

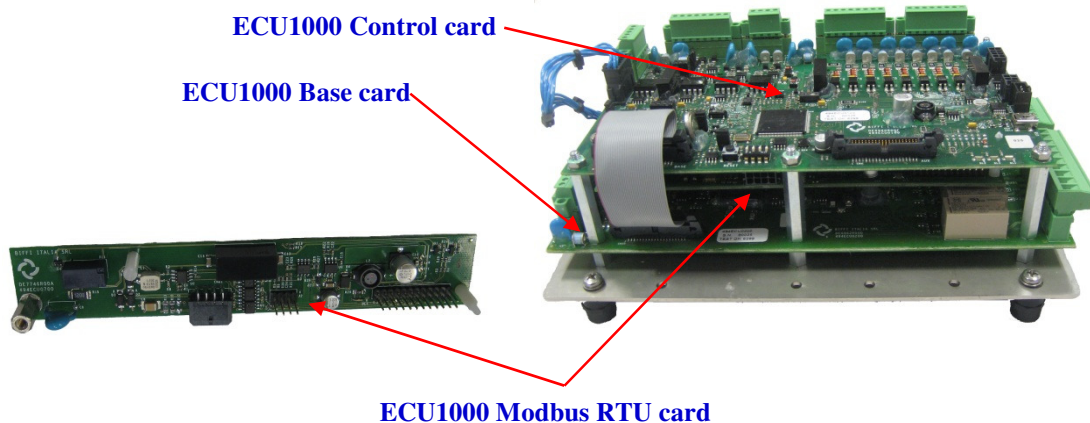
DTDE 332



ECU 1000

MODBUS RTU/RS485

INSTRUCTION MANUAL








ECU 1000 Modbus RTU

REV.	DATE	PREPARED	APPROVED	NOTES
0	25/02/2014	M. Giuliani	A. Affaticati	Issue
1	08/08/2014	M. Giuliani	A. Battaglia	

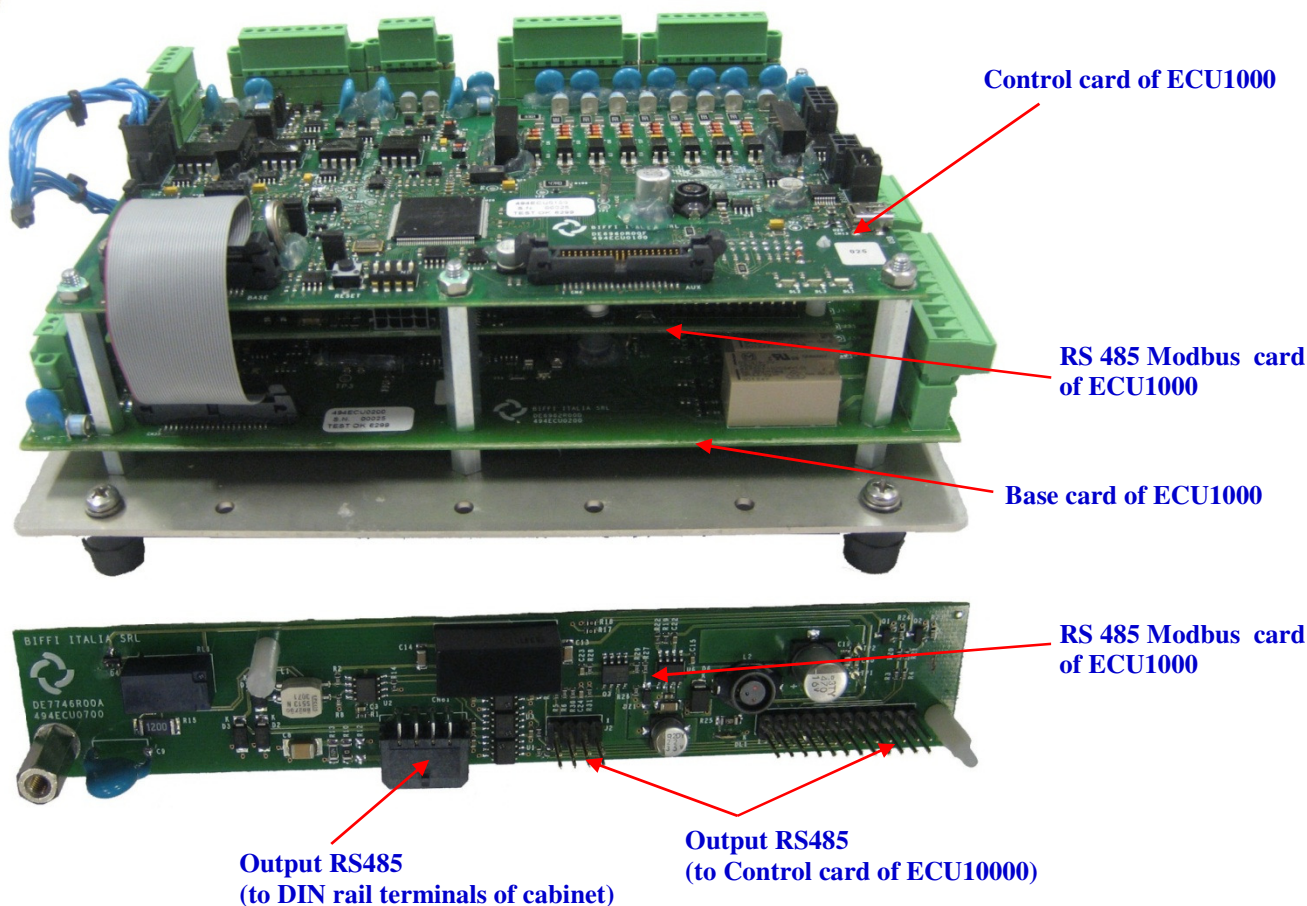
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<p>Warning:</p> 	<ul style="list-style-type: none">• It is assumed that the installation, the setting, the commissioning, the maintenance and repair works are carried out by qualified personnel and checked by responsible Specialists.• The door of cabinet must be kept “closed” by the key (or equivalent tool). Operating the unit or working on the Electronics with the cabinet door “open” could cause personal injury and damage the equipment
<p>Warning:</p> 	<p>The ECU1000 controls the actuator, it could control the HPU, it could drive generic electric, mechanic, pneumatic and hydraulic devices. To avoid unwanted movement of mechanic parts or leakage of pressurized fluids and risk injury of people and damage of equipment and ambient, any mechanic, electric, hydraulic and pneumatic device controlled by the ECU1000 device should be placed in safe condition before executing any installation, commissioning or maintenance operation (see relevant instruction manuals of actuator, HPU, etc.)</p>
<p>Warning:</p> 	<p>If the device is located in hazardous area a “hot permit” must be obtained before opening the explosion proof enclosures. Moreover the area must be cleaned from explosive mixture since time keeper battery and residual capacitor charge could generate electrical spark and cause explosion. The installation must be carried out in accordance to the applicable Ex-d Standards regarding the electrical installations in hazardous areas and any other applicable national standard and rule.</p>
<p>Warning:</p> 	<p>Refer to DTDE326 for the installation and maintenance instruction manual of the ECU1000 cabinet.</p>
<p>Warning:</p> 	<p>If the MODBUS interface is factory configured as MODBUS-R, do not set the DEMAND SOURCE = BUS. In MODBUS-R configuration, it is not possible to change the DEMAND SOURCE value.</p>

1 Introduction

The ECU1000 can be connected to a RS485 MODBUS RTU bus by the optional module “ECU1000 RS485 Modbus”. The card is mounted on a connector of the ECU1000 control card has an output according to the standard RS485. This standard allows a half-duplex, multidrop connection between actuators /transmitters and a Master device. The card is provided of line termination resistors to terminate the line if the actuator is the last of the bus. The line termination can be activated by a configuration parameter. By a cable the connector of the “ECU1000 RS485 Modbus” card is connected to the DIN rail terminals of the ECU1000 cabinet.



1.1 MODBUS-C and MODBUS-R options

The ECU1000 MODBUS interface is available in two different version:

- MODBUS-C
- MODBUS-R

The MODBUS-C version allows writing the MODBUS writable parameters/registers.

The MODBUS-R version **does not allow** writing the MODBUS writable parameters/registers.

The option MODBUS-C/MODBUS-R is Factory configured.

The default configuration is MODBUS-C.

The MODBUS-R option is set on customer request only.

