

High-speed Counter Module



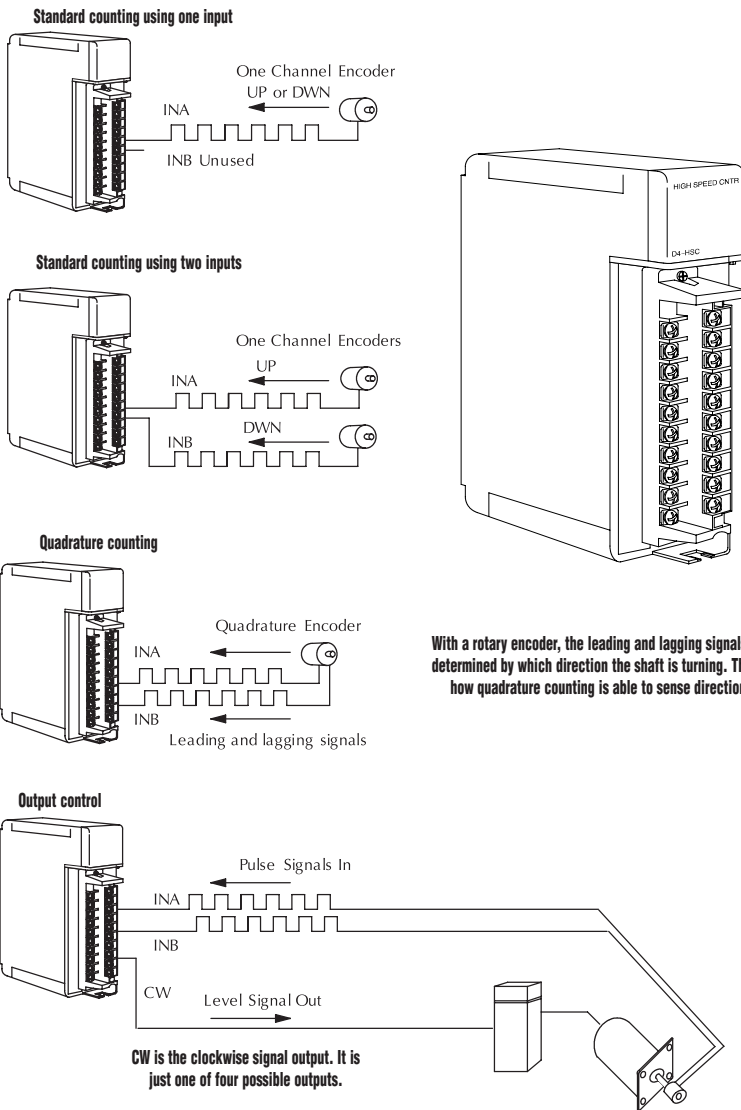
Specifications	
Module Type	Intelligent
I/O Points Assigned	16 X input, 32 Y output
Modules per CPU	Eight, in any local or expansion slot location
Field Wiring Connector	Removable terminal type
Count Signal Level	4.75VDC-30VDC less than 10mA
Maximum Count Speed	100kHz (50% duty cycle)
Minimum Input Pulse Width	5µs
Internal Power Consumption	300mA maximum at 5VDC (supplied by base power supply)
Operating Environment	0°C to 60°C (32°F to 140°F), 5% to 95% humidity (non-condensing)
Manufacturer	Koyo Electronics

Overview

The DL405 high-speed counter provides high-speed up or down counting capability. It provides the user with count data and output signals such as Clockwise, Counter-clockwise, Decelerate, and Equal. The module functions asynchronously with the DL405 CPU, allowing fast response and control.

