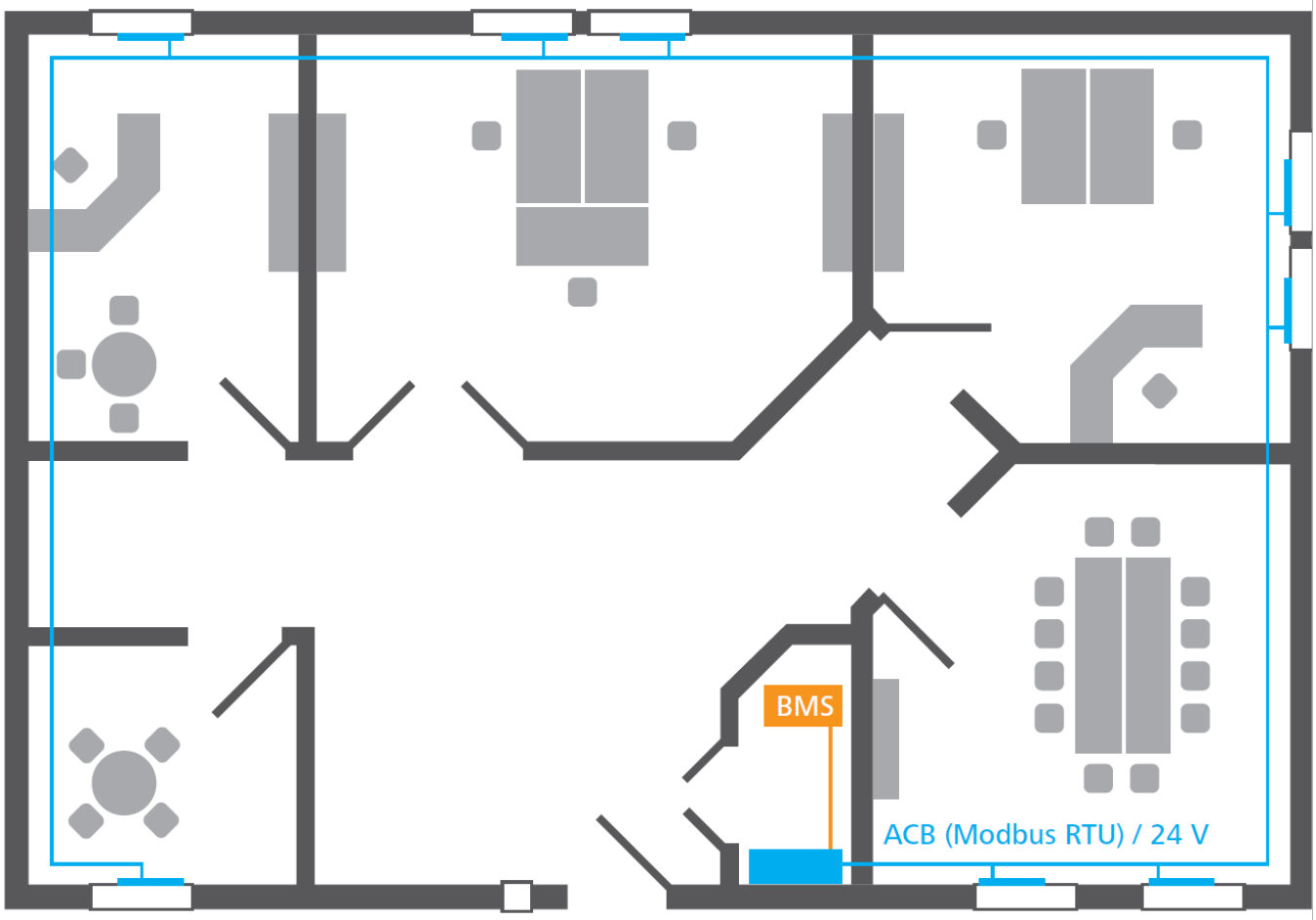
ACB planning manual

Process image and planning documents for ACB – window drives (based on Modbus RTU) to control out of the building management system (BMS)

Advanced **C**ommunication **B**us (ACB)



D+H Mechatronic AG · Georg-Sasse-Straße 28-32 · D-22949 Ammersbek/Hamburg · Germany
Tel: +49 (0)40 60565 0 · Fax: +49 (0)40 60565 222 · info@dh-partner.com · www.dh-partner.com

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1 Usage

This planning manual describes the hardware and software requirements for controlling D+H drives and D+H modules over the **A**dvanced **C**ommunication **B**us (ACB). The ACB protocol is based on the industry standard **Modbus** RTU (RS485).
This document describes the process image of Modbus registers for operation of D+H ACB drives and ACB modules.