2 Reference documents

DTDE 327 “Control functions and Local Operator Interface” of ECU1000
DTDE328 “Functions description”, Input characterization-Recorder-Graph-Logger-PST-HPU-On/Off control-Optional local lamps-PWM driver, RS485 Modbus RTU”
DTDE300 ECU1000 “Product description”
DTDE330 “ECU1000 BIFFI-Assistant User Manual”
Hydraulic diagram and installation and operation manuals of mechanical and hydraulic equipment controlled by the ECU1000 cabinet
Modbus_over_serial_line_V1_02.pdf specification
Modbus_Application_Protocol_V1_1b.pdf specification

3 Communication features

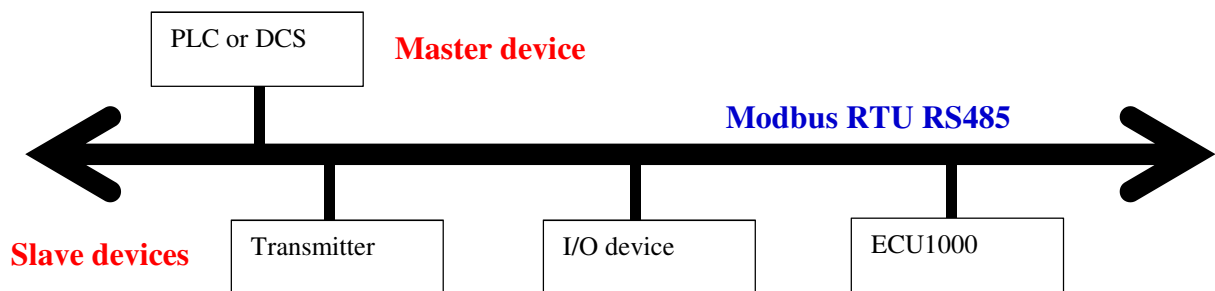
Communication Protocol	: Modbus RTU
Transmission Tecnology	: RS-485, half duplex
Network Topology	: Line (bus) structure
Transmission Medium	: Twisted, screened copper cable
Data Rate	: 1200 2400 4800 9600 19200 38400 bit/sec
Device Number	: Max. 32 devices per segment. Repeaters are requested with more than 32 devices on the Bus
Slave Address	: From 1 to 247 (address 0 reserved for broadcast messages), configurable via local operator interface of ECU1000
Bus Access	: Polling between masters and slaves
Electrical Power	: Powered by the ECU1000
Bus Termination	: Available on board, configurable via local operator interface of ECU1000
Temperature	: -40°C, +75°C
Baud Rate	: Configurable via local operator interface of ECU1000
Addressing	: Configurable via local operator interface of ECU1000
Coding System	: 8 bits binary, hexadecimal 0-9, A-F. Two hexadecimal characters contained in each 8 bit field of the message
Bits per byte	: 1 Start bit 8 Data bits, least significant bit sent first 1 Bit for Even/Odd parity; no bit for no parity; configurable via local operator interface of actuator 1 Stop bit with parity; 2 Stop bits without parity
Error Check Field	: Cyclical Redundancy Check (CRC)

4 RS485 communication method

The “ECU1000 RS485 Modbus” card communicates with the master device (PLC or DCS) via RS485; the transmission media consists in a shielded twisted pair cable. One unique transmission speed is allowed for all devices on the bus when the system works. All devices are connected in a bus structure. Up to 32 stations (master and slaves) can be connected in one segment. Repeaters should be used to extend the number of devices on one bus. Addresses range is from 1 to 247. The Electronics of ECU1000 is optocoupled from the bus lines

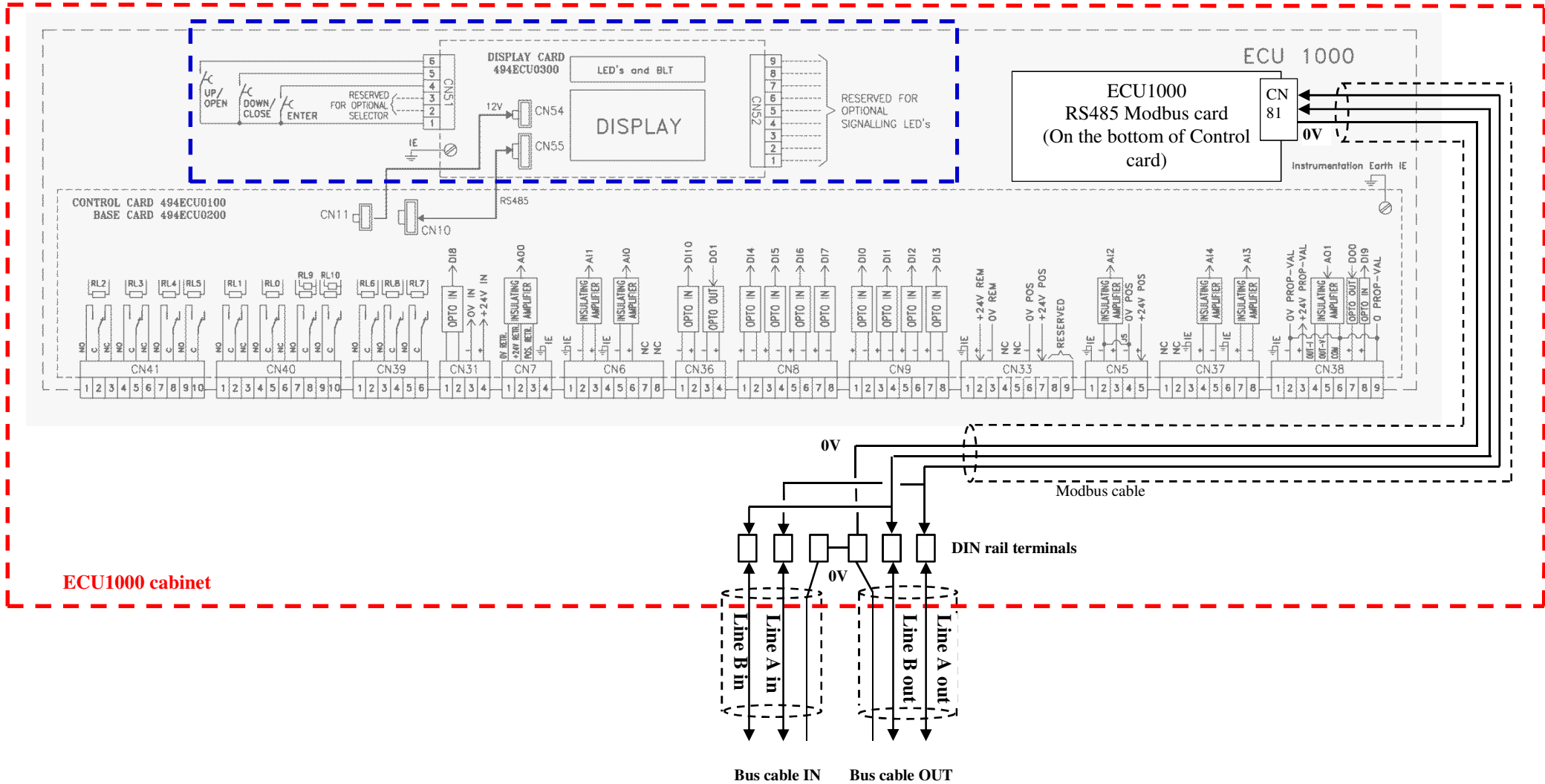
The bus must be terminated by a resistor of 120 Ω at the beginning and at the end of each segment. Only two terminations in one bus segment must be provided. To ensure error-free operation, and to increase driving capability, pull-up and pull-down resistors should be provided on the termination network. The maximum cable length depends on the transmission speed.

The data lines must not be reversed. To avoid polarity inversion, it is suggested to use **different colours** of wire for each data line. Use of shielded cable is mandatory for having high system immunity against electromagnetic disturbs. The data lines should be kept separate from all other cables. It should be laid in separate, conductive and earthed cable trunking. It must be ensured that there is not voltage difference between individual nodes of bus.



