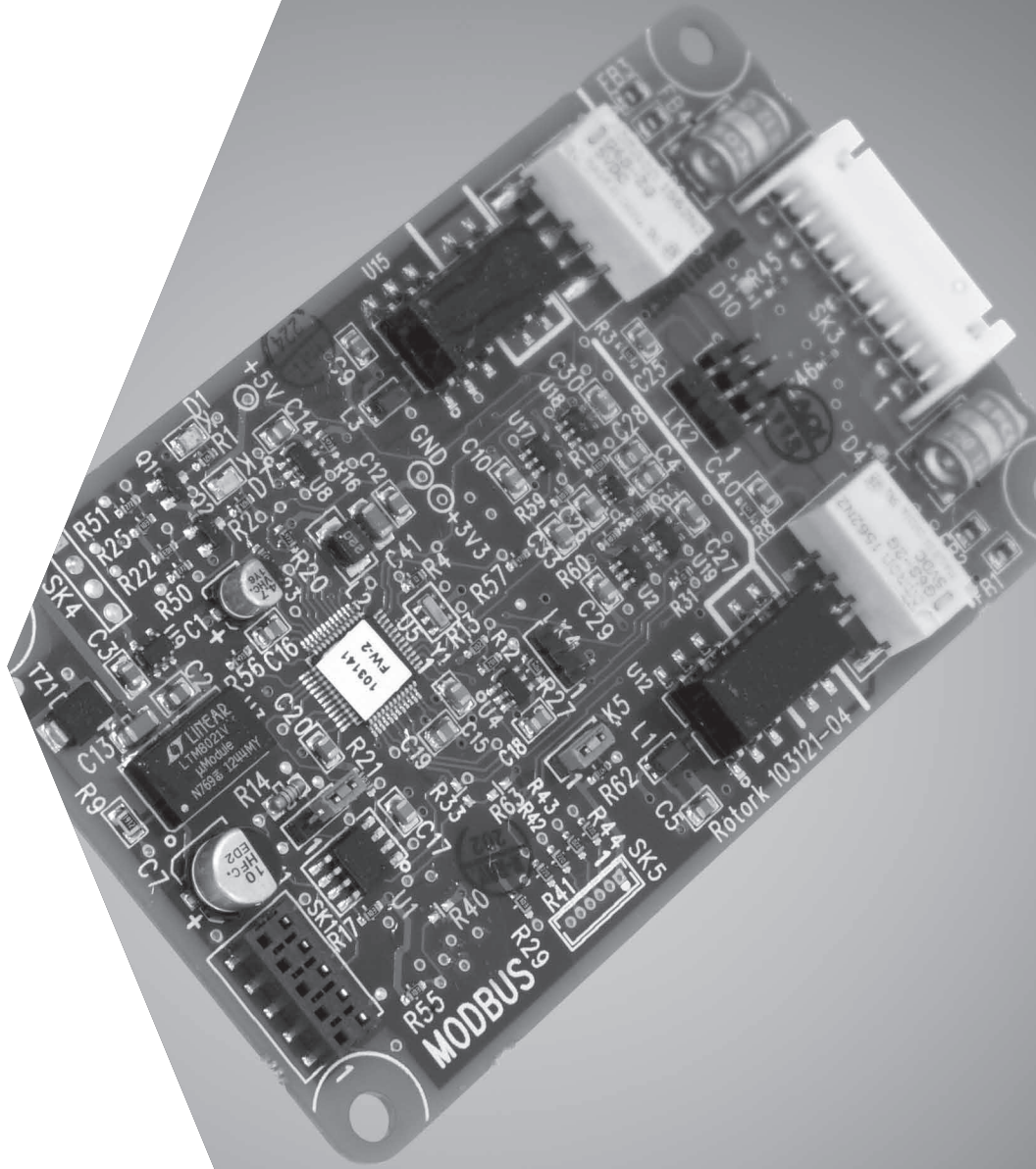


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for Future Generations



Modbus Custom Database A

Startup guide

Technical manual appendix

Modbus[®]

The information in this database appendix document should be read and applied in conjunction with information contained in the Rotork Modbus mk3 Technical Manual (PUB111-013).