2 Voltage supply and control

Supply voltage 24V ACB products: 24 V stabilized, ripple ≤ 2 V

Recommendation polarity for 24V ACB drives:

- Polarity Mot.a: +24 V DC
- Polarity Mot.b: GND

Recommendation supply for 230V ACB drives:

- Phase-CLOSE: 230V AC

2.1 Operating mode pole change + ACB or ACB only

D+H ACB drives and ACB modules can be operated in operating mode “pole change + ACB” or “ACB” only, in which the specified mode is actioned after a restart.

Operating mode “pole change + ACB”:
The drive takes the travel command (open/close) after applying supply voltage according to polarity of supply cables Mot.a-b. The “HS” (high-speed) connection cable will also be analysed.

When a Modbus-ACB command is received, the drive changes to “ACB” mode, polarity and “HS” line will not be analysed anymore.
This configuration can be useful, if e.g. an emergency operation in case of a malfunction of Modbus-ACB activation is intended. On the other hand, it can also lead to unintended movements in case of interruptions of voltage supply.

Operating mode “ACB”:
The D+H ACB drive reacts to Modbus-ACB travel commands only. The polarity of connecting cables Mot.a-b and “HS” line will **not** be analysed.

The factory default of drives is “pole change + ACB”. **We recommend the register address 20480 (0x5000) to set to operation mode “ACB”**. Otherwise it can lead to unintended travel commands in case of interruption of voltage supply. The desired parameterizing can take place by using the Modbus register-address 20480 (0x5000) or via the BSY+ interface by using the D+H Software-Tool SCS.

Notice:
For ACB drives with 230 V AC supply voltage the phases “OPEN” and “CLOSED” will be evaluated, instead of polarity.

2.2 Group of drives with ACB and BSY+ technology

The usage of several drives at one heavy window is possible via the BSY+ synchronic functionality. In this case only the BSY+ Master drive has to be connected to ACB (Modbus-RTU). If possible, do not connect the BSY+ slave drives to the ACB bus (Modbus) to keep the number of Modbus devices to a minimum. The synchronization of all remaining BSY+ Slave drives will be done by the additional BSY+ bus technology.

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One group does exist out of one BSY+ Master drive and one or more BSY+ Slave drive/s. The address of BSY+ Master drive is equal to the number of drives in the whole group. A single drive has the BSY+ address “Master 1”.

2.3 ACB operation of BSY+ drives by D+H modules

D+H drives with BSY+ technology can be operated by the modules ACB-BSY+-GW1-24 and ACB-BSY+-GW1-230 via Modbus RTU. For that the modules have to be signed in at the corresponding BSY+ Master drive. This happens automatically. Alternatively, a manual registration with the D+H Software-Tool SCS via the BSY+ addressing is possible.

The modules are Slave participants at BSY+ bus.

2.4 Referencing D+H ACB drives

All D+H ACB drives will be referenced by setting their zero-point at each time achieving the end position “CLOSED”. Caused by technical reasons referencing is necessary after 100 operations latest. This means that the drives have to be closed completely after 100 operations.

3 Description of hardware interfaces

Modbus interface description:

Medium	RTU / RS-485
Baud rate	19200 bps
Number of data bits	8
Parity	even
Stop Bits	1
Slave response timeout	300 ms
Standby between telegrams	60 Bits, complies ca. 3 ms
Broadcast telegrams (Modbus address 0)	4 repetitions
Number of bus nodes	max. 32
Valid Modbus Slave ID’s (register address 0x5020, can also be set using the SCS tool and BSY+ interface)	0 Broadcast and Multimaster 1 – 246 246 = factory setting BSY-Master drives 245 = factory setting BSY-Slave drives
register addressing	0 based
Termination* (end of wires)	110 - 120 Ω
Polarisation* (bus bias voltage)	2 x 560 Ω, 5 V

* see image 1 and 2

Topology (see image 1 and 2):

- Line-topology with stub line of max.15 m
- Overall line-length including junction 200 m

