Actuator LA36/LA37
IC with Parallel
Connection diagram
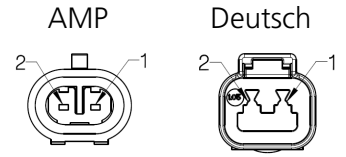
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Integrated Controller Parallel

Platform: 33 (Ordering example value for place 11 and 12)

Actuator 8
Actuator 7
Actuator 6
Actuator 5
Actuator 4
Actuator 3
Actuator 2
Actuator 1

Power   AMP   Deutsch

Signal   Deutsch
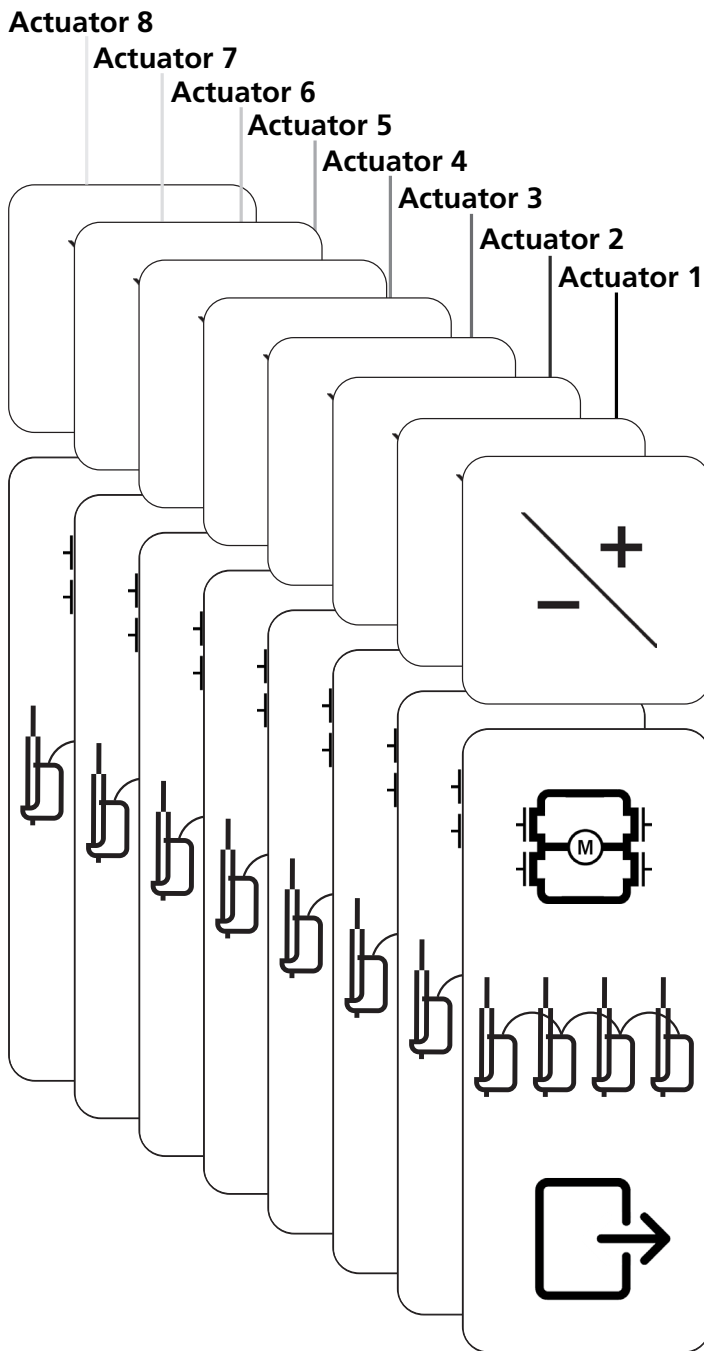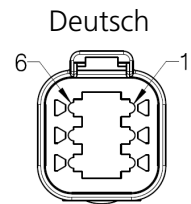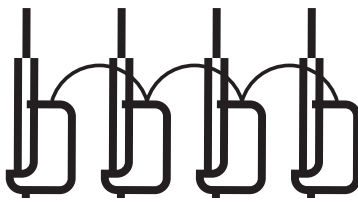
		Power
VDC+	**BROWN**	2
GND -	**BLUE**	1
		Signal
Digital input	**BLACK**	1
Digital input	**RED**	2
Parallel Com	**VIOLET**	4
Signal GND	**WHITE**	3
Digital output	**YELLOW**	5
Digital output	**GREEN**	6

Please be aware that if the power supply is not properly connected, you might damage the actuator!