The D4-HSC module supports the following key features:

- Quadrature or up/down encoder input
- Maximum input pulse rate of 100 kHz (50% duty cycle)
- Seven user control inputs
- Four external outputs for controlling motor modes
- Counting range from -8,388,608 to +8,388,607 with overflow
- Counter input multiplication of X1, X2, or X4
- User selectable count direction
- A or B mode selection
A mode to reset counter at preset
B mode to continue counting after preset
- Find **Home** mode to search for home position
- Sampling count to determine pulse rate



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External Module Input Descriptions	
IN A	Depending on mode chosen, this is either a standard UP/DOWN counter input, or one of the quadrature counter inputs.
IN B	Depending on mode chosen, this is either a standard UP/DOWN counter input, or one of the quadrature counter inputs.
IN Z	This input can be used to help you find home position for positioning control. It can also be used as an external means of resetting the counter.
LD (Load)	If you want to use an offset number with your counting, a rising edge signal at this terminal will copy the offset value into the current count.
RST (Reset)	A high (ON) signal at this terminal resets the counter to zero and it remains there until there is a transition to a low signal (OFF)
LATCH	You may want to store the current count. The rising edge of a signal at this terminal will store the current count in shared RAM. Counting continues with no interruption.
C.INH	You may want to temporarily ignore the count inputs coming in on INA and INB. A high (ON) signal at this terminal will inhibit the counting to accomplish this need. Current count is suspended until a transition to a low (OFF) signal is seen.
RUN	Not to be confused with Run mode of the DL405, a high (ON) signal here will activate HSC RUN. A low (OFF) signal will deactivate it.
LS1 and LS2	Either or both of these terminals can be connected to limit switches to help find home position, or they can merely be used as discrete inputs.

External Module Output Descriptions	
CW	Clockwise – Turns on when the optional HSC RUN mode is invoked and the current count is less than the preset value. It will reset when the current count equals the preset value. This output can also be controlled independently from the count values with an internal output bit allocated to the HSC.
CCW	Counter Clockwise – Turns on when the optional HSC RUN mode is invoked and the current count is greater than the preset value. It will reset when the current count equals the preset value. It can also be controlled independently from the count values with an internal output bit allocated to the HSC.
OUT1	Deceleration – If the optional HSC RUN mode is active, this output turns on when the current count equals the deceleration value. It is reset when HSC RUN mode is exited and re-entered, or when an internal output bit allocated to the HSC is enabled.
OUT2	Brake – If the optional HSC RUN mode is active, this output turns on when the current count equals the preset value. It is reset when HSC RUN mode is exited and re-entered, or when an internal output bit allocated to the HSC is enabled.

Internal Interface Signals from DL405 CPU to D4-HSC
Reset OUT 1 and OUT 2
Reset Overflow
Load Offset to Counter
Enabled HSC RUN
Enable CCW
Enable OUT2
Enable CW
Enable OUT1
Inhibit Counting
Latch Current Count
Reset Current Count
Select count Mode
Change Count Direction
Enable Home Search
Enable x2 Operation
Enable x4 Operation
Select Reset Operation
Enable Sampling
Copy Offset
Reset CW, CCW
Reset Home Search Error
Enable Reset with INZ
Enable OUT2 after Home Search

Internal Interface Signals from D4-HSC to DL405 CPU
Current Count > Preset Value
Current Count = Preset Value
Current Count < Preset Value
Count Overflow
CCW Status
OUT2 Status
CW Status
OUT1 Status
LS2 Status
LS1 Status
Home Search Executing
Sampling Executing
Missing Terminal Block
External Power Supply Failure
Internal HSC Error

Check the Power Budget

Verify your power budget requirements

Your I/O configuration choice can be affected by the power requirements of the I/O modules you choose. When determining the types and quantity of I/O modules you will be using, it is important to remember there is a limited amount of power available from the power supply.

The chart on the opposite page indicates the power supplied and used by each DL405 device. The adjacent chart shows an example of how to calculate the power used by your particular system. These two charts should make it easy for you to determine if the devices you have chosen fit within the power budget of your system configuration.

If the I/O you have chosen exceeds the maximum power available from the power supply, you can resolve the problem by shifting some of the modules to an expansion base or remote I/O base (if you are using remote I/O).

