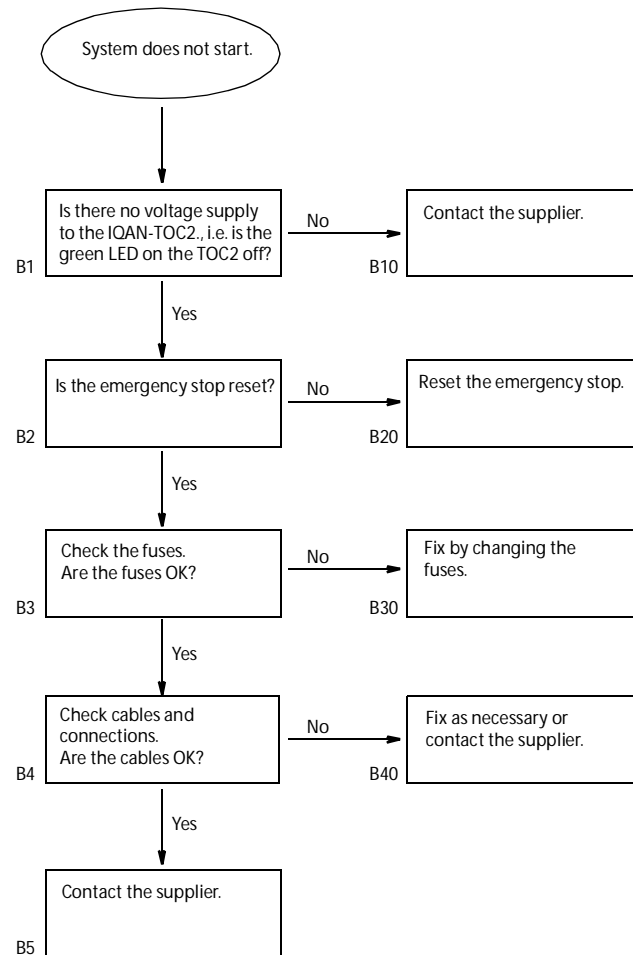
The purpose of this chapter is to make it easier to discover minor faults on your own and to be able to read the system in order to provide technicians with system information. Follow the instructions for structured troubleshooting if there is a functional failure in the system.



Beside each box is an index, which can be used during troubleshooting. For example if you need to contact service.

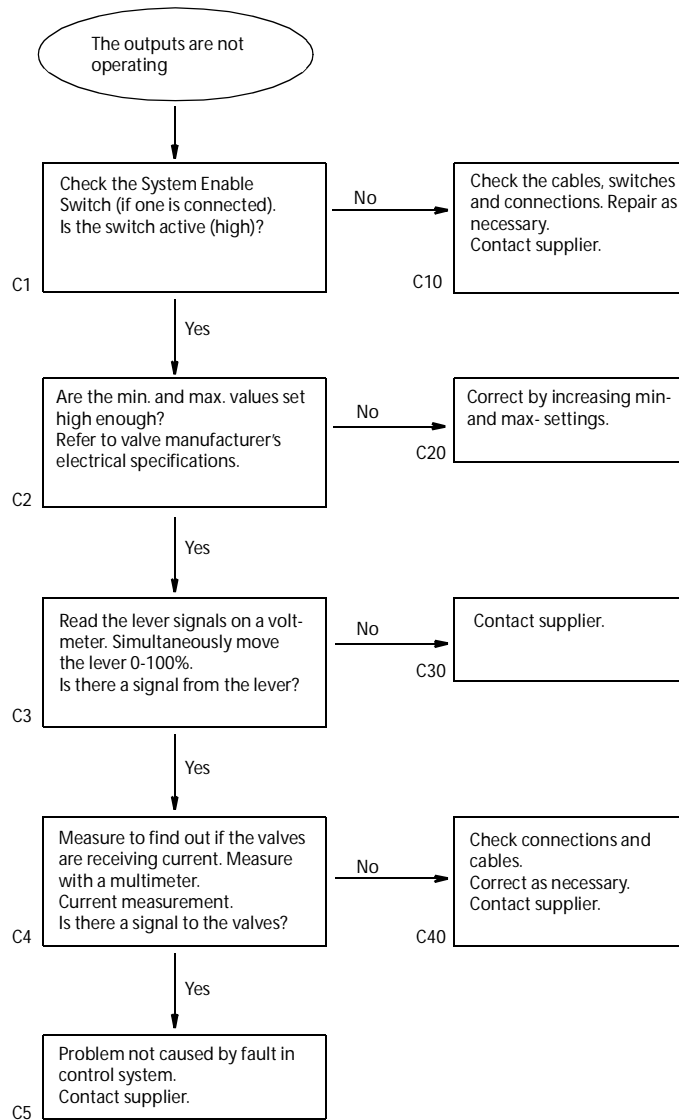
The system does not start (B0)

This section contains instructions for troubleshooting and action to be taken if the system does not start.



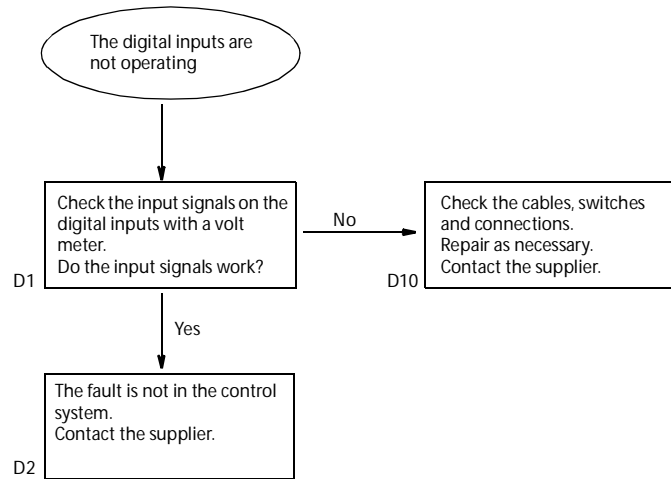
Troubleshooting the current/PWM outputs (C0)

In this troubleshooting section you check the control system's voltage inputs, current/PWM outputs and their cables.



Troubleshooting the digital inputs (D0)

In this troubleshooting section, you check the control system's digital inputs, digital outputs and their cables.





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