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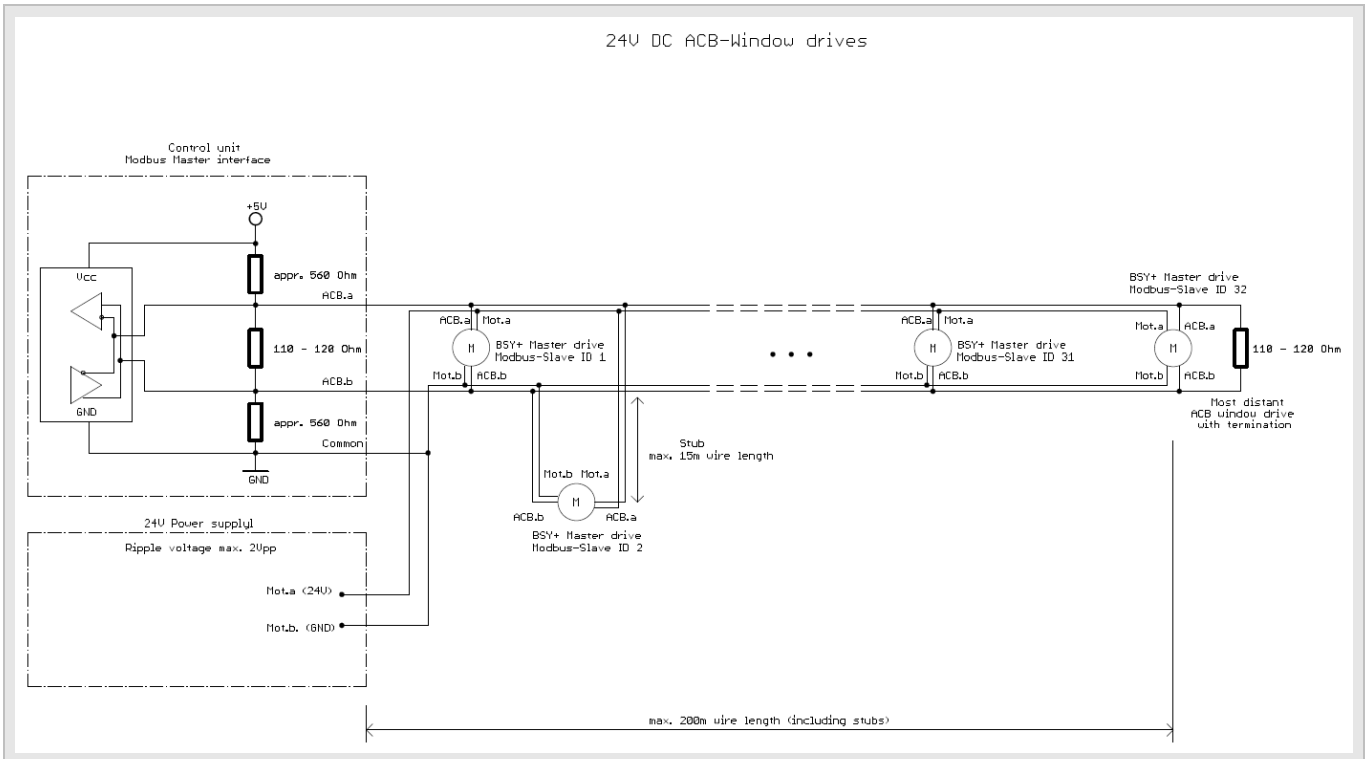