The Green and Yellow wires from parallel connected actuators must NOT be interconnected

Integrated Controller Parallel

| Input/Output	Specification	Comments
Description	Parallel drive of up to 8 actuators. A Master actuator with an integrated H-bridge controller controls up to 7 slave actuators. The version with "IC option" cannot be operated with PWM (power supply).	
Brown	12 VDC ± 20 % 24 VDC ± 10 % Connect Brown to positive	The parallel actuators can run on one OR separate power supplies. Power supply GND (-) is electrically connected to the housing Current limit levels can be adjusted through BusLink (one actuator at a time).
Blue	12-24 V DC - (GND) Connect Blue to negative	
Red	Extends the actuator	The signal becomes active at: > 67% of V_{IN} The signal becomes inactive at: < 33% of V_{IN} Input current: 10 mA It does not matter where the in/out signals are applied. You can either choose to connect the signal cable to one actuator OR you can choose to connect the signal cable to each actuator on the line. Either way this will ensure parallel drive
Black	Retracts the actuator	
Green	Endstop reached out	Output voltage min. V_{IN} - 2 V Source current max. 100 mA
Yellow	Endstop reached in	Endstop reached are NOT potential free. Endstop reached can be configured with BusLink software according to any position needed.
Violet	Parallel communication: Violet cords must be connected together	Standby power consumption: 12 V, 60 mA, 24 V, 45 mA No feedback available during parallel drive
White	Signal GND: White cords must be connected together	For correct wiring Signal GND see next page

- Current cut-offs should not be used as stop function! This might damage the actuator. Current cut-offs should only be used in emergencies!
- Current cut-off limits are not proportional with the load curves of the actuator. This means that the current cut-offs cannot be used as load indicator.
- There are tolerances on the spindle, nut, gear wheels etc. and these tolerances will have an influence on the current consumption for the specific actuator.