ECU 1000 Modbus RTU

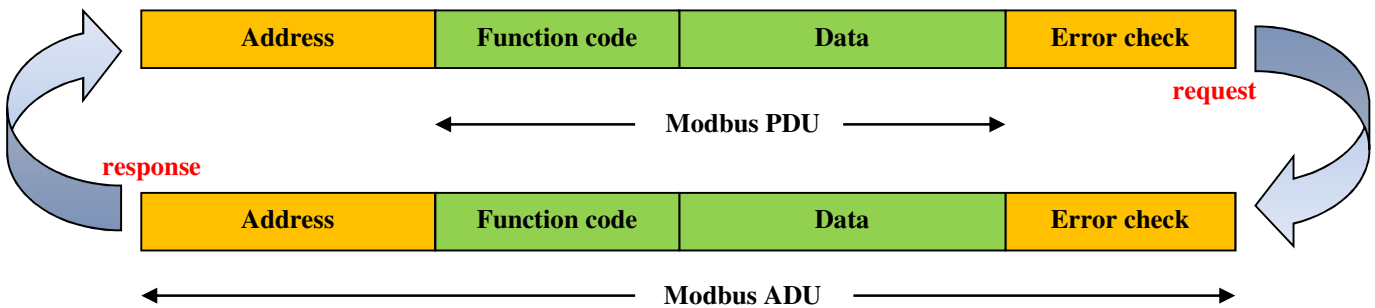
4.1 ECU1000 wiring diagram



5 Modbus RTU protocol

MODBUS RTU protocol is a messaging structure, used to establish **master-slave** communication between intelligent devices. Since MODBUS is only a messaging structure, it is independent from the physical layer. It is traditionally implemented using RS 485. The typical bus topology is based on a Master device (PLC or DCS) that communicates with several slave devices (transmitters, actuators, I/O devices). The **Master** cyclically reads status and data and sends commands to the **Slaves**. The master initiates the transmission with the “request” message. The slave devices answer by sending the requested data and performing the action of the “request” message.

The figure below shows a request-response cycle. The fields “**Function code**” and “**Data**” are the **Protocol Data Unit (PDU)**, the complete request or response are the **Application Data Unit (ADU)**



No response from slaves is done in case of broadcast message. Address 0 is used for the broadcast message.

If a slave receives the request, but it detects a communication error (parity, CRC, etc.) no response is returned.

If a slave receives the request without a communication error, but cannot handle it (for example, if the request is to read a non-existent output or register), the slave will return an exception response informing the master of the nature of the error.

6 Modbus RTU function codes

The following paragraph describes the parameters/data of the ECU1000 Modbus RTU Module.

The following function codes are supported by ECU1000 Modbus RTU Module:

Function Code	Modbus Name
03	Read Holding Registers
06	Preset Single Register
16 (10 Hex)	Preset Multiple Registers
20 (14 Hex)	Read file

Function Code 03 (0x03) – Read Holding Registers

Request

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x03
Start address	2 bytes	0x0000 - 0xFFFF
Quantity of Register	2 bytes	0x0001 – 0x007D
CRC	2 bytes	-

Response

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x03
Byte Count	1 byte	2*qty of registers
Register Value	2 bytes	0x0000 - 0xFFFF
....
Register Value	2 bytes	0x0000 - 0xFFFF
CRC	2 bytes	-

Exception Codes: 0x01, 0x02, 0x03, 0x04

ECU 1000 Modbus RTU

Function Code 06 (0x06) – Write Single Register

Request

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x06
Register Address	2 bytes	0x0000 - 0xFFFF
Register Value	2 bytes	0x0000 - 0xFFFF
CRC	2 bytes	-

Response

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x06
Register Address	2 bytes	0x0000 - 0xFFFF
Register Value	2 bytes	0x0000 - 0xFFFF
CRC	2 bytes	-

Exception Codes: 0x01, 0x02, 0x03, 0x04

Function Code 16 (0x10) – Write Multiple Registers

Request

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x10
Start Address	2 bytes	0x0000 - 0xFFFF
Quantity of Registers	2 bytes	0x0001 – 0x007B
Byte Count	1 byte	2*quantity of registers
Register Value	2 bytes	0x0000 - 0xFFFF
...
Register Value	2 bytes	0x0000 - 0xFFFF
CRC	2 bytes	-

Response

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x10
Start Address	2 bytes	0x0000 - 0xFFFF
Quantity of Registers	2 bytes	0x0001 – 0x007B
CRC	2 bytes	-

Exception Codes: 0x01, 0x02, 0x03, 0x04

Function Code 20 (0x14) – Read File

See 6.5.

ECU 1000 Modbus RTU

6.1 Read status and variables: function code 03

Address	Obj	Name	Type	Range	Units	R/W	Description																																		
0		Actuator Position	INT16	0-1000	%	R	1000 = 100.0 %																																		
1		Position Demand	INT16	0-1000	%	R	1000 = 100.0%																																		
2		Demand Source	UINT16	0-2	-	R	Actual Position Demand source: 0 = External 4-20 mA 1 = BUS 2 = Internal																																		
3		Status summary					0=normal, 1=failure, 2=alarm, 3=failure and alarm																																		
4		Remote not available					0=available, 1=not available																																		
5		Maintenance request					0=OK, 1=maintenance request																																		
6		Reserved																																							
7		Status 1	UINT16	0-65535	-	R	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Bit: 0 = not active, 1 = active</td> </tr> <tr><td>b0</td><td>Normal</td></tr> <tr><td>b1</td><td>Failure</td></tr> <tr><td>b2</td><td>Alarm</td></tr> <tr><td>b3</td><td>Remote not avail.</td></tr> <tr><td>b4</td><td>Mainten. request</td></tr> <tr><td>b5</td><td>Open</td></tr> <tr><td>b6</td><td>Closed</td></tr> <tr><td>b7</td><td>Pump1 on</td></tr> <tr><td>b8</td><td>Pump2 on</td></tr> <tr><td>b9</td><td>Opt-SOV1</td></tr> <tr><td>b10</td><td>Local</td></tr> <tr><td>b11</td><td>ESD</td></tr> <tr><td>b12</td><td>PST</td></tr> <tr><td>b13</td><td>Rem-HW</td></tr> <tr><td>b14</td><td>Interlock OP</td></tr> <tr><td>b15</td><td>Interlock CL</td></tr> </table>	Bit: 0 = not active, 1 = active		b0	Normal	b1	Failure	b2	Alarm	b3	Remote not avail.	b4	Mainten. request	b5	Open	b6	Closed	b7	Pump1 on	b8	Pump2 on	b9	Opt-SOV1	b10	Local	b11	ESD	b12	PST	b13	Rem-HW	b14	Interlock OP	b15	Interlock CL
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15-16		Reserved																																							
17		Oil Pressure	INT16	-10000 +10000	bar	R	10000 = 1000.0 bar																																		
18		Temperature	INT16	-32768 +32767	°C	R	100=100°C																																		
19		Humidity	UINT16	0-1000	%	R	1000 = 100.0 %																																		
20		Process AI	UINT16	0-4095	bit	R	Generic AI (in bit)																																		
21		Interlock AI	UINT16	0-4095	bit	R	Interlock AI (in bit)																																		
22 23 24 25		Next PST	DATE	01.01. 2010 00:00:00 31.12. 2099 23:59:59	-	R	dd/mm (BCD format) yyyy (BCD format) 00:hh (BCD format) mm/ss (BCD format)																																		
26 27		Next pump switch		0-10000 0-59	-	R	10000=10000 h 59= 59 m																																		
28		Pressure 1	INT16	-10000 +10000	bar	R	10000 = 1000.0 bar																																		
29		Pressure 2	INT16	-10000 +10000	bar	R	10000 = 1000.0 bar																																		

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6.2 Write commands: function codes 06 and 16

Address	Obj	Name	Type	Range	Units	R/W	Description
1000	-	Actuator cmd_1	INT16	0-2	-	R/W	Operating Mode: 1 = Auto Mode 2 = Manual Mode
1001	-1005	Position Demand	INT16	0-1000	%	R/W	1000 = 100.0 %
1002		Actuator cmd_2 (see Note 1)	INT16	0-3			Manual Command: 0 = manual stop 1 = manual open 2 = manual close 3 = PST
1003		Actuator cmd_3	INT16	0-1		R/W	0 = ESD Off 1 = ESD On
1004		Actuator cmd_4	INT16	0-6		R/W	1 = IntOP On 2 = IntOP Off 3 = IntCL On 4 = IntCL Off 5 = Int On (Open + Close) 6 = Int Off (NO Interlock)
1005		Reserved					
1006	-1018	Clear Failure/Alarm	UINT16	0-1		R/W	1 = clear failure/Alarm Always read as 0.
1007	-4304	Select open stroke signature	UINT16	1-5	-	R/W	1=Curve1, 2=Curve2, 3=Curve3, 4=Curve4, 5=Curve5 Always read as 0.
1008	-4305	Select close stroke signature	UINT16	1-5	-	R/W	1=Curve1, 2=Curve2, 3=Curve3, 4=Curve4, 5=Curve5 Always read as 0.
1009	-4306	Select PST signature	UINT16	1-5	-	R/W	1=Curve1, 2=Curve2, 3=Curve3, 4=Curve4, 5=Curve5 Always read as 0.
1010	-4307	Select recorder signature	UINT16	1-5	-	R/W	1=Curve1, 2=Curve2, 3=Curve3, 4=Curve4, 5=Curve5 Always read as 0.

Note 1: Actuator cmd_2: manual stop, manual open and manual close have effect only in **Manual Bus** mode (see 10).