image 1 wiring diagram for 24 V DC ACB opening drives

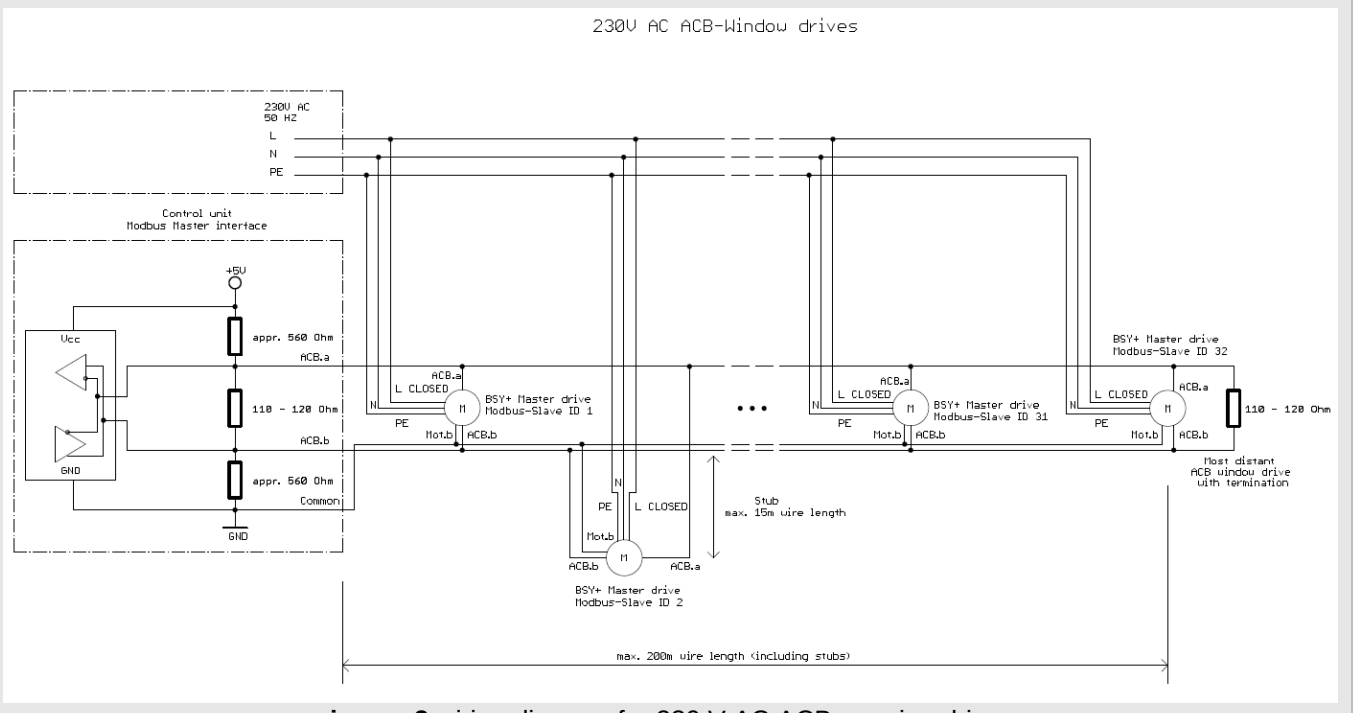

image 2 wiring diagram for 230 V AC ACB opening drives

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4 Process image

4.1 General

The **A**dvanced **C**ommunication **B**us uses the Modbus RTU protocol for communication.

All of the registers mentioned below are 16 bits wide. Both Modbus register types, the input register and the holding register, are used. Modbus-ID 0 is intended for broadcast/multicast messages. Divergent from the Modbus standard, only IDs from 1 to 246 are valid addresses.

The process image is intended exclusively for communication with the master opening drive in one synchronous group. On slave opening drives, control commands are not applied and data are incorrectly returned. If possible, do not connect the BSY+ slave drives to the ACB bus (Modbus) to avoid these errors and to keep the number of Modbus devices as small as possible. The ACB modules, which are slave participants in the BSY+ synchronisation group, are an exception. Further information about BSY+ addressing can be find in chapter 2.2 and 2.3.

The connected ACB drives can be operated only in ventilation mode and the running speed is limited to 7 mm/s (lamella drives 2 mm/s).

In the following tables the Modbus register addresses are shown in decimal followed by hexadecimal put in brackets. The hexadecimal numbers are marked with a prefixed “0x“. All other numbers are decimal.

Indicated is always the real register address as sent in the Modbus telegram (0 based) and not the register number, displaced by 1 (1 based).

4.2 ACB drives and -modules are Modbus-Slaves

The ACB drives and -modules do have the interfaces ACB and BSY+. Regarding the ACB interface the ACB drives and -modules are generally Modbus Slave participants.

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4.3 “Simple” input registers

These input registers provide general information about the drive. These registers can be read only.

In contrast to the input registers up from address 16384 (0x4000) the “simple”-ACB-registers have just one information per register and the address range starts up from decimal value 1000. In this range the most important information is summarised.

The “simple” registers are available at CDC-0xx2-ACB from firmware version B03 and at ZA-ACB from version A05. By updating the firmware with the D+H Software-Tool SCS this function can be added afterwards.