Warning: It is extremely important to calculate the power budget correctly. If you exceed the power budget, the system may operate in an unpredictable manner which may result in a risk of personal injury or equipment damage.

Use ZIPLinks to reduce power requirements

If your application requires a lot of relay outputs, consider using the ZipLink AC or DC relay output modules. These modules can switch high current (10A) loads without putting a load on your base power budget. Refer to Wiring System for DL405 PLCs later in this section for more information.

This logo is placed next to I/O modules that are supported by the ZIPLink connection systems.

See the I/O module specifications at the end of this section.



Calculating your power usage

The following example shows how to calculate the power budget for the DL405 system. The example is constructed around a single 8-slot base using the devices shown. It is recommended you construct a similar table for each base in your system.

A			
<i>Base Number</i>	<i>Device Type</i>	<i>5 VDC (mA)</i>	<i>External 24 VDC Power (mA)</i>
0			
B CURRENT SUPPLIED			
<i>CPU/Expansion Unit /Remote Slave</i>	D4-440 CPU	3700	400
C CURRENT REQUIRED			
<i>SLOT 0</i>	D4-16ND2	+150	+0
<i>SLOT 1</i>	D4-16ND2	+150	+0
<i>SLOT 2</i>	F4-04DA	+120	+100
<i>SLOT 3</i>	D4-08ND3S	+100	+0
<i>SLOT 4</i>	D4-08ND3S	+100	+0
<i>SLOT 5</i>	D4-16TD2	+100	+0
<i>SLOT 6</i>	D4-16TD2	+100	+0
<i>SLOT 7</i>	D4-16TR	+1000	+0
D OTHER			
<i>BASE</i>	D4-08B-1	+80	+0
<i>Handheld Programmer</i>	D4-HPP-1	+320	+0
E Maximum Current Required		2820	100
F Remaining Current Available		3700-2820=880	400-100=300
1. Using a chart similar to the one above, fill in column 2. 2. Using the tables on the opposite page, enter the current supplied and used by each device (columns 3 and 4). Pay special attention to the current supplied by the CPU, Expansion Unit, and Remote Slave since they differ. Devices which fall into the "Other" category (Row D) are devices such as the Base and the Handheld programmer, which also have power requirements, but do not plug directly into the base. 3. Add the current used by the system devices (columns 3 and 4) starting with Slot 0 and put the total in the row labeled "maximum current required" (Row E). 4. Subtract the row labeled "Maximum current required" (Row E), from the row labeled "Current Supplied" (Row B). Place the difference in the row labeled "Remaining Current Available" (Row F). 5. If "Maximum Current Required" is greater than "Current Supplied" in either column 3 or 4, the power budget will be exceeded. It will be unsafe to use this configuration and you will need to restructure your I/O configuration. Note the auxiliary 24 VDC power supply does not need to supply all the external power. If you need more than the 400mA supplied, you can add an external 24VDC power supply. This will help keep you within your power budget for external power.			

DL405 CPU power supply specifications and power requirements

Specification	AC Powered Units	24 VDC Powered Units	125 VDC Powered Units
Part Numbers	D4-454, D4-450, D4-440, D4-430, D4-EX (expansion base unit), D4-RS (remote slave unit)	D4-454DC-1, D4-450DC-1, D4-440DC-1, D4-EXDC (expansion base unit), D4-RSDC (remote slave unit)	D4-450DC-2
Voltage Withstand (dielectric)	1 minute @ 1,500 VAC between primary, secondary, field ground, and run relay		
Insulation Resistance	> 10MΩ at 500VDC		
Input Voltage Range	85-132 VAC (110 range) 170-264 VAC (220 range)	20-28 VDC (24 VDC) with less than 10% ripple	90-146 VDC (125 VDC) with less than 10% ripple
Maximum Inrush Current	20 A	20 A	20 A
Maximum Power	50 VA	38 W	30 W

