CONTINENTAL HYDRAULICS™

engineering in motion

DUPLOMATiC
MOTION SOLUTIONS

Solenoid Operated Valve With On Board Electronics And IO-Link Interface

Start-up Manual

Index

GENERAL INFO

This document is valid for on-off valves with on board electronics. Appendix contains information about IO-Link interface.

Should you have any questions concerning valves, please contact Continental Hydraulics or Duplomatic MS S.p.A., indicating the description, the code and the serial number written on the label on case side.

For installation, start-up, commissioning and maintenance use only skilled workers and materials fit for purpose, as recommended.

Before installation read this file and follow strictly what is indicated.

Continental / Duplomatic MS disclaims any liability for damage to person or property resulting from noncompliance of rules and instructions here declared, from misuse or incorrect use or from tampering of provided valves.

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Led description

VSD03L / DS3GL valves are equipped with two leds **L1** and **L2**
The functionality of the LED is accordingly to table below:

IO-Link Interface			
Led	Colour	On	Flashing
L1	Green	--	Device linked to Master
	Red	Device Disconnected	Device Powered, not connected to Master
L2	Green	Valve Ready	--
	Red	Error	--

| Digital Interface EC*		
Led	Colour	On
L1	Green	Coil A energized
	Red	Coil A error
L2	Green	Coil B energized
	Red	Coil B error

Parameter Description

The IO-Link version is able to apply the behaviours showed for EC, ECF, ECL and ECG because the function behaviour is set via bus. The ECG feature is effective only with proportional spools designed for ECG function, refer to catalogs.
As follow a brief description of the versions mentioned valid both for IO-Link as well for EC versions.

EC1/EC2 versions allows to control the solenoid with a low power signal from the PLC. The IO-Link mode that correspond to these versions is Normal.
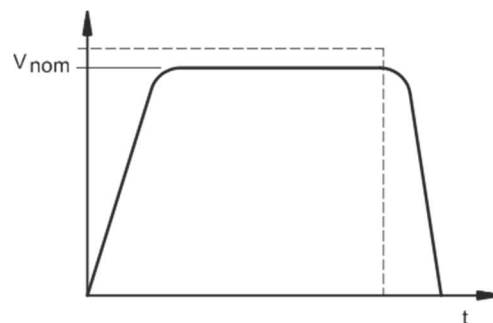

ECL This version allows to feed the solenoid at the nominal current value for a time sufficient to guarantee the complete valve energizing (200 ms). The current is therefore automatically reduced at holding (approx 60%). The IO-Link mode that correspond to these versions is ECO, it is possible to set the hold current percentage of the nominal current by parameter ONOFF_ECO, and set the power on time by parameter ONOFF_TECO
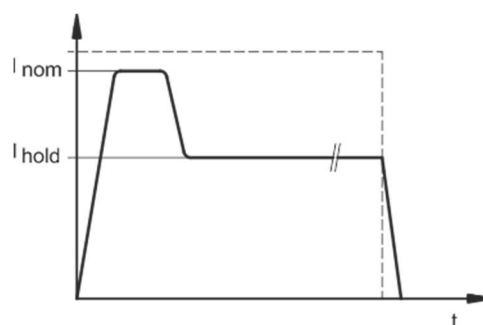

ECF This version allows a fast switching, over boosting the 12 V solenoid just for the time needed to energize it. Then, the voltage will be lowered at the nominal value. The de-energizing is fast, around 10 ms. At over boosting time, the power-supply unit must be able to provide a 6 A current with 24 V supply voltage.

The IO-Link mode that correspond to these versions is FAST, it is possible to set the current percent increment added to the nominal current value by parameter ONOFF_BOOST, and set the boost time by parameter ONOFF_TBOOST
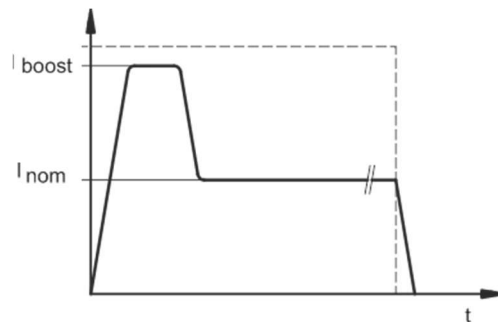
ECG This version enables hydraulic actuators to perform a smooth start and stop by setting times values (200 - 600 ms) for ramp up and ramp down. See available spools in the catalog Variables should be used in IO-Link are ONOFF_TON and OFFON_TOFF.
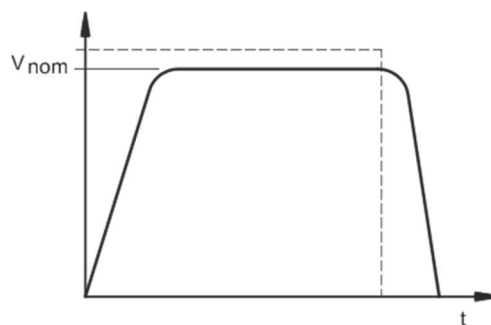
APPENDIX 1: I/O Link Communication Interface

This appendix is valid for the following products:

- ON-OFF directional control valves
- ON-OFF pressure control valves

The parametrization of the valve has to be done using the Master IO-Link tool according to the IO-Link specification. Typical Master IO-link devices are power strip, remote or main PLC.

Parameter Description

Process Data Input PDI

Process Data Input PDI are sent from valve to process Master IO-link devices through Fieldbus.