The parallel system

The parallel drive function will support a number of actuators working jointly:
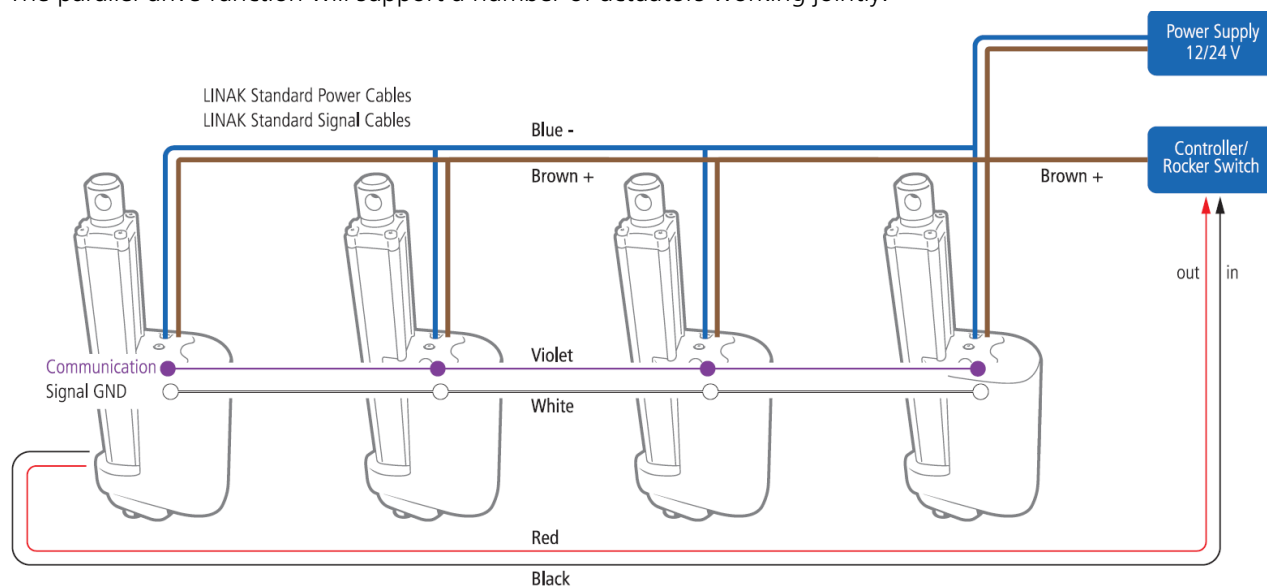
It is both possible to run parallel with a single power supply, or to run each actuator with separate power supplies:
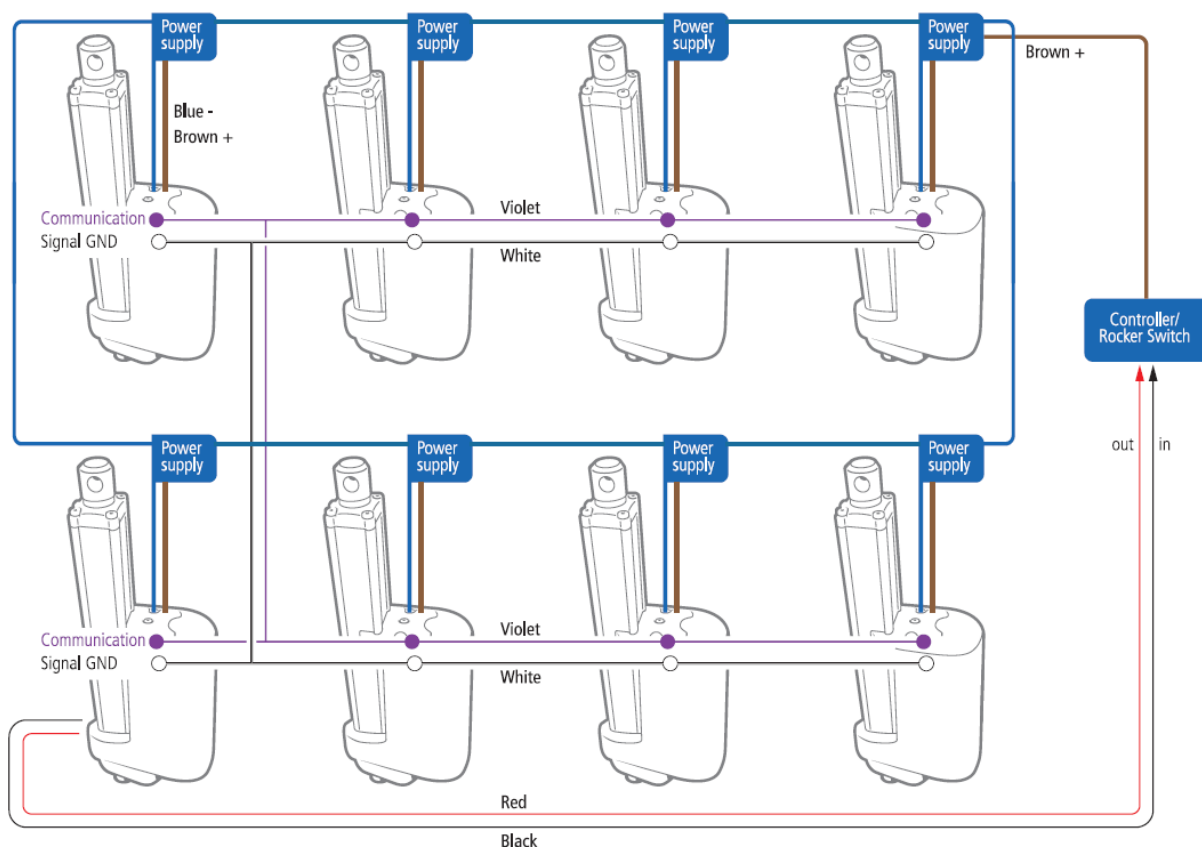
Only standard power and signal cables are available for parallel.