Modbus Custom Database A1 is an alternative to the standard Modbus database for applications that require different data mapping. The database described in this manual is only applicable for applications where Modbus Custom Database A1 is selected for use. This database is only applicable to Modbus cards with firmware version V104 or higher.

Parameter	R/W	Function code	Address register/bit	Details
Open valve	Write	05, 15	Bit 0	Coil write, Coil readback using Function code 01, readback value is 01.
Close valve	Write	05, 15	Bit 1	Coil write, Coil readback using Function code 01, readback value is 01.
Fieldbus Setpoint*	Write	05, 15	Bit 2	Coil write, Coil readback using Function code 01, readback value is 01.
Fieldbus reset	Write	05, 15	Bit 3	Coil write, Coil readback using Function code 01, readback value is 01.
Fieldbus enable local	Write	05, 15	Bit 32	Coil write, Coil readback using Function code 01, readback value is 01.
Fieldbus enable Open	Write	05, 15	Bit 33	Coil write, Coil readback using Function code 01, readback value is 01.
Fieldbus enable Close	Write	05, 15	Bit 34	Coil write, Coil readback using Function code 01, readback value is 01.
Field bus channel 1	Write	05, 15	Bit 36	Coil write, Coil readback using Function code 01, readback value is 01.
Field bus channel 2	Write	05, 15	Bit 37	Coil write, Coil readback using Function code 01, readback value is 01.
Emergency Shut Down (ESD)	Write	05, 15	Bit 38	Coil write, Coil readback using Function code 01, readback value is 01.
Partial valve stroke test	Write	05, 15	Bit 39	Coil write, Coil readback using Function code 01, readback value is 01.
Digital Output 1	Write	05, 15	Bit 63	Coil write, Coil readback using Function code 01, readback value is 01.
Digital Output 2	Write	05, 15	Bit 62	Coil write, Coil readback using Function code 01, readback value is 01.
Digital Output 3	Write	05, 15	Bit 61	Coil write, Coil readback using Function code 01, readback value is 01.
Digital Output 4	Write	05, 15	Bit 60	Coil write, Coil readback using Function code 01, readback value is 01.
Digital Output 5	Write	05, 15	Bit 59	Coil write, Coil readback using Function code 01, readback value is 01.
Digital Output 6	Write	05, 15	Bit 58	Coil write, Coil readback using Function code 01, readback value is 01.
Thermostat trip	Read	02	Bit 8	0 – Thermostat OK 1 – Thermostat tripped (Actuator motor temperature too high due to excessive continuous operation, motor stalling or extremely high ambient temperature)
Phase Loss	Read	02	Bit 9	0 – Phase OK 1 – Phase lost (One or more mains power supply phases missing)
Remote selected	Read	02	Bit 10	0 – Remote control mode not selected 1 – Remote control mode selected.
Local selected	Read	02	Bit 11	0 – Local control mode not selected 1 – Local control mode selected.
Valve opened	Read	02	Bit 12	0 – Not at open limit 1 – At open limit.
Valve closed	Read	02	Bit 13	0 – Not at close limit 1 – At close limit.