Total Process Data Input length is 2 octets (16 Bits) according to table below:

Bit Offset	SubIndex	Bit Length	Description		Data Type	Value Range	Description
			ON-Off 1-Solenoid	On-Off 2-solenoids			
0	1	1	Coil 1 state	Coil 1 state	BooleanT	0 = disabled 1 = enabled	Coil 1 enabled
1	2	1	-	Coil 2 state	BooleanT	0 = disabled 1 = enabled	Coil 2 enabled
4	3	1			BooleanT		Reserved for future use
5	4	1			BooleanT		Reserved for future use
8	5	1	Error 1	Error 1	BooleanT	0 = No Error 1 = Error	Valve 1 error
9	6	1	-	Error 2	BooleanT	0 = No Error 1 = Error	Valve 2 error
10	7	2	Mode	Mode	UIntegerT	00 Normal 01 Fast 10 Eco 11 Smooth	Current mode
12	8	1			BooleanT		Reserved for future use
13	9	1			BooleanT		Reserved for future use
14	10	1	Warning 1	Warning 1	BooleanT	0 = No error 1 = error	Valve 1 warning
15	11	1	-	Warning 2	BooleanT	0 = No error 1 = error	Valve 2 warning

Process Data Output PDO

Total Process Data Input length is 2 octets (16 bits) according to table below:

Bit Offset	SubIndex	Bit Length	Description		Data Type	Value Range	Description
			ON-Off 1-Solenoid	On-Off 2-solenoids			
0	1	1	Coil 1 command	Coil 1 command	BooleanT	0 = enabled 1 = disabled	Coil 1 enabled
1	2	1	-	Coil 2 command	BooleanT	0 = enabled 1 = disabled	Coil 2 enabled
10	3	2	Mode	Mode selection	UintegerT	00 Normal 01 Fast 10 Eco 11 Smooth	Mode setting

Variables

Variable Names (i)	Alias	Menu	Index	length	Access policy	Description	Value range (min, max) And Default value	On-Off 1- Solenoid	On-Off 2- Solenoid
V_RequestFlags	-	Parameter-Configuration	80	16	rw	Bitfield, can be written to request some tasks: 0 -> Inactive 1 -> Update configuration 2 -> Save configuration to EEprom	--	X	X
V_Temperature	TEMPERATURE	Diagnosis	81	16	ro	H-Bridge (power stage) temperature [°C]	0, 150	X	X
V_CtrlStageVoltage	Ctrl_Voltage	Diagnosis	82	16	ro	Voltage of the board control stage	0, 50	X	X
V_PowerStageVoltage	Pwr_Voltage	Diagnosis	83	16	Ro	Voltage of the board power stage	0, 50	X	X
V_Sol1Current	CURRENT_A	Diagnosis	84	16	ro	Current on the solenoid A	0, 7000	X	X
V_Sol2Current	CURRENT_B	Diagnosis	85	16	ro	Current on the solenoid B	0, 7000	X	X
V_Hours_powered	HOURS_POWERED	Diagnosis	86	32	ro	Hours device ON Hours since device is powered ON	0, 10000000	X	X
V_Hours_Sol1_On	HOURS_SOL1_ON	Diagnosis	87	32	ro	Hours Coil 1 ON Hours since Coil1 is powered ON	0, 10000000	X	X
V_Hours_Sol2_On	HOURS_SOL2_ON	Diagnosis	88	32	ro	Hours Coil 2 ON Hours since Coil2 is powered ON	0, 10000000	--	X
V_OnOffMode	ONOFF_MODE	Parameter-Valve Parameter	89	16	rw	Mode 0 = Normal 1 = Fast 2 = Eco 3 = Smooth * 4 = Set by control word Device working mode, operating modes are mutually exclusive	Default according to code order	X	X
V_OnOffTon	ONOFF_TON	Parameter-Valve Parameter	90	16	rw	Time on [ms] Power on time for each coil, used only in smooth mode	0, 1000 Default 500	X	X
V_OnOffToff	ONOFF_TOFF	Parameter-Valve Parameter	91	16	rw	Time off [ms] Power off time for each coil, used only in smooth mode	0, 1000 Default 500	X	X
V_OnOffTboost	ONOFF_TBOOST	Parameter-Valve Parameter	92	16	rw	Time Boost [ms] Boost time, used only in boost mode	0, 400 Default 300	X	X
V_ONOffBoost	ONOFF_BOOST	Parameter-Valve Parameter	93	16	rw	Boost Value [%] Current percent increment added to the nominal current value, used only in boost mode	100, 200 Default 150	X	X
V_OnOff_Teco	ONOFF_TECO	Parameter-Valve Parameter	94	16	rw	Time Eco [ms] Power on time for each coil, used only in eco mode	0, 2000 Default 2000	X	X
V_OnOff_eco	ONOFF_ECO	Parameter-Valve Parameter	95	16	rw	Eco Value [%] Hold current, percentage of nominal Current used in eco mode	60, 100 Default 80	X	X
V_Coil_voltage_nom	-	Observation	96	8	ro	Coil nominal Voltage Coil working nominal voltage	12,24 Default according to code order	X	X
V_Coil_current_nom	-	Observation	97	16	ro	Coil nominal current Coil working nominal current	0,7000 Default according to code order	X	X
V_Coil_resistance_nom	-	Observation	98	16	ro	Coil resistance Coil nominal resistance	0, 100 Default according to code order	X	X

Note (i)
Any change to the variable, if permitted, becomes operative only after requesting a configuration update through the '**RequestFlags'** register

Note (*)
The smooth feature is effective only with proportional spools designed for ECG function, refer to catalog