6.3 Read/ WriteBus registers: function codes 03, 06, 16

The registers with flag “R” in the column R/W can be read only by the function code “03”

Address	Obj	Name	Type	Range	Units	R/W	Description
Bus MODBUS RTU							
2020	1920	Modbus node	UINT16	1-247	-	R	247=247
2021	1921	Modbus baud rate	UINT16	0-5	bit/s	R	0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400
2022	1922	Modbus parity	UINT16	1-5	-	R	0 = no parity 1 = odd 2 = even
2023	1923	Modbus termination	UINT16	1-5	-	R	0 = Off 1 = On
2030	1980	Position <xx%	UINT16	1-100	-	R/W	100=100% It affects b10 of the Status 2 register
2031	1981	Position >xx%	UINT16	0-99	-	R/W	99=99% It affects b9 of the Status 2 register

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6.4 Read/Write ECU1000 Parameters: function codes 03, 06, 16

The registers with flag “R” in the column R/W can be read only by the function code “03”

Address #3019: it may be changed only if it is 0=OFF.

To set the recorder: write 0 in the register #3019. Set the registers #3016, 3018, 3019. Set the recorder mode by the register #3019.

Address	Obj	Name	Type	Range	Units	R/W	Description
Positioner							
3000	800	Dead Band	UINT16	0-100	%	R/W	100=10.0 %
3001	1200	Max time to position	UINT16	4-255	sec	R/W	255=255 sec
3002	811	Speed SOV%		1-50	%	R/W	% of position error to activate the Speed SOV
Date							
3003	1300	Date and time • dd/mm • yyyy • 00:hh • mm:ss	DATE	01.01. 2010 00:00:00 31.12. 2099 23:59:59	-	R/W	dd/mm (BCD format) yyyy (BCD format) 00:hh (BCD format) mm/ss (BCD format)
3004							
3005							
3006							
3007	1302	Maintenance request date	DATE	01.01. 2010 00:00:00 31.12. 2099 23:59:59	-	R/W	dd/mm (BCD format) yyyy (BCD format) 00:hh (BCD format) mm/ss (BCD format)
3008							
3009							
3010							
3011		Reserved					
HPU							
3012	1400	Pump1 mode	UINT16	0-1	-	R/W	0=off, 1=auto
3013	1404	Max time to pressure	UINT16	0-255	min	R/W	255=255 min
3014	1410	Pump2 mode	UINT16	0-1	-	R/W	0=off, 1=auto
3015		reserved					
Recorder							
3016	1600	Recording duration	UINT16	0-8	-	R/W	0=2sec, 1=4sec, 2=10sec, 3=20sec, 4=50sec, 5=100sec, 6=200sec, 7=500sec, 8=1000sec
3017	1601	Stop condition	UINT16	0-3	-	R/W	0=failure, 1=alarm, 2=position <5%, 3=position >95%
3018	1602	Y-axis	UINT16	0-65535		R/W	Bit: 0 = not active, 1 = active b0 Position Demand b1 Actuator position b2 HPU oil pressure b3 Position error b4 AO1% b5 Interlock B6 PST pressure1 B7 PST pressure2 B8 PST trigger B9-15 nu
3019	1603	Recorder mode (see note1)	UINT16	0-4	-	R/W	0=off, 1=record, 2=PST, 3=OP-stroke, 4=CL-stroke
Failsafe							
3020	1100	Delay before failsafe	UINT16	0-100	sec	R/W	Delay before initiating failsafe
3021	1101	Action of failsafe	UINT16	0-3	-	R/W	0=off, 1=tracking, 2=stayput, 3=go to position%
3022	1102	Position of failsafe	UINT16	0-100	%	R/W	Position% to move in failsafe

Note1: Recorder: write the registers 3016, 3017 and 3018 only if the register 3019 is **OFF=0**. If it is not off the new values of registers 3016, 3017 and 3018 will be rejected

If set to 1, 3 or 4 it is automatically set to 0 at the end of the recording.

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Address	Obj	Name	Type	Range	Units	R/W	Description
PST							
3023	1801	PST start	UINT16	0-3	-	R/W	0=off, 1=manual, 2=auto, 3=auto-manual
3024	1802	PST period	UINT16	1-1000	day	R/W	1000=1000 day
3025 3026	1803	PST time • 00:hh • mm:ss	UINT16 UINT16	00:00:00 23:59.59	-	R/W	00:hh (BCD format) mm:ss (BCD format)
3027	1804	PST travel	UINT16	1-40	%	R/W	40=40% of travel
3028	1805	PST pause	UINT16	0-60	sec	R/W	60=60sec
3029	1809	Max PST duration	UINT16	2-1000	sec	R/W	1000=1000 sec
3030	1806	Max T-PST	UINT16	0-1000	%	R/W	Max T-PST compared with the signature
3031	1807	Max T-RET	UINT16	0-1000	%	R/W	Max T-RET compared with the signature
3032	1808	Max OV-Trav	UINT16	1-100	%	R/W	Max Over-travel (1 to 100% of travel)
Input characterization							
3033	10105	Inp characteriz.	UINT16	0-1	-	R/W	0=off, 1=on (input characterization enable)
3034	1700	Input characteristic	UINT16	0-3	-	R/W	0=off, 1=linear 100-0, 2=custom increase, 3=custom decrease
ESD							
3035	700	ESD action	UINT16	0-3	-	R/W	0=off, 1=tracking, 2=stayput, 3=go to position%
3036	701	ESD position	UINT16	0-100	%	R/W	Position% to move in ESD
3037	703	ESD delay	UINT16	1-100	sec	R/W	Delay before initiating ESD
3038	704	ESD duration	UINT16	1-100	sec/10	R/W	Min duration of ESD command
3039 to 3099		Reserved					
ECU1000 data							
4000	10000	HW configuration	UINT16	0-2	-	R	0=base, 1=Modbus, 2=Hart
4001 to 4006	8010	Base SW version	-	-	-	R	ASCII code, 12 char
4007 to 4012	8009	Display SW version	-	-	-	R	ASCII code, 12 char
Cabinet and actuator data							
4013 to 4020	8003	ECU1000 Cabinet serial number	-	-	-	R	ASCII code, 16 char
4021 to 4028	8000	Actuator serial number	-	-	-	R	ASCII code, 16 char
Valve data							
4029 to 4036	9002	Valve tag	-	-	-	R/W	ASCII code, 16 char

6.5 Read Files: function code 20

Function code 20 (0x14) – Read File

It is used to read a file from remote device. The quantity of registers to be read combined with the other field of the response must not exceed the allowable length of the Modbus PDU: 253 bytes

Request

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x14
Byte Count	1 byte	0x07 – 0xF5
Sub-request x, reference type	1 byte	0x06
Sub-request x, file number	2 bytes	0x0001 – 0xFFFF
Sub-request x, record number (register start address)	2 bytes	0x0000 – 0x270F
Sub-request x, record length (register start address)	2 bytes	N
Sub-request x+1, reference type	1 byte	0x06
....
CRC	2 bytes	-

Response

Field Name	Size	Value
Address	1 byte	-
Function Code	1 byte	0x14
Response data length	1 byte	0x07 – 0xF5
Sub-request x, file response length	1 byte	0x07 – 0xF5
Sub-request x, reference type	1 byte	0x06
Sub-request x, record data	N*2bytes	
Sub-request x+1, file response length		
....
CRC	2 bytes	-

Exception Codes: 0x01, 0x02, 0x03, 0x04, 0x08

6.5.1 Y-t curves

File numbers:

Curve PST = 0 to 5
 Curve Opening = 10 to 15
 Curve Closing = 20 to 25
 Curve Recorder = 30 to 35

Registers of a curve:

The registers 0 to 9 contain the general data of one curve (curve summary).

Each axis has 206 registers:

- 5 registers describe the variable of the axis
- 201 registers contain the samples of the variable
- If a curve has less than 201 samples, the registers of the absent samples are set to 0xFF

Each curve has

- maximum 5 axis, time + 4 variables
- minimum 2 axis, time + 1 variable

A curve with

- 5 axis occupies 1030 registers, the last register is 1039
- 4 axis occupies 824 registers, the last register is 833
- 3 axis occupies 618 registers, the last register is 627
- 2 axis occupies 412 registers, the last register is 421

The Registers from 1040 to 1043 are dedicated to PST Times and Status.