If separate power supplies are used, they must have the same potential, and the power supply GND (blue wires) must be connected in a common ground.

- The signal cables may be 40 meters in total

BusLink software tool and the parallel system:

The BusLink software tool is available for parallel and can be used for:

Configuration, Manual run and Diagnostics (service counter)

The BusLink software can be downloaded here: https://www.linak.com/segments/techline/ic-integrated-controller/

For more information and easy set-up of BusLink, please follow this link to view the Quick Guide for BusLink: https://cdn.linak.com/-/media/files/brochure-source/en/techline-buslink-quick-guide-brochure-eng.pdf

(i)   Please note that the BusLink cables must be purchased separately from the actuator!
Item number for BusLink cable kit: See Cable kit tabel

Only through the BusLink software tool is it possible to state if the system is Parallel or Non-critical Parallel. Via this tool it is also possible to reconfigure the whole system from one system to the other.

The parallel system:

- The system does not have to run on one main power supply only – it can be supplied by individual supplies corresponding to the number of actuators in the system. Please respect the actuator specifications regarding voltage level and current consumption!

- It does not matter where the IN/OUT signal is applied.

- When all actuators are connected, a Master will automatically be chosen. E.g. with 5 actuators in one system there will be 1 Master and 4 Slaves. The Master can control up to 7 slaves

- If an overload occurs, the running of the actuators will be stopped and blocked in that direction until an activation in the opposite direction has been made, or the system has been re-powered

- Before entering BusLink mode, all actuators must be disconnected. It is only possible to configure one actuator at a time through BusLink

- When changing the actuator configuration, it is important that all actuators in the system have the same configuration before the system starts running. Otherwise, the actuators will not run

- Actuators will be pre-programmed from our production as 2, 3, 4, 5.. etc. parallel systems. Through BusLink it will be possible to add or remove actuators to/from the system

- In case an actuator drops off the line due to e.g. a damaged signal cable, the parallel system will stop immediately

- In case one of the actuators are broken, the system will not move; not even after re-powering. The broken actuator needs to be replaced, before the system can run again. The system will only run, when it is complete or configured to a Non-critical Parallel system via the Buslink software tool

Only for non-critical parallel systems

- The Non-critical Parallel system offers auto-detection for every single power up if a new actuator is added to the line (system)

- To add or remove actuators from the system, the system needs to be shut down and powered up again. Please be aware, that after re-powering, the system will not detect if an actuator is missing!