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Parameter	R/W	Function code	Address register/bit	Details
Torque trip open	Read	02	Bit 14	0 – Torque trip not detected in open direction 1 – Torque trip detected in open direction (Actuator torque is higher than the configured opening torque limit. Does not apply at the end of travel when torque seating is selected)
Torque trip close	Read	02	Bit 15	0 – Torque trip not detected in close direction 1 – Torque trip detected in close direction (Actuator torque is higher than the configured closing torque limit. Does not apply at the end of travel when torque seating is selected)
End p open	Read	02	Bit 0	For Limit seating 0 – Not at open limit, 1 - At open limit. For Torque seating 0 - Not at open limit / Torque, 1 - At open limit / Torque.
End p close	Read	02	Bit 1	For Limit seating 0 – Not at close limit, 1 - At close limit. For Torque seating 0 - Not at close limit / Torque, 1 - At close limit / Torque.
Set Point Reached	Read	02	Bit 2	0 – Moving, moved by Open/Close command, in Local or Stop mode 1 – Set point reached (Remote mode only)
Not ready remote	Read	02	Bit 3	0 – Ready for remote control 1 – Not ready for remote control (Control selector set to Local or Stop mode)
Valve opening	Read	02	Bit 4	0 – Not opening 1 – Opening (Local, remote or hand operation)
Valve closing	Read	02	Bit 5	0 – Not closing 1 – Closing (Local, remote or hand operation)
Warning	Read	02	Bit 6	0 – No Warning. 1 – Collective warnings of the actuator.
Fault	Read	02	Bit 7	0 – No fault 1 – Fault (Monitor Relay indication. One or more of the following conditions is true: actuator is in local or stop mode, thermostat has tripped, mains power phase is lost)
Actuator running	Read	02	Bit 44	0 - Actuator is in idle. 1 - Actuator is in running.
Handwheel operation	Read	02	Bit 45	0 - Actuator is in idle. 1 - Actuator is operated without electric operation command.
DIN1	Read	02	Bit 56	0 - No Signal present at Digital input 1. 1 - +24VDC Signal present at Digital input 1.
DIN2	Read	02	Bit 57	0 - No Signal present at Digital input 2. 1 - +24VDC Signal present at Digital input 2.
DIN3	Read	02	Bit 58	0 - No Signal present at Digital input 3. 1 - +24VDC Signal present at Digital input 3.
DIN4	Read	02	Bit 59	0 - No Signal present at Digital input 4. 1 - +24VDC Signal present at Digital input 4.
DIN5	Read	02	Bit 60	0 - No Signal present at Digital input 5. 1 - +24VDC Signal present at Digital input 5.
DIN6	Read	02	Bit 61	0 - No Signal present at Digital input 6. 1 - +24VDC Signal present at Digital input 6.
Interlock Bypass	Read	02	Bit 108	0 - No By-pass of interlock function is active. 1 - By-pass of Interlock function is active
Interlock Active	Read	02	Bit 98	0 - Actuator is not interlocked. 1 - Actuator is interlocked.
Handwheel active	Read	02	Bit 227, 111	0 - No manual operation is active. 1 - Manual operation is active (handwheel is engaged)
Channel 1 active	Read	02	Bit 240	0 - No Signal. 1 - Channel 1 is the active operation command channel.
Channel 2 active	Read	02	Bit 241	0 - No Signal. 1 - Channel 2 is the active operation command channel.
Channel 1 Data EX	Read	02	Bit 242	0 - No Signal. 1 - Channel 1 is in the data exchange state.
Channel 2 Data EX	Read	02	Bit 243	0 - No Signal. 1 - Channel 2 is in the data exchange state.
Channel 1 fail state	Read	02	Bit 244	0 - No Signal. 1 - No valid fieldbus communication via channel 1 (application does not communicate with the DCS).
Channel 2 fail state	Read	02	Bit 245	0 - No Signal. 1 - No valid fieldbus communication via channel 2 (application does not communicate with the DCS)