Register-address	Function	Description
1000 (0x03e8)	Actual state of command drive group	Stop: 0 CLOSED: 1 OPEN: 2 Window cleaner: 5 (with lock) Position: 6 None: 31
1001 (0x03e9)	Set-position of position-command (only at position commands, otherwise output value 0)	Unit: % Value range: 0 -100% Position CLOSED: 0 Position OPEN: 100
1002 (0x03ea)	Actual state of positions ventilation (referred to ventilation stroke)	Unit: % Position CLOSED: 0 Position OPEN: ≥ 100
1003 (0x03eb)	Drive group end-position OPEN	Not end-position OPEN: 0 End-position OPEN: 1
1004 (0x03ec)	Drive group end-position CLOSED (At drive groups with lock drives also locked)	Not end-position CLOSED: 0 End-position CLOSED: 1
1005 (0x03ed)	Drive group failure	None failure: 0 failure: 1
1006 (0x03ee)	Drive group condition-code	Possible condition-code are listed in 5.2
1007 (0x03ef)	Actual state of speed	Unit: 1/10 mm/s
1008 (0x03f0)	Actual state of position	Unit: mm
1009 (0x03f1)	General condition (operation mode)	Polarity change: 0 ACB: 1
1010 (0x03f2)	Current drive group	Unit: mA (±50 mA) Current of complete opening drive group except lock drives
1011 (0x03f3)	Supply voltage	Unit: mV

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4.4 Enlarged input registers

These input registers provide general information about the drive. These registers can be read only.

Register-address	Function	Bit-assignment	Description
16384 (0x4000)	default	<5:0> default	Rest: 1 Inactive: 2 Normal : 3 Programming mode: 4
	Common default	<6> Operating mode	Polarity change: 0 ACB: 1
	Internal usage	<15:7>	
16385 (0x4001)	Condition code and BSY+ address	<7:0> Condition code	The condition codes are listed in 5.2
		<15:8> BSY+ address of fault	Value 255 stands for the entire BSY+ drive group
16386 (0x4002)	Actual state of positions	<7:0> Related to ventilation stroke	Unit: % Position CLOESED: 0 % Position OPEN: ≥ 100 %
		<15:8> Internal usage	
16387 (0x4003)	Actual state position (BSY+ Master drive)	<15:0> Value	Unit: mm
16388 (0x4004)	Speed	<7:0> Actual state of speed	Drive stops: 0
		<15:8> Set-speed	Unit: 0.1 mm/s
16389 (0x4005)	Actual state of command drive group	<4:0> Command	Stop: 0 CLOSED: 1 OPEN: 2 Window cleaner (with lock): 5 Position: 6
		<7:5> Internal Usage	
		<15:8> Set-position for position-commands (otherwise no relevance)	Unit: % Value range: 0...100 % Related to ventilation stroke Position commands with 0 % and 100 % are converted as CLOSED and OPEN
16390 (0x4006)	Actual state of drive group	<0> Polarity or 230 V phase-evaluation	Mot. a -: 0 Mot. a +: 1

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			Phase CLOSED: 0 Phase OPEN: 1
		<1> Failure	No failure: 0 Failure: 1 Permanent fault (possibly to be remedied by new move command only)
		<2> Fault	No fault: 0 Fault: 1 Temporary problem, e.g. trigger active anti trap protection
		<3> Internal usage	
		<4> locked (only if lock)	Not locked: 0 locked: 1
		<5> Unlocked (only if lock)	Not unlocked: 0 Unlocked: 1
		<6> Opening drive group CLOSED	Not CLOSED: 0 CLOSED: 1
		<7> Opening drive group OPEN	Not OPEN: 0 OPEN: 1
		<8> Target (command) achieved	1 Only set, when the opening mechanic the end-position “CLOSED” (with lock “locked”) or OPEN achieved. In case the ventilation stroke is shorter than the opening stroke, no “target achieved” after achieving the ventilation stroke end-position will be indicated (Exception: in case of ventilation stroke limitation “generate OPEN signal” is set). More precise information see chapter 5.1
		<15:9> Internal usage	
16391 (0x4007)	Current drive group	<15:0> Current	Unit: mA (±50 mA)