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6.5.2 Curve register map

CURVE-xx							
Address	Obj	Name	Type	Range	Units	R/W	Description
Record: Curve-xx summary							
0	-	ID curve	UINT16	0-5, 10-15, 20-25, 30-35	-	R	0, 10, 20, 30 = Signature 1,11,21,31 = Most recent curve 5,15, 25, 35 = Oldest curve
1 2 3 4	-	Date and time • dd/mm • yyyy • 00:hh • mm:ss	DATE	01.01. 2010 00:00:00 - 31.12. 2099 23:59:59	-	R	dd/mm (BCD format) yyyy (BCD format) 00:hh (BCD format) mm/ss (BCD format) 0xFFFFFFFFFFFFFFFF = curve not present
5	-	nY	UINT16	1-4	-	R	Axis number 0xFFFF = curve not present
6	-	Size	UINT16	0-4096	-	R	File length in bytes If the curve is not present 0xFFFF
7	-	Samples number	UINT16	0-201	-	R	Number of samples (of each axis) If the curve is not present 0xFFFF
8	-	Sampling Time	UINT16	10-5000	-	R	Sampling time (ms) (time between 2 samples). If the curve is not present 0xFFFF
9	-	-	UINT16	FFFF	-	R	Nu (0xFFFF)
Record: Axis-1 description (in general t-axis, "time")							
10	-	Variable name	UINT16	0-100	-	R	Variable of axis-1 (see Variable codes list)
11	-	EU_1	UINT16	0 – (N-1)	-	R	EU code of axis-1 (see EU code list)
12	-	Min_1	INT16	-32768 +32767	-	R	Min value of axis-1
13	-	Max_1	INT16	-32768 +32767	-	R	Max value of axis-1
14	-	Decimal_1	UINT16	0-5	-	R	Decimal number of axis-1 (to be used with Min, Max values and samples)
Record: Samples 0-99 of axis-1 ,100 values							
15	-	Sample0_1	INT16	-32768 +32767	-	R	Sample 0 of axis-1
16-113	-	Samples1 to 98_1	INT16	-32768 +32767	-	R	Samples from 2 to 98 of axis-1
114	-	Sample99_1	INT16	-32768 +32767	-	R	Sample 99 of axis-1
Record: Samples 100-200 of axis-1 , 101 values							
115	-	Sample100_1	INT16	-32768 +32767	-	R	Sample 100 of axis-1
116-214	-	Samples101 to 199_1	INT16	-32768 +32767	-	R	Samples from 101 to 200 of axis-1
215	-	Sample200_1	INT16	-32768 +32767	-	R	Sample 200 of axis-1

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Address	Obj	Name	Type	Range	Units	R/W	Description
Record: Axis-2 description							
216	-	Variable name	UINT16	0-100		R	Variable of axis-2 (see Variable codes list)
217	-	EU_2	UINT16	0 – (N-1)	-	R	EU code of axis-2 (see EU code list)
218	-	Min_2	INT16	-32768 +32767	-	R	Min value of axis-2
219	-	Max_2	INT16	-32768 +32767	-	R	Max value of axis-2
220	-	Decimal_2	UINT16	0-5	-	R	Decimal number of axis-2 (to be used with Min, Max values and samples)
Record: Samples 0-99 of axis-2, 100 values							
221	-	Sample0_2	INT16	-32768 +32767	-	R	Sample 0 of axis-2
222-319	-	Samples1 to 98_2	INT16	-32768 +32767	-	R	Samples from 2 to 98 of axis-2
320	-	Sample99_2	INT16	-32768 +32767	-	R	Sample 99 of axis-2
Record: Samples 100-200 of axis-2, 101 values							
321	-	Sample100_2	INT16	-32768 +32767	-	R	Sample 100 of axis-2
322-420	-	Samples101 to 199_2	INT16	-32768 +32767	-	R	Samples from 101 to 200 of axis-2
421	-	Sample200_2	INT16	-32768 +32767	-	R	Sample 200 of axis-2
Record: Axis-3 description							
422	-	Variable name	UINT16	0-100		R	Variable of axis-3 (see Variable codes list)
423	-	EU_3	UINT16	0 – (N-1)	-	R	EU code of axis-3 (see EU code list)
424	-	Min_3	INT16	-32768 +32767	-	R	Min value of axis-3
425	-	Max_3	INT16	-32768 +32767	-	R	Max value of axis-3
426	-	Decimal_3	UINT16	0-5	-	R	Decimal number of axis-3 (to be used with Min, Max values and samples)
Record: Samples 0-99 of axis-3, 100 values							
427	-	Sample0_3	INT16	-32768 +32767	-	R	Sample 0 of axis-3
428-525	-	Samples1 to 98_3	INT16	-32768 +32767	-	R	Samples from 2 to 98 of axis-3
526	-	Sample99_3	INT16	-32768 +32767	-	R	Sample 99 of axis-3
Record: Samples 100-200 of axis-3, 101 values							
527	-	Sample100_3	INT16	-32768 +32767	-	R	Sample 100 of axis-3
528-626	-	Samples101 to 199_3	INT16	-32768 +32767	-	R	Samples from 101 to 200 of axis-3
627	-	Sample200_3	INT16	-32768 +32767	-	R	Sample 200 of axis-3

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Address	Obj	Name	Type	Range	Units	R/W	Description
Record: Axis-4 description							
628	-	Variable name	UINT16	0-100		R	Variable of axis-4 (see Variable codes list)
629	-	EU_4	UINT16	0 – (N-1)	-	R	EU code of axis-4 (see EU code list)
630	-	Min_4	INT16	-32768 +32767	-	R	Min value of axis-4
631	-	Max_4	INT16	-32768 +32767	-	R	Max value of axis-4
632	-	Decimal_4	UINT16	0-5	-	R	Decimal number of axis-4 (to be used with Min, Max values and samples)
Record: Samples 0-99 of axis-4, 100 values							
633	-	Sample0_4	INT16	-32768 +32767	-	R	Sample 0 of axis-4
634-731	-	Samples1 to 98_4	INT16	-32768 +32767	-	R	Samples from 2 to 98 of axis-4
732	-	Sample99_4	INT16	-32768 +32767	-	R	Sample 99 of axis-4
Record: Samples 100-200 of axis-4, 101 values							
733	-	Sample100_4	INT16	-32768 +32767	-	R	Sample 100 of axis-4
734-832	-	Samples101 to 199_4	INT16	-32768 +32767	-	R	Samples from 101 to 200 of axis-4
833	-	Sample200_4	INT16	-32768 +32767	-	R	Sample 200 of axis-4
Record: Axis-5 description							
834	-	Variable name	UINT16	0-100		R	Variable of axis-5 (see Variable codes list)
835	-	EU_5	UINT16	0 – (N-1)	-	R	EU code of axis-5 (see EU code list)
836	-	Min_5	INT16	-32768 +32767	-	R	Min value of axis-5
837	-	Max_5	INT16	-32768 +32767	-	R	Max value of axis-5
838	-	Decimal_5	UINT16	0-5	-	R	Decimal number of axis-5 (to be used with Min, Max values and samples)
Record: Samples 0-99 of axis-5, 100 values							
839	-	Sample0_5	INT16	-32768 +32767	-	R	Sample 0 of axis-5
634-731	-	Samples1 to 98_5	INT16	-32768 +32767	-	R	Samples from 2 to 98 of axis-5
938	-	Sample99_5	INT16	-32768 +32767	-	R	Sample 99 of axis-5
Record: Samples 100-200 of axis-5, 101 values							
939	-	Sample100_5	INT16	-32768 +32767	-	R	Sample 100 of axis-5
734-832	-	Samples101 to 199_5	INT16	-32768 +32767	-	R	Samples from 101 to 200 of axis-5
1039	-	Sample200_5	INT16	-32768 +32767	-	R	Sample 200 of axis-5
Record: PST STATUS and TIMES (for PST CURVES)							
1040	-	PST Status	INT16	1-7	-	R	See List of PST Status. 0xFFFF for no PST curves.
1041	-	T-PST	INT16	0-10000	-	R	Time in 1/10 of seconds. 10000 = 1000.0 sec 0xFFFF for no PST curves.
1042	-	T-RET	INT16	0-10000	-	R	Time in 1/10 of seconds. 10000 = 1000.0 sec 0xFFFF for no PST curves.
1043	-	OV-TRAV	INT16	0-1000	-	R	% of Position. 1000 = 100.0% 0xFFFF for no PST curves.

List of variable codes

Position demand	0
Actuator position	1
HPU oil pressure	2
Position error	3
AO1%	4
Interlock	5
PST pressure1	6
PST pressure2	7
PST trigger	8
Time	9

List of EU codes

no EU	0
%	1
bar	2
°C	3
mm	4
m	5
bit	6
mA	7
V	8
Sec	9

List of PST Status

	0
PST Passed	1
PST Failed	2
Reset	3
Failed T-PST	4
Failed T-RET	5
Failed OV-TRAV	6

6.5.3 Example to read the PST curve (files 0 to 5):

Procedure to read a PST curve.