Parameter	R/W	Function code	Address register/bit	Details
Channel 1 activity	Read	02	Bit 246	0 - No Signal. 1 - Bus communication available on channel 1.
Channel 2 activity	Read	02	Bit 247	0 - No Signal. 1 - Bus communication available on channel 2.
Thermostat trip	Read	04	1000 / Bit 0	0 – Thermostat OK 1 – Thermostat tripped (Actuator motor temperature too high due to excessive continuous operation, motor stalling or extremely high ambient temperature)
Phase Loss	Read	04	1000 / Bit 1	0 – Phase OK 1 – Phase lost (One or more mains power supply phases missing)
Remote selected	Read	04	1000 / Bit 2	0 – Remote control mode not selected 1 – Remote control mode selected
Local selected	Read	04	1000 / Bit 3	0 – Local control mode not selected 1 – Local control mode selected
Valve opened	Read	04	1000 / Bit 4	0 – Not at open limit 1 – At open limit
Valve closed	Read	04	1000 / Bit 5	0 – Not at close limit 1 – At close limit
Torque trip open	Read	04	1000 / Bit 6	0 – Torque trip not detected in open direction 1 – Torque trip detected in open direction (Actuator torque is higher than the configured opening torque limit. Does not apply at the end of travel when torque seating is selected)
Torque trip close	Read	04	1000 / Bit 7	0 – Torque trip not detected in close direction 1 – Torque trip detected in close direction (Actuator torque is higher than the configured closing torque limit. Does not apply at the end of travel when torque seating is selected)
End p open	Read	04	1000 / Bit 8	0 – Torque trip not detected in open direction 1 – Torque trip detected in open direction (Actuator torque is higher than the configured opening torque limit. Does not apply at the end of travel when torque seating is selected)
End p close	Read	04	1000 / Bit 9	0 – Torque trip not detected in close direction 1 – Torque trip detected in close direction (Actuator torque is higher than the configured closing torque limit. Does not apply at the end of travel when torque seating is selected)
Set Point Reached	Read	04	1000 / Bit 10	0 – Moving, moved by Open/Close command, in Local or Stop mode 1 – Set point reached (Remote mode only)
Not ready remote	Read	04	1000 / Bit 11	0 – Ready for remote control 1 – Not ready for remote control (Control selector set to Local or Stop mode)
Valve opening	Read	04	1000 / Bit 12	0 – Not opening 1 – Opening (Local, remote or hand operation)
Valve closing	Read	04	1000 / Bit 13	0 – Not closing 1 – Closing (Local, remote or hand operation)
Warning	Read	04	1000 / Bit 14	0 – No Warning. 1 – Collective warnings of the actuator.
Fault	Read	04	1000 / Bit 15	0 – No fault 1 – Fault (Monitor Relay indication. One or more of the following conditions is true: actuator is in local or stop mode, thermostat has tripped, mains power phase is lost)
Position of valve % (0-1000)	Read	04	1001	Valve position: Data returned as a value 0 – 1000 representing 0.0% to 100.0%, 0x0000 to 0x03E8
Actuator running	Read	04	1002 / Bit 4	0 - Actuator is in idle. 1 - Actuator is in running.
Handwheel operation	Read	04	1002 / Bit 5	0 - Actuator is in idle. 1 - Actuator is operated without electric operation command.
DIN1	Read	04	1003 / Bit 0	0 - No Signal present at Digital input 1. 1 - +24VDC Signal present at Digital input 1.
DIN2	Read	04	1003 / Bit 1	0 - No Signal present at Digital input 2. 1 - +24VDC Signal present at Digital input 2.
DIN3	Read	04	1003 / Bit 2	0 - No Signal present at Digital input 3. 1 - +24VDC Signal present at Digital input 3.
DIN4	Read	04	1003 / Bit 3	0 - No Signal present at Digital input 4. 1 - +24VDC Signal present at Digital input 4.