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			Current of complete opening drive group without lock drives
16392 (0x4008)	Travel time	<15:0> Value	Unit: 0.1 s incl. lock, if available
16393 (0x4009)	Supply voltage	<15:0> Value	Unit: mV (±400 mV)
16394 (0x400A) – 16417 (0x4021)	Internal usage		
16418 (0x4022)	Triggering Hi	<7:0> Hi-value	
16419 (0x4023)	Triggering Lo	<15:0> Lo-value	
16420 (0x4024)	Odometer Hi	<15:0> Hi-value	Unit: m
16421 (0x4025)	Odometer Lo	<15:0> Lo-value	

4.5 Identification input registers

These input registers provide identification-information about the drive. These registers can be read only.

Register-address	Function	Bit-assignment	Description
16896 (0x4200)	Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	Net-ID of enquired drive. Complies with the Net-ID printed on the type plate (bytes shown as hexadecimal). Example: 3B-A0-07-6E ^ ^ Byte 3 Byte 0
16897 (0x4201)	Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16898 (0x4202)	BSY+ participant 1/2	<3:0> Quantity opening drives <7:4> Quantity lock drives <11:8> Internal usage	
16899 (0x4203)	BSY+ participant 2/2	<0> Master-Slave <15:1> Internal usage	BSY+ Master drive: 1 BSY+ Slave drive: 0
16900 (0x4204)	Old Modbus-ID	<7:0> ID	Lastly assigned Modbus ID (246 = never assigned an ID)
16901 (0x4205)	Opening drive Slave 1 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	

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16902 (0x4206)	Opening drive Slave 1 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16903 (0x4207)	Opening drive Slave 2 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16904 (0x4208)	Opening drive Slave 2 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16905 (0x4209)	Opening drive Slave 3 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16906 (0x420A)	Opening drive Slave 3 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16907 (0x420B)	Opening drive Slave 4 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16908 (0x420C)	Opening drive Slave 4 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16909 (0x420D)	Opening drive Slave 5 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16910 (0x420E)	Opening drive Slave 5 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16911 (0x420F)	Opening drive Slave 6 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16912 (0x4210)	Opening drive Slave 6 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16913 (0x4211)	Opening drive Slave 7 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16914 (0x4212)	Opening drive Slave 7 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16915 (0x4213)	Lock drive Slave 1 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16916 (0x4214)	Lock drive Slave 1 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16917 (0x4215)	Lock drive Slave 2 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16918 (0x4216)	Lock drive Slave 2 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16919 (0x4217)	Lock drive Slave 3 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16920 (0x4218)	Lock drive Slave 3 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16921 (0x4219)	Lock drive Slave 4 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16922 (0x421A)	Lock drive Slave 4 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16923 (0x421B)	BSY+ gateway 1 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	
16924 (0x421C)	BSY+ gateway 1 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16925 (0x421D)	BSY+ gateway 2 Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	

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16926 (0x421E)	BSY+ gateway 2 Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16927 (0x421F)	BSY+ Master Net-ID 3-2	<7:0> ID Byte 2 <15:8> ID Byte 3	Established with ACB-BSY+-GW1
16928 (0x4220)	BSY+ Master Net-ID 1-0	<7:0> ID Byte 0 <15:8> ID Byte 1	
16929 (0x4221) - 17035 (0x428B)	Internal usage		
17036 (0x428C)	Software version Hi	<15:0> Value	At CDC-0252: 75 00 1x xx[1]
17037 (0x428D)	Software version Lo	<15:0> Value	[1]x xx stands for the version
17038 (0x428E)	Software version date 1	<7:0> Month <15:8> Day	
17039 (0x428F)	Software version date 2	<7:0> Reserve <15:8> Year	
17040 (0x4290)	Article description Product	<15:0> Value	Not defined: 0 VCD: 1 VCD-S: 2 CDC: 3 KA: 4 KA-TW: 5 CDP: 6 CDP-TW: 7 ZA: 8 LA: 9 DXD: 10 FRA: 11 VLD: 12 BDT: 13 SHD: 14 DDS: 15 LD: 16 LAH: 17 CDC-TW: 18 ACB-BSY+-GW 19 CDC-(PL) 20 LDF 21 LDH 22 LDS 23 LDE 24 LDN 25 LDC M24A 26