- If adding a new actuator to the system, be aware that the actuator needs to have the same configuration (Non-critical Parallel) as the existing ones; this can be done via the BusLink software tool.
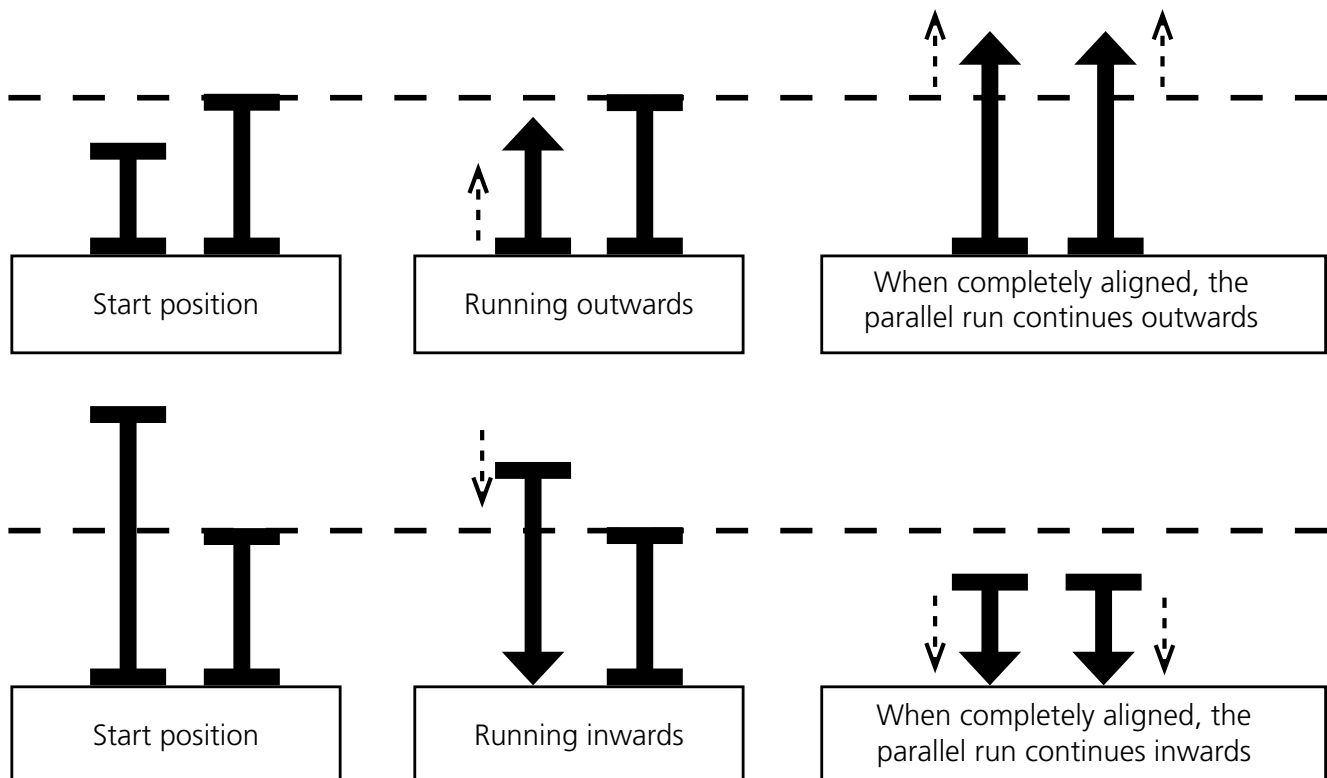
System Monitoring for Parallel:

If one of the actuators have one of the following error conditions, the actuator will immediately STOP:

- H-Bridge fault
- Out of the temperature range (High duty cycle protection)
- Overcurrent (Current cut-off if one or all actuators go in mechanical block)
- SMPS fault
- Endstop reached signal fault switch
- Hall sensor failure
- Position lost
- Overvoltage

Alignment of the parallel actuator system:

If the actuators are not in parallel when starting up, the next movement will run in the following manner:

Start position	Running outwards	When completely aligned, the parallel run continues outwards

| Start position	Running inwards	When completely aligned, the parallel run continues inwards

Recovery mode:

The purpose of recovery run mode is to have the ability to move the actuators at a reduced performance, even if one of the actuators in the system has lost its position (eg. due to failure with CRC, Hall or EOS). The movement in steps will indicate to the user that something is wrong.

Since the position is unknown to at least one actuator in the system, the parallel system wil move without synchronisation. This introduces the risk of unaligned movement if one of the actuators is physically unable to move.

Recovery run mode will not engage if a wrong number of actuators is connected in the system.