Parameter	R/W	Function code	Address register/bit	Details
DIN5	Read	04	1003 / Bit 4	0 - No Signal present at Digital input 5. 1 - +24VDC Signal present at Digital input 5.
DIN6	Read	04	1003 / Bit 5	0 - No Signal present at Digital input 6. 1 - +24VDC Signal present at Digital input 6.
AIN1	Read	04	1004	Analog Input 1: Data returned as a value 0 – 1000 representing 0.0% to 100.0%, 0x0000 to 0x03E8
Torque	Read	04	1005	Valve Torque: Data returned as a value 0 – 1000 representing 0.0% to 100.0%, 0x0000 to 0x03E8
Interlock Bypass	Read	04	1006 / Bit 4	0 - No By-pass of interlock function is active. 1 - By-pass of Interlock function is active
Interlock Active	Read	04	1006 / Bit 10	0 - Actuator is not interlocked. 1 - Actuator is interlocked.
AIN2	Read	04	1010	Analog Input 2: Data returned as a value 0 – 1000 representing 0.0% to 100.0%, 0x0000 to 0x03E8
Handwheel active	Read	04	1014 / Bit 11	0 - No manual operation is active. 1 - Manual operation is active (handwheel is engaged)
Channel 1 active	Read	04	1015 / Bit 8	0 - No Signal. 1 - Channel 1 is the active operation command channel.
Channel 2 active	Read	04	1015 / Bit 9	0 - No Signal. 1 - Channel 2 is the active operation command channel.
Channel 1 Data EX	Read	04	1015 / Bit 10	0 - No Signal. 1 - Channel 1 is in the data exchange state.
Channel 2 Data EX	Read	04	1015 / Bit 11	0 - No Signal. 1 - Channel 2 is in the data exchange state.
Channel 1 fail state	Read	04	1015 / Bit 12	0 - No Signal. 1 - No valid fieldbus communication via channel 1 (application does not communicate with the DCS).
Channel 2 fail state	Read	04	1015 / Bit 13	0 - No Signal. 1 - No valid fieldbus communication via channel 2 (application does not communicate with the DCS)
Channel 1 activity	Read	04	1015 / Bit 14	0 - No Signal. 1 - Bus communication available on channel 1.
Channel 2 activity	Read	04	1015 / Bit 15	0 - No Signal. 1 - Bus communication available on channel 2.
Open valve	Write	06, 16	1000 / bit 8	Register bit write operation command in direction OPEN
Close valve	Write	06, 16	1000 / bit 9	Register bit write operation command in direction CLOSE
Position control enabled*	Write	06, 16	1000 / bit 10	Register bit write run to set point.
Fieldbus reset	Write	06, 16	1000 / bit 11	Register bit write. Clears Open, Close and Position Enable bits.
Fieldbus enable local	Write	06, 16	1002 / bit 8	Register bit write command to enable/disable Local control.
Fieldbus enable Open	Write	06, 16	1002 / bit 9	Register bit write for enabling operation command in direction OPEN.
Fieldbus enable Close	Write	06, 16	1002 / bit 10	Register bit write for enabling operation command in direction CLOSE.
Field bus channel 1	Write	06, 16	1002 / bit 12	Register bit write Initiate change-over to channel 1. Write 0x4000 to send an ESD command
Field bus channel 2	Write	06, 16	1002 / bit 13	Register bit write Initiate change-over to channel 2. Write 0x4000 to send an ESD command
Emergency Shut Down (ESD)	Write	06, 16	1002 / bit 14	Register bit write ESD command. Write 0x4000 to send an ESD command
Partial valve stroke test	Write	06, 16	1002 / bit 15	Register bit write PST command. Write 0x8000 to send a partial stroke command