The procedure consists in the following steps:

1. Read the record “**Summary**” of each PST curves memorized in the ECU1000 memory. In the “**Summary**”
 - a. **The register 0 of each file indicates the curves present in the ECU1000 memory**
 - b. **The register 5 of each file indicates the number of axis of each curve**
2. According to **a.** and **b.** select the curve to read
3. Read the record “**Axis description**” of the selected curve
4. Read the record “**Samples 0-99**” of one axis (100 samples)
5. Read the record “**Samples 100-200**” of one axis (101 samples)
6. Repeat the steps 4 and 5 to read all axis of the selected curve

To read the records “summary” of each PST curves: the response contains the main info of each PST curve (type, date, number of axis, number of samples, etc.)

Function code 20 (0x14): Request		
Address	1 byte	N
Function code	1 byte	0x14
Byte count	1 bytes	0x2A
Reference type of record “Summary curve-0” (file 0)	1 bytes	06
Number of file of record “Summary curve-0”	2 bytes	0x0000
Start address of record “Summary curve-0”	2 bytes	0x0000
Number of registers of record “Summary curve-0”	2 bytes	0x000A
Reference type of record “Summary curve-1” (file 1)	1 bytes	06
Number of file of record “Summary curve-1”	2 bytes	0x0001
Start address of record “Summary curve-1”	2 bytes	0x0000
Number of registers of record “Summary curve-1”	2 bytes	0x000A
Reference type of record “Summary curve-5” (file 5)	1 bytes	06
Number of file of record “Summary curve-5”	2 bytes	0x0005
Start address of record “Summary curve-5”	2 bytes	0x0000
Number of registers of record “Summary curve-5”	2 bytes	0x000A
CRC	2 bytes	-

Function code 20 (0x14): Response		
Address	1 byte	N
Function code	1 byte	0x14
Response data length	1 bytes	0x84
Resp length of “Summary curve-0” (file 0)	1 byte	0x15
Reference type of “Summary curve-0”	1 bytes	06
Record “Summary curve-0”	10*2 bytes	0-1= curve ID, 2-9= date and time, 10-11= number of axis, 12-13= bytes of curve 0, 14-15= samples of curve 0, 16-17= sampling time, 18-19= nu (0xFF)
Resp length of “Summary curve-1” (file 1)	1 byte	0x15
Reference type of “Summary curve-1”	1 bytes	06
Record “Summary curve-1”	10*2 bytes	0-1= curve ID, 2-9= date and time, 10-11= number of axis, 12-13= bytes of curve 0, 14-15= samples of curve 0, 16-17= sampling time, 18-19= nu (0xFF)
Resp length of “Summary curve-5” (file 5)	1 byte	0x15
Reference type of “Summary curve-5”	1 bytes	06
Record “Summary curve-5”	10*2 bytes	0-1= curve ID, 2-9= date and time, 10-11= number of axis, 12-13= bytes of curve 0, 14-15= samples of curve 0, 16-17= sampling time, 18-19= nu (0xFF)
CRC	2 bytes	-

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To read the records “Axis description”: the response contains the info relevant to each axis of the selected curve (variable, EU, min value, max value, etc.)

Function code 20 (0x14): Request		
Address	1 byte	N
Function code	1 byte	0x14
Byte count	1 bytes	0x23
Reference type of record “Axis-1 description”	1 bytes	06
Number of file of record “Axis-1 description”	2 bytes	0x0001
Start address of record “Axis-1 description”	2 bytes	0x000A
Number of register of record “Axis-1 description”	2 bytes	0x05
Reference type of record “Axis-2 description”	1 bytes	06
Number of file of record “Axis-2 description”	2 bytes	0x0001
Start address of record “Axis-2 description”	2 bytes	0x00D8
Number of register of record “Axis-2 description”	2 bytes	0x0005

Reference type of record “Axis-5 description”	1 bytes	06
Number of file of record “Axis-5 description”	2 bytes	0x0001
Start address of record “Axis-5 description”	2 bytes	0x0342
Number of register of record “Axis-5 description”	2 bytes	0x05
CRC	2 bytes	-

Function code 20 (0x14): Response		
Address	1 byte	N
Function code	1 byte	0x14
Response data length	1 bytes	0x3C
Resp length of “Axis-1 description”	1 byte	0x0B
Reference type of “Axis-1 description”	1 bytes	06
Record “Axis-1 description”	5*2 bytes	0-1= variable of axis, 2-3= EU code of axis-1, 4-5=min value of axis-1, 6-7= max value of axis-1, 8-9= decimal number of axis-1
Resp length of “Axis-2 description”	1 byte	0x0B
Reference type of “Axis-2 description”	1 bytes	06
Record “Axis-2 description”	5*2 bytes	0-1= variable of axis, 2-3= EU code of axis-2, 4-5=min value of axis-2, 6-7= max value of axis-2, 8-9= decimal number of axis-2

Resp length of “Axis-5 description”	1 byte	0x0B
Reference type of “Axis-5 description”	1 bytes	06
Record “Axis-5 description”	5*2 bytes	0-1= variable of axis, 2-3= EU code of axis-5, 4-5=min value of axis-5, 6-7= max value of axis-5, 8-9= decimal number of axis-5
CRC	2 bytes	-

To read the record “Samples 0-99” of an axis: the response contains the value of samples from 0 to 99

Function code 20 (0x14): Request		
Address	1 byte	N
Function code	1 byte	0x14
Byte count	1 bytes	0x07
Reference type of record “Samples 0-99”	1 bytes	06
File number of record “Samples 0-99”	2 bytes	0x0001
Start address of record “Samples 0-99”	2 bytes	0x000F
Number of registers of record “Samples 0-99”	2 bytes	0x0064
CRC	2 bytes	-

Function code 20 (0x14): Response		
Address	1 byte	N
Function code	1 byte	0x14
Response data length	1 bytes	0xCA
Resp length of “Samples 0-99”	1 byte	0xC9
Reference type of “Samples 0-99”	1 bytes	06
Record “Samples 0-99”	100*2 bytes	Samples from 0 to 99
CRC	2 bytes	-

To read the record “Samples 100-200” of an axis: the response contains the value of samples from 100 to 200

Function code 20 (0x14): Request		
Address	1 byte	N
Function code	1 byte	0x14
Byte count	1 bytes	0x07
Reference type of record “Samples 100-200”	1 bytes	06
File number of record “Samples 100-200”	2 bytes	0x0001
Start address of record “Samples 100-200”	2 bytes	0x0073
Number of registers of record “Samples 100-200”	2 bytes	0x0065
CRC	2 bytes	-

Function code 20 (0x14): Response		
Address	1 byte	N
Function code	1 byte	0x14
Response data length	1 bytes	0xCC
Resp length of “Samples 100-200”	1 byte	0xCB
Reference type of “Samples 100-200”	1 bytes	06
Record “Samples 100-200”	101*2 bytes	Samples from 100 to 200
CRC	2 bytes	-

6.5.4 Read the “Failure” logger (file 100)

The register 0 provides the number of failures present in the failure logger. The registers 1 to 5 provide the data of failure 1, the registers 6 to 10 contain the data of failure 2 and so on for the other failures. Each failure adds 5 registers to the file. The failure 1 is the most recent. The file number is **100**

The procedure to read the failure logger should be done in two steps:

1. To read the number of failures present in the ECU1000 failure logger
2. To read the data of the selected failures

Failure logger							
Address	Obj	Name	Type	Range	Units	R/W	Description
Record: Failure number							
0	-	N° of Failure	UINT16	0-256	-	R	Number of failures present in the logger
Record: Failure 1							
1		Date and time	DATE	01.01.	-	R	dd/mm (BCD format)
2		• dd/mm		2010			yyyy (BCD format)
3		• yyyy		00:00:00			00:hh (BCD format)
4	-	• 00:hh		-			mm:ss (BCD format)
		• mm:ss		31.12.			
				2099			
				23:59:59			
5	-	Failure_1 code	UINT16	2 - 12	-	R	Code of FAILURE (see list of Failure codes)
Record: Failure n							
n-4		Date and time	DATE	01.01.	-	R	dd/mm (BCD format)
n-3		• dd/mm		2010			yyyy (BCD format)
n-2		• yyyy		00:00:00			00:hh (BCD format)
n-1	-	• 00:hh		-			mm:ss (BCD format)
		• mm:ss		31.12.			
				2099			
				23:59:59			
n	-	Failure_n code	UINT16	2 - 14	-	R	Code of FAILURE (see list of Failure codes)