Power Requirements

Power Supplied					
<i>CPUs/Remote Units/ Expansion Units</i>	<i>5 VDC Current Supplied in mA</i>	<i>24V Aux Power Supplied in mA</i>	<i>CPUs/Remote Units/ Expansion Units</i>	<i>5V Current Supplied in mA</i>	<i>24V Aux Power Supplied in mA</i>
D4-430 CPU	3700	400	D4-EX	4000	400
D4-440 CPU	3700	400	D4-EXDC	4000	NONE
D4-440DC-1 CPU	3700	NONE	D4-RS	3700	400
D4-450 CPU	3700	400	D4-RSDC	3700	NONE
D4-454 CPU	3100	400	H4-EBC	3470	400
D4-450DC-1 CPU	3100	NONE	H4-EBC-F	3300	400
D4-450DC-2 CPU	3100	NONE			
D4-454DC-1	3100	NONE			
Power Consumed					
<i>Power-consuming Device</i>	<i>5V Current Consumed</i>	<i>External 24VDC Current Required</i>	<i>Power-consuming Device</i>	<i>5V Current Consumed</i>	<i>External 24VDC Current Required</i>
<i>I/O Bases</i>			<i>Analog Modules (continued)</i>		
D4-04B-1	80	NONE	F4-16AD-1	75	100
D4-06B-1	80	NONE	F4-16AD-2	75	100
D4-08B-1	80	NONE	F4-04DA-1	70	75+20per circuit
			F4-04DA-2	90	90
			F4-04DAS-1	60	60 per circuit
			F4-04DAS-2	60	60 per circuit
			F4-08DA-1	90	100+20 per circuit
			F4-08DA-2	80	150
			F4-16DA-1	90	100+20 per circuit
			F4-16DA-2	80	25 max.
			F4-08RTD	80	NONE
			F4-08THM-n	120	50
			F4-08THM	110	60
<i>DC Input Modules</i>			<i>Remote I/O</i>		
D4-08ND3S	100	NONE	H4-ERM100	320(300)	NONE
D4-16ND2	150	NONE	H4-ERM-F	450	NONE
D4-16ND2F	150	NONE	D4-RM	300	NONE
D4-32ND3-1	150	NONE			
D4-64ND2	300 max.	NONE			
<i>AC Input Modules</i>			<i>Communications and Networking</i>		
D4-08NA	100	NONE	H4-ECOM100	300	NONE
D4-16NA	150	NONE	H4-ECOM-F	670	NONE
			D4-DCM	500	NONE
			F4-MAS-MB	235	NONE
			FA-UNICON	NONE	65
<i>AC/DC Input Modules</i>			<i>CoProcessors</i>		
D4-16NE3	150	NONE	F4-CP128-1	305	NONE
F4-08NE3S	90	NONE	F4-CP128-T	350	NONE
<i>DC Output Modules</i>			<i>Specialty Modules</i>		
F4-08TD1S	295	NONE	H4-CTRIO	400	NONE
D4-16TD1	200	125	D4-INT	100	NONE
D4-16TD2	400	NONE	D4-HSC	300	NONE
D4-32TD1	250	140	F4-16PID	160	NONE
D4-32TD1-1	250	140 (15V)	F4-8MPI	225	170
D4-32TD2	350	120 (4A max including loads)	D4-16SIM	150	NONE
D4-64TD1	800	NONE	F4-4LTC	280	75
<i>AC Output Modules</i>			<i>Programming</i>		
D4-08TA	250	NONE	D4-HPP-1 (Handheld Prog.)	320	NONE
D4-16TA	450	NONE			
<i>Relay Output Modules</i>			<i>Operator Interface</i>		
D4-08TR	550	NONE	DV-1000	150	NONE
F4-08TRS-1	575	NONE			
F4-08TRS-2	575	NONE	C-more Micro-Graphic	210	NONE
D4-16TR	1000	NONE			
<i>Analog Modules</i>					
F4-04AD	150	100			
F4-04ADS	370	120			
F4-08AD	75	90			