Parameter	R/W	Function code	Address register/bit	Details
Position % (0-1000)	Write	06, 16	1001	Valve set point position command Data written as a value 0 – 1000 representing 0.0% to 100.0%, 0x0000 to 0x03E8
Digital Output 1	Write	06, 16	1003 / bit 0	Register bit write digital output 1.
Digital Output 2	Write	06, 16	1003 / bit 1	Register bit write digital output 2.
Digital Output 3	Write	06, 16	1003 / bit 2	Register bit write digital output 3.
Digital Output 4	Write	06, 16	1003 / bit 3	Register bit write digital output 4.
Digital Output 5	Write	06, 16	1003 / bit 4	Register bit write digital output 5.
Digital Output 6	Write	06, 16	1003 / bit 5	Register bit write digital output 6.
CH1 Analogue Input Max/Min	Write	03, 06	20	CH1 Min - 02, Max - 01 Function code 03 for read
CH2 Analogue Input Max/Min	Write	03, 06	20	CH2 Min - 04, Max - 03 Function code 03 for read
Redundancy	Write	03, 06	81	0 - Redundancy 1, 1 - Redundancy 2 Function code 03 for read
Diagnostics	Read	08		00 00 Loopback 00 10 (0AHex) Clear Counters and Diagnostic Register 00 11 (0BHex) Return Bus Message Count 00 12 (0CHex) Return Bus Communication Error Count 00 13 (0DHex) Return Bus Exception Error Count 00 14 (0EHex) Return Slave Message Count 00 15 (0FHex) Return Slave No Response Count 00 16 (10Hex) Return Slave NAK Count 00 17 (11Hex) Return Slave Busy Count 00 18 (12Hex) Return Character Overrun Count
Report Slave ID	Read	17		Byte 1: Slave Address Byte 2: 0x11 (Function Code) Byte 3: Byte Count = 97 Byte 4: 0x01 (Ident Code) Byte 5: 0x00 = Not ready REMOTE, 0xFF = Ready REMOTE from byte 6 (vendor, 18 bytes): Rotork controls from byte 24 (actuator controls order number, 18 bytes) from byte 42 (firmware version, 13-byte ASCII string) from byte 55 (device tag, 20-byte ASCII string) from byte 75 (actuator controls serial number, 13-byte ASCII string) from byte 88 (actuator controls serial number, 13-byte ASCII string)*

* When 1000 / bit 2 is set, 1000 / bit 0 and 1000 / bit 1 are ignored.

FC04 matches data from FC03 with a read offset of 32 (decimal), i.e. the registers start at 1032 (decimal). FC06 and FC16 commands can be read with FC03 at the same data base points.

Data from FC03 and FC04 register reads is returned in "little endian format", i.e. low byte first and high byte second, rather than the standard register format of high byte first and low byte second.

FC06 and FC16 commands must remain energised for the duration of the action. De-energising during movement will cause the actuator to stop.

Data locations not present in this table will read zero and the data is invalid.

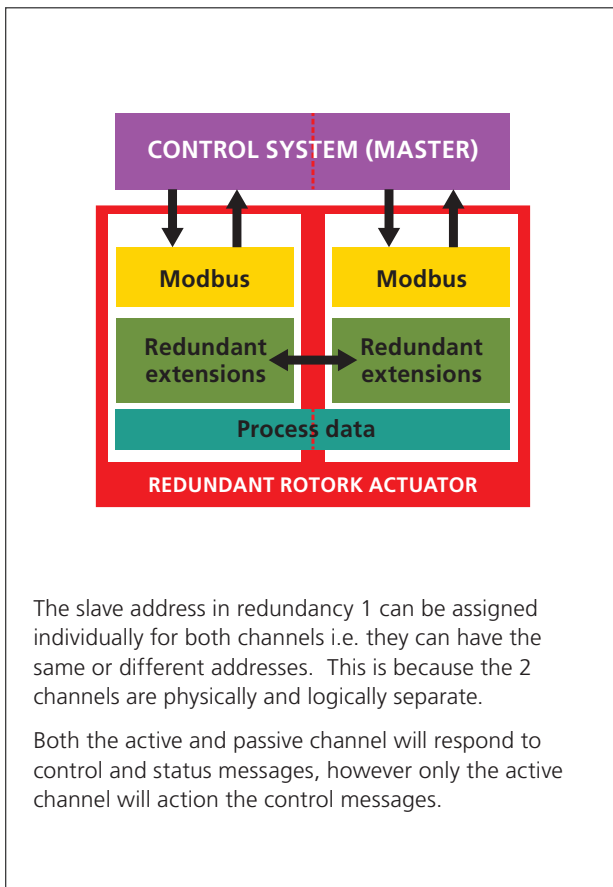
Channel 1 and 2 Baud Rate, Parity and Termination can be individually configured via HMI and Insight 2 software.