List of failure codes

Actuator position	2	Hardware 0	7	Bus control	12
Position Demand	3	SW error 0	8		
Temperature	4	HPU failure	9		
Proportional valve	5	Failsafe	10		
Power supply	6	Stayput by SOV	11		

6.5.5 Read the “Alarm” logger (file 101)

The register 0 provides the number of alarms present in the alarm logger. The registers 1 to 5 provide the data of alarm 1, the registers 6 to 10 contain the data of alarm 2 and so on for the other alarms. Each alarm adds 5 registers to the file. The alarm 1 is the most recent. The file number is **101**

The procedure to read the alarm logger should be done in two steps:

1. To read the number of alarms present in the ECU1000 alarm logger
2. To read the data of the selected alarms

Alarm logger							
Address	Obj	Name	Type	Range	Units	R/W	Description
Record: Alarm number							
0	-	N° of Alarms	UINT16	0-256	-	R	Number of alarms present in the logger
Record: Alarm 1							
1	-	Date and time	DATE	01.01. 2010	-	R	dd/mm (BCD format)
2		• dd/mm		2010			yyyy (BCD format)
3		• yyyy		00:00:00			00:hh (BCD format)
4		• 00:hh • mm:ss		- 31.12. 2099 23:59:59			mm/ss (BCD format)
5	-	Alarm_1 code	UINT16	2 – 41	-	R	Code of ALARM (see list Alarm codes)

Record: Alarm n							
n-4	-	Date and time	DATE	01.01. 2010	-	R	dd/mm (BCD format)
n-3		• dd/mm		2010			yyyy (BCD format)
n-2		• yyyy		00:00:00			00:hh (BCD format)
n-1		• 00:hh • mm:ss		- 31.12. 2099 23:59:59			mm/ss (BCD format)
n	-	Alarm_n code	UINT16	2 - 41	-	R	Code of ALARM (see list Alarm codes)

List of alarm codes

High temperature	2	HPU signalling switch	17	PST T-RET	32
Low temperature	3	HPU general sensor	18	PST reset	33
Stroke limit	4	Pump1 power supply	19	Hydraulic valve leakage	34
Humidity	5	Pump1 motor TH	20	Max start pump1	35
Acceleration -x	6	nu	21	Max start pump2	36
Acceleration -y	7	General sensor pump1	22	Max start D-SOV	37
Acceleration -z	8	Pump2 power supply	23	Hand pump	38
Fail to position	9	Pump2 motor TH	24	Max time pump1	39
Pump1 filter	10	Display card	25	Max time pump2	40
Pump2 filter	11	General sensor pump2	26	PWM utilization%	41
Oil level	12	Memory-FL	27		
Oil low pressure	13	Memory-NVR	28		
Oil temperature	14	Characterization	29		
Oil high pressure	15	PST T-PST	30		
HPU pressure transmitter	16	PST OV-TR	31		

6.5.6 Read the “Event” logger (file 102)

The register 0 provides the number of events present in the event logger. The registers 1 to 6 provide the data of event 1, the registers 7 to 12 contain the data of event 2 and so on for the other events. Each event adds 6 registers to the file.

The event 1 is the most recent. The file number is **102**

The procedure to read the event logger should be done in two steps:

1. To read the number of event present in the ECU1000 event logger
2. To read the data of the selected events

Event logger							
Address	Obj	Name	Type	Range	Units	R/W	Description
Record: Event number							
0	-	N° of Events	UINT16	0-256	-	R	Number of Events present in the logger
Record: Event 1							
1	-	Date and time	DATE	01.01.	-	R	dd/mm (BCD format) yyyy (BCD format) 00:hh (BCD format) mm/ss (BCD format)
2		• dd/mm		2010			
3		• yyyy		00:00:00			
4		• 00:hh • mm:ss		- 31.12. 2099 23:59:59			
5	-	Action	UINT16	2 - 6	-	R	Action code (see list of action codes)
6		Event_1 code	UINT16	2 - 25			Code of EVENT (see list of event codes)

Record: Event n							
n-5	-	Date and time	DATE	01.01.	-	R	dd/mm (BCD format) yyyy (BCD format) 00:hh (BCD format) mm/ss (BCD format)
n-4		• dd/mm		2010			
n-3		• yyyy		00:00:00			
n-2		• 00:hh • mm:ss		- 31.12. 2099 23:59:59			
n-1	-	Action code	UINT16	2 - 6	-	R	Code of actuator action (see list of action codes)
n		Event_n code	UINT16	2 - 21			Code of EVENT (see list of event codes)

List of event codes

Power on	2	CRC memory-EE	17
Remote manual	3	CRC memory-FL	18
Local command	4	CRC memory-NVR	19
Bus manual	5	Pump switch	20
ESD	6	Interlock	21
Limit calibration	7		
Failsafe	8		
Demand <5>95%-HW	9		
Demand <5>95%-Bus	10		
Demand <5>95%-loc	11		
PST	12		
Configuration	13		
Restore configuration	14		
Full default	15		
Tracking	16		

List of Action codes

Open	2
Close	3
No-out	4
Test	5
“-“ Null	6

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Example: To read the records of the most recent 10 alarms (if alarm logger contains more than 10 alarms): the response contains the data of the 10 alarms

Function code 20 (0x14): Request		
Address	1 byte	N
Function code	1 byte	0x14
Byte count	1 bytes	0x46
Reference type of record "Alarm 1"	1 bytes	06
Number of file of record "Alarm 1"	2 bytes	0x0064
Start address of record "Alarm 1"	2 bytes	0x0001
Number of register of record "Alarm 1"	2 bytes	0x05
Reference type of record "Alarm 2"	1 bytes	06
Number of file of record "Alarm2"	2 bytes	0x0064
Start address of record "Alarm 2"	2 bytes	0x0006
Number of register of record "Alarm 2"	2 bytes	0x0005

Reference type of record "Alarm 10"	1 bytes	06
Number of file of record "Alarm 10"	2 bytes	0x0064
Start address of record "Alarm 10"	2 bytes	0x002E
Number of register of record "Alarm 10"	2 bytes	0x05
CRC	2 bytes	-

Function code 20 (0x14): Response		
Address	1 byte	N
Function code	1 byte	0x14
Response data length	1 bytes	0x78
Resp length of Alarm 1	1 byte	0x0B
Reference type of Alarm 1	1 bytes	06
Record data Alarm 1	5*2 bytes	Date and code of Alarm 1
Resp length of Alarm 2	1 byte	0x0B
Reference type of Alarm 2	1 bytes	06
Record data Alarm 2	5*2 bytes	Date and code of Alarm 2

Resp length of Alarm 10	1 byte	0x0B
Reference type of Alarm 10	1 bytes	06
Record data Alarm 10	5*2 bytes	Date and code of Alarm 10
CRC	2 bytes	-

Example: To read the records of the most recent 10 events (if event logger contains more than 10 events): the response contains the data of the 10 events

Function code 20 (0x14): Request		
Address	1 byte	N
Function code	1 byte	0x14
Byte count	1 bytes	0x46
Reference type of record "Event 1"	1 bytes	06
Number of file of record "Event 1"	2 bytes	0x0064
Start address of record "Event 1"	2 bytes	0x0001
Number of register of record "Event 1"	2 bytes	0x06
Reference type of record "Event 2"	1 bytes	06
Number of file of record "Event2"	2 bytes	0x0064
Start address of record "Event 2"	2 bytes	0x0007
Number of register of record "Event 2"	2 bytes	0x0005

Reference type of record "Event 10"	1 bytes	06
Number of file of record "Event 10"	2 bytes	0x0064
Start address of record "Event 10"	2 bytes	0x0037
Number of register of record "Event 10"	2 bytes	0x06
CRC	2 bytes	-

Function code 20 (0x14): Response		
Address	1 byte	N
Function code	1 byte	0x14
Response data length	1 bytes	0x8C
Resp length of Event 1	1 byte	0x0D
Reference type of Event 1	1 bytes	06
Record data Event 1	6*2 bytes	Date and code of Event 1
Resp length of Event 2	1 byte	0x0D
Reference type of Event 2	1 bytes	06
Record data Event 2	6*2 bytes	Date and code of Event 2

Resp length of Event 10	1 byte	0x0D
Reference type of Event 10	1 bytes	06
Record data Event 10	6*2 bytes	Date and code of Event 10
CRC	2 bytes	-

7 Configuration by Local Operator Interface

The LOCAL/REMOTE selector (if present) must be set on REMOTE.