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			LDC M230A 27 LDE -Short 28 KA-CN 29
17041 (0x4291)	Article description Force	<15:0> Value	0.1 N
17042 (0x4292)	Article description Versions number	<15:0> Value	
17043 (0x4293)	Article description Stroke	<15:0> Value	mm
17044 (0x4294)	Article description Voltage	<15:0> Value	Not defined: 0 12 V DC: 1 24 V DC: 2 48 V DC: 3 115 V AC: 4 230 V AC: 5 Solar: 6
17045 (0x4295)	Article description Technics	<15:0> Value	Not defined: 0 ACB: 1 BSY+: 2 TMS+: 3 PLP: 4 RC: 5
17046 (0x4296)	Article description Mechanical design 1/2	<0> L <1> R <2> SBD <3> SBU <4> OT <5> MT <6> HV <7> M <8> TM <9> MB <10> BM <11> DS <12> HS <13> KM <14> OA <15> ZB	
17047 (0x4297)	Article description Mechanical design 2/2	<0> ON <1> STH <15:2> *Reserve*	
17048 (0x4298)	Article description Program	<0> CP <1> HP <2> IS	

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		<15:3> *Reserve*	
17049 (0x4299)	Article description Signal	<0> BRV <1> VP <2> SA <3> SZ <4> SGI <15:5> *Reserve*	
17050 (0x429A)	Article description Protection class	<0> LS <1> AS2 <2> AS3 <3> SKS <15:4> *Reserve*	
17051 (0x429B)	Maximum stroke	<15:0> Value	mm
17052 (0x429C)	Hardware design	<0> Integrated power pack <1> HS supported <2> Option AS <3> Option SKS <7:4> *Reserved* <8> Option Sx <11:9> *Reserved* <12> Option SGI <15:13> *Reserved*	24 V DC: 0 230 V AC: 1 Only in case of polarity change operation None evaluation HS: 0 With evaluation HS: 1 Without signaller: 0 With signaller: 1 Without SKS: 0 With SKS: 1 None end-position signal: 0 With end-position signal: 1 None positioner: 0 With positioner: 1

4.6 “Simple” holding registers

The holding registers are used to control the drive. They can be accessed for reading and typing as well. This “free” area is always accessible.

Attention:
Operation commands are not executed if drives are in programming mode by reading out or parameterising via the D+H SCS-Tool. The voltage must then be interrupted or a restart must be carried out. Please also refer to register 20560 (0x5050).

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Contrary to the holding registers up from address 20480 (0x5000) “Simple”-ACB register have only one information per register and the address range starts up from the decimal value 2000. In this area the most important control commands will be summarised.

The “Simple” registers are available at CDC-0xx2-ACB up from firmware version B03 and at ZA-ACB up from version A05. By updating the firmware with the D+H Software-Tool SCS this function can be added afterwards.

Register Address	Function	Description
2000 (0x07d0)	Nominal drive command (control command)	Stop: 0 CLOSED: 1 OPEN: 2 Ventilation position: 6 None (without change): 31
2001 (0x07d1)	Nominal-position for position-control command (For the products CDC-ACB, ZA-1-ACB, LDx-1202-1-ACB, KA-1-ACB and ACB-BSY+-GW1-24, the control command "Ventilation position" in register address 2000 does not have to be included in the transmission).	Unit: % Resolution: 1% steps Position CLOSED: 0 Position OPEN: 100
2002 (0x07d2)	Target-speed	Unit: 1/10 mm/s At value = 0 will be driven with the standard-speed of the drive. Value-range: 45 to 70* (lamella drives 5 to 20*) *except closing-area 1
2003-2004 (0x07d3-0x07d4)	*Reserved*	Set with value 0.
2005 (0x07d5)	Multicast-addressing ID 1	Value-range: 0 or 1 By broadcast-messages the drives, who´s Modbus-ID in the multicast-addressing are set (value = 1), take over the control command. For more detailed information look at chapter 5.4
2006 (0x07d6)	Multicast-addressing ID 2	
…	…	
2036 (0x07f4)	Multicast-addressing ID 32	

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4.7 Extended holding registers

The holding registers serve for the configuration of the drive. They can be accessed for reading and writing as well. This “free” area is always available.