If recovery run mode is engaged, it will cause a movement as shown below:
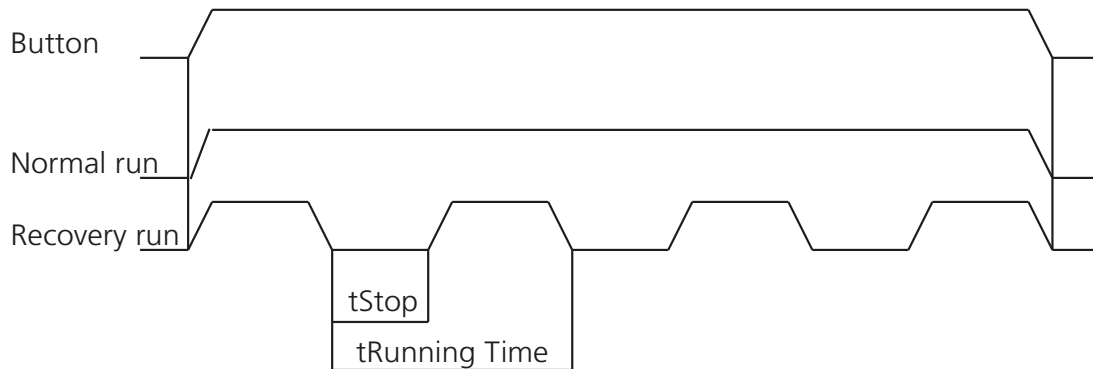
Recovery run mode:

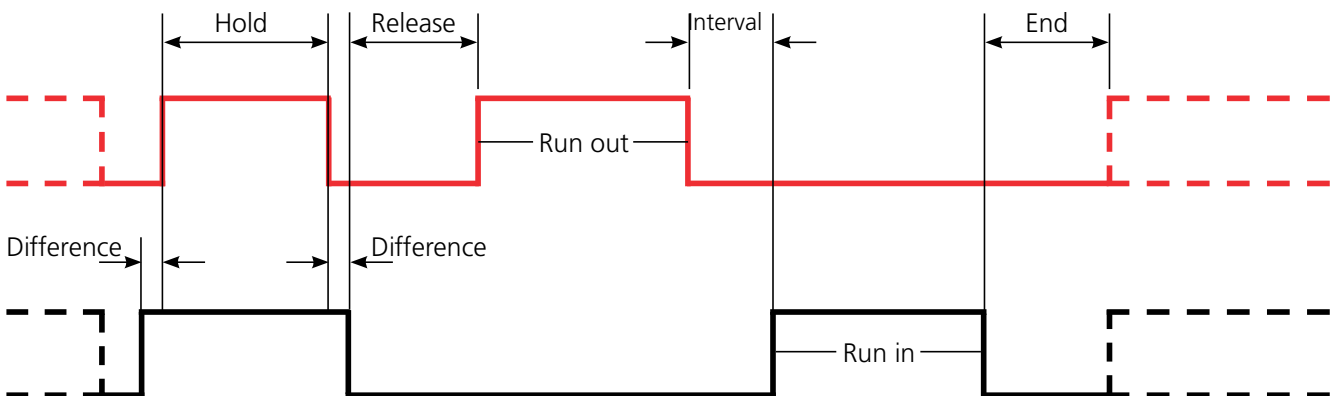| tStop	2000ms
tRunning Time	2000ms

IC - Parallel manual service mode:

With the Parallel Manual Service mode it is possible to drive one or more parallel actuators separately, using the Red and Black wire from each actuator.

An example: if there are 4 actuators in the system and one is removed, the remaining 3 actuators will still be operational simultaneously - so long as they are connected via the Violet and White wires, and given that 'Parallel manual service mode' is activated on at least one of them.

For activation of 'Parallel manual service mode' please follow the instructions below:

Step	Procedure	Min.	Max.
1. First step	Power up all remaining actuators in the system		
2. Hold	Put power on the Red and Black wires for 10-30 seconds. Hold with a maximum of difference between the two wires.	10 sec.	30 sec..
3. Release	Disconnect all wires and wait 0.5-2 seconds before the next step. Hold with a maximum of difference between the two wires.	0.5 sec.	2 sec.
4. Extend/Retract	Now choose either to extend or retract the actuator: To extend the actuator: Connect only the Red wire(s) to the power supply To retract the actuator: Connect only the Black wire(s) to the power supply	-	-
5. Interval	Switch between running in/out as much as needed, without exceeding the 2.0 seconds interval between disconnecting/connecting the Red and Black wires	-	2 sec.
6. End	To exit the parallel manual mode, disconnect the Red and Black wires for more than 2.0 seconds	2 sec.	-

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