1. Push ENTER for entering in the ECU1000 MENU.
2. Select “OPERATOR” and push ENTER.
3. Select “SETUP” and push ENTER
4. Digit the correct Password and push ENTER
5. Select “ACTUATOR SETUP” and push ENTER
6. Select “BUS” and push ENTER

The following parameters are available for configuring the MODBUS interface:

- MODBUS NODE (1 to 247)
- MODBUS BAUD (1200, 2400, 4800, 9600, 19200 or 38400 bit/sec)
- MODBUS PARITY (Even, Odd or No parity)
- MODBUS TERMINATION (On, Off)

8 Configuration by BIFFI-Assistant

Use the Biffi Assistant for connecting with the ECU1000.

Open the Function Block “ACTUATOR SETUP” and then open the Tab “BUS”.

The following parameters are available for configuring the MODBUS interface:

- MODBUS NODE (1 to 247)
- MODBUS BAUD (1200, 2400, 4800, 9600, 19200 or 38400 bit/sec)
- MODBUS PARITY (Even, Odd or No parity)
- MODBUS TERMINATION (On, Off)

9 Failsafe function

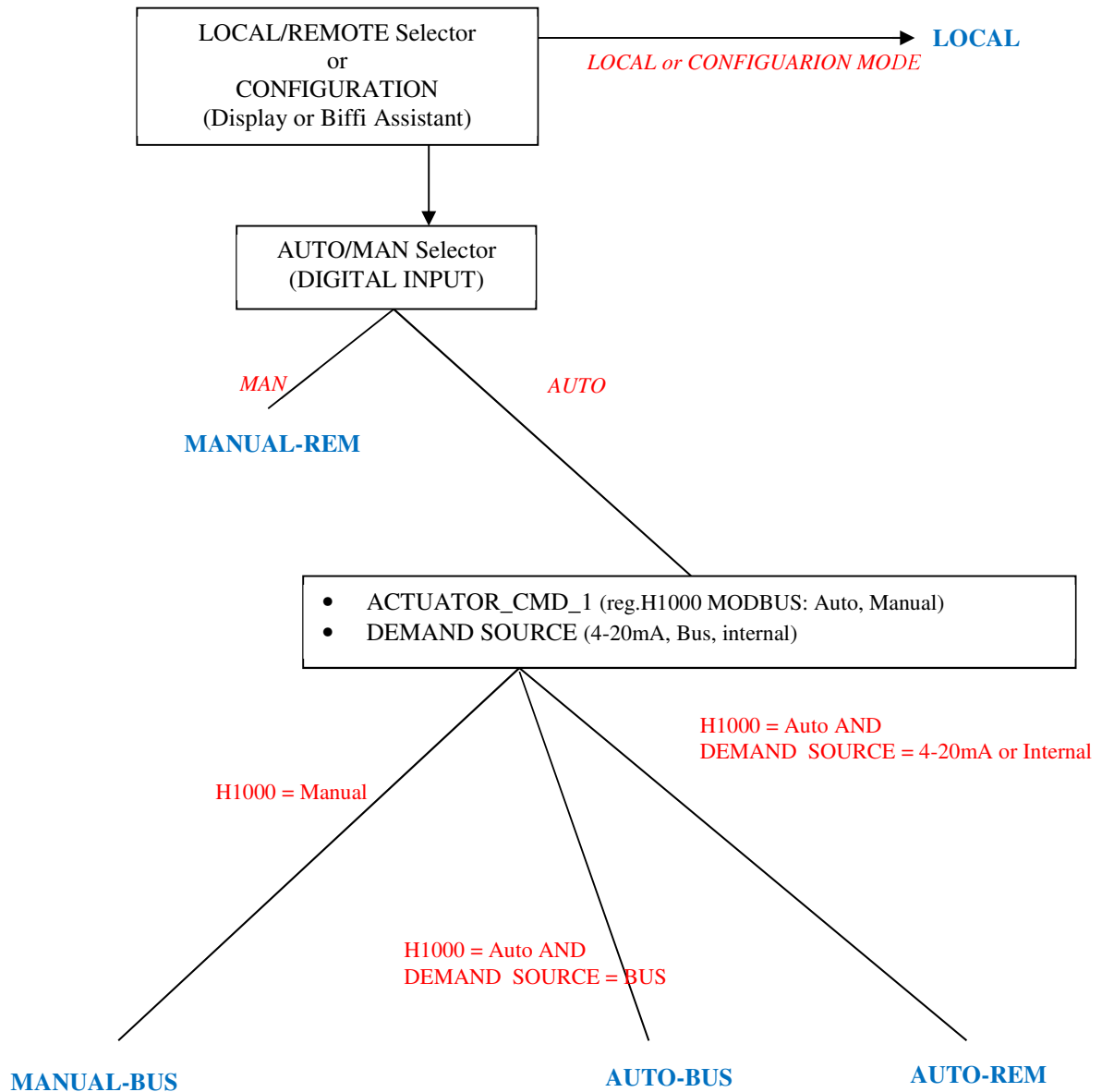
This function is available only if requested on order. It allows configuring the action of the actuator in case of loss of the bus signal. The action takes place only if the ECU1000 works in REMOTE and is controlled by BUS. When the bus signal restores, also the ECU1000 restores at its normal functioning. The fail safe function can be configured via either bus or Local Operator Interface or BIFFI-Assistant SW tool.

The hard-wired controls “ESD”, “Interlock” and “Stay in position by SOV” override the Failsafe action according to the description in the manual DTDE327

10 Selector Priority – Operating Mode

10.1 Operating Mode (MODBUS-C option)

The LOCAL/REMOTE SELECTOR and CONFIGURATION MODE have the priority on the AUTO/MAN SELECTOR, the DEMAND SOURCE and on the MODBUS REGISTER 1000. The following block diagram resumes the priorities that affect the Operating Mode of the ECU1000.



MANUAL REM: the ECU1000/actuator is controlled through the HW commands (OPEN, CLOSE and STOP).

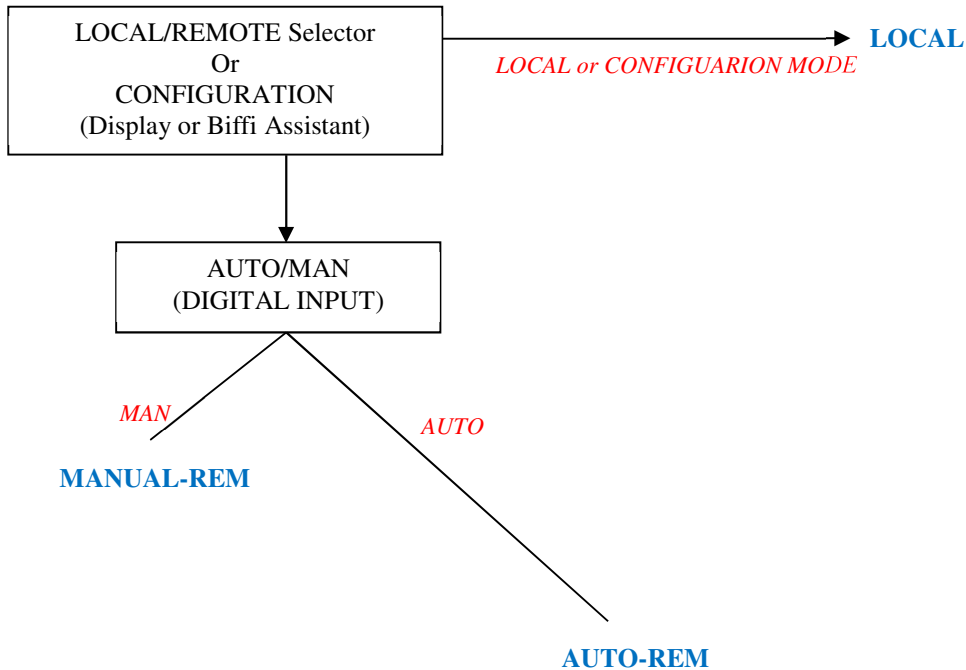
AUTO REM: the ECU1000/actuator is controlled through the 4-20mA or the Internal set point.

AUTO-BUS: the ECU1000/actuator is controlled through the MODBUS set point.

MAN-BUS: the ECU1000/actuator is controlled through the MODBUS manual commands (OPEN, CLOSE and STOP)


10.2 Operating Mode (MODBUS-R option)

The LOCAL/REMOTE SELECTOR and CONFIGURATION MODE have the priority on the AUTO/MAN SELECTOR. The following block diagram resumes the priorities that affect the Operating Mode of the ECU1000.



MANUAL REM: the ECU1000/actuator is controlled through the HW commands (OPEN, CLOSE and STOP).

AUTO REM: the ECU1000/actuator is controlled through the 4-20mA or the Internal set point.

Warning: 	If the MODBUS interface is factory configured as MODBUS-R, do not set the DEMAND SOURCE = BUS. In MODBUS-R configuration, it is not possible to change the DEMAND SOURCE value.
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