Redundancy can be individually configured via HMI and Insight 2 software.

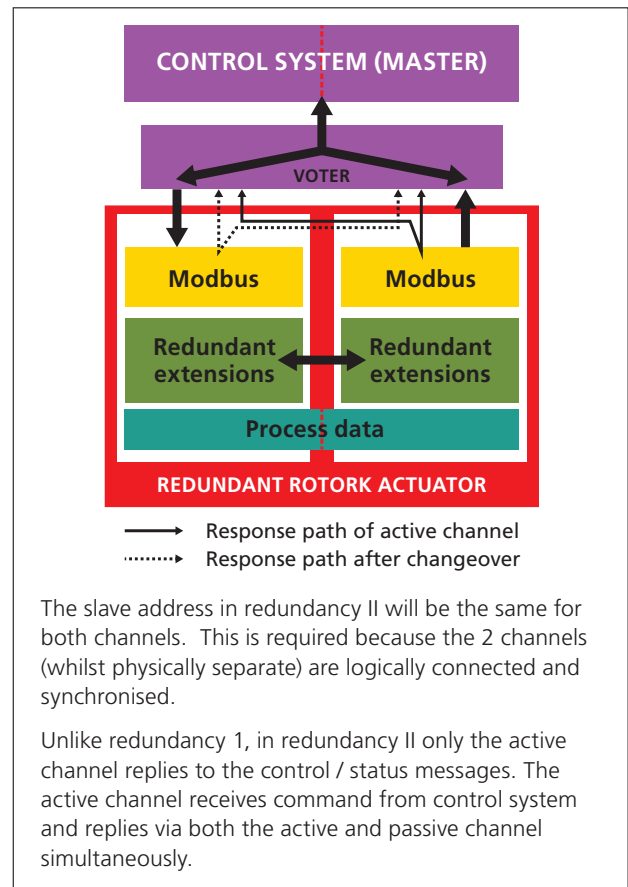
Diagnostics counter will not be rolled over after reaching its limit 65535(Maximum value). Clear the counters using clear command via modbus register.

Within the limits of above registers, the unused registers will get 00 response and out of range registers will get exception response.

Modbus Redundancy I



Modbus Redundancy II



The communication channel which first exchanges process data with the controls is the active channel; the second channel will automatically become the passive channel. The actuator can only be controlled via the active channel.

The control system may change over the active channel if neither channel signal a fault state and are in communication with control system (FC04 1014, bits 10/11).

Change over, via the control system, can be initiated using either the active or passive channel. An automatic switchover to the alternate channel is initiated when communication on the active channel fails and the Passive Channel Activity bit (FC04 1014, bits 10/11) is set.

No loss of data will be experienced during the changeover.

FC04 1015 register referenced below shows the operational status of the communication via the DCS:

Bit	Name	Value	Description
8	Channel 1 active	1	Channel 1 is the active mode.
		0	Channel 1 is the passive mode.
9	Channel 2 active	1	Channel 2 is the active mode.
		0	Channel 2 is the passive mode.
10	Channel 1 Data Process	1	Channel 1 valid data exchange process.
		0	Channel 1 no valid data exchange process.
11	Channel 2 Data Process	1	Channel 2 valid data exchange process.
		0	Channel 2 no valid data exchange process.
12	Channel 1 Fail state	1	Fault detected on channel 1.
		0	No Fault detected on channel 1.
13	Channel 2 Fail state	1	Fault detected on channel 2.
		0	No Fault detected on channel 2.
14	Channel 1 activity	1	Bus Communication active on the channel 1.
		0	No activity on channel 1.
15	Channel 2 activity	1	Bus Communication active on the channel 2.
		0	No activity on channel 2.

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