Register-address	Function	Bit-assignment	Description
20480 (0x5000)	Operating mode	<0> Mode	Pole change+ACB: 0 ACB: 1 For explanation look at chapter 2.1
20481 (0x5001)	Internal usage		Must be 0
20482 (0x5002)	Nominal-travel action-command	<4:0> Control command	Stop: 0 CLOSED: 1 OPEN: 2 Position: 6 None (without change): 31
		<5> momentary-flag	With this flag at a communication-timeout (1.8 seconds no valid tele-gramm received) stopped
		<6> Internal usage	Must be 0
		<7> with speed	Speed standard: 0 Speed out of 0x5003: 1
		<15:8> Nominal-position for position-control com-mand	Unit: % Position CLOSED: 0 % Position OPEN: 100 %
20483 (0x5003)	Target-speed	<7:0> Value	Unit: 0.1 mm/s Value range: 45 to 70* (lamella drives 5 to 20*) *exceptional closing range 1
20484 (0x5004)	Multicast-addressing 0	<15> Modbus-ID 1 <14> Modbus-ID 2 … <0> Modbus-ID 16	By broadcast-messages the drives, who´s Modbus-ID in the multicast-addressing are set, take over the drive command. For more detailed information look at chapter 5.4
20485 (0x5005)	Multicast-addressing 1	<15> Modbus-ID 17 … <0> Modbus-ID 32	
20486 (0x5006) - *20511 (0x501F)*	Internal usage		
20512 (0x5020)	Modbus-ID	<7:0>	Set of Modbus-ID Value range: 1...246

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			For usage: look at chapter 5.3.2
20513 (0x5021) - 20559 (0x504F)	Internal usage		
20560 (0x5050)	Drive-system-com-mands	<7:0> Value	None: 0 Reset: 2 At all drives of the drive group a reset / reboot will be conducted (at BSY+ a redirection takes place to the Slave drive)

4.8 Object data holding registers

If needed in this address range object-information, e.g. position of window within the object, can be filed.

In the object data holding register information will be filed in textual form. Depending on the data volume the save after writing these registers can take some time. Hence saving of 32 registers (64 Byte) can last up to 200 ms. Meanwhile there is the possibility that the drive will not answer.

Attention: Only program when drive stops!

Register-address	Function	Bit-assignment	Description
36864 (0x9000)	Text 1		UTF-8
…			
36895 (0x901f)	Text 32		UTF-8

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5 Explanations

5.1 End-position evaluation

In the "Simple" register address range, the end position "CLOSED" can be evaluated directly at register address 1004 (0x03ec) and the end position “OPEN” at register address 1003 (0x03eb).

Alternatively, the end positions can be read out via register 16390 (0x4006). The end-position “CLOSED”, respectively with lock drives “LOCKED” is achieved, when in register-address 16390 (0x4006) the bits “opening drives CLOSED” and “target achieved” are set.

The end-position “OPEN” is achieved, when in register-address 16390 (0x4006) the bit “opening drive OPEN” is set. When the ventilation stroke is less than the opening stroke, “no target achieved” after achieving the ventilation stroke end-position appears. Exceptional case: When the drive is parameterised to ventilation-stroke-limitation “OPEN-signal generate”.

At position-drive-commands it is condition-code 65 after achieving the nominal-position in the register at address 16385 (0x4001). This means “control command “Position” target position achieved”.

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5.2 Condition-code (contains faults, failures and conditions)

Condition	Value
No fault	0
Communication fault BSY+ Slave (e.g. disconnection)	1
Communication fault BSY+	2
Communication fault BSY+	3
Communication fault BSY+	4
Emergency cut-off, opening drives do have too huge position difference to each other	5
End-position „OPEN“, one drive	7
Emergency cut-off,, transmission unit does not rotate	8
Emergency cut-off,, over-load	9
End-position “CLOSED“, trail timeout	10
End-position “CLOSED“	11
End-position “CLOSED“ with reverse, trail timeout	12
End-position “CLOSED“ with reverse	13
Stop, new drive command	14
Internal usage	15
End-position ventilation stroke „OPEN“	16
Emergency cut-off, triggering option SKS (external)	17
Emergency cut-off, 1. triggering option SKS (external)	18
Emergency cut-off, 2. triggering option SKS (external)	19
Emergency cut-off, 3. triggering option SKS (external)	20
Emergency cut-off, 4. triggering option SKS (external)	21
Emergency cut-off, 5. triggering option SKS (external)	22
Emergency cut-off, 6. triggering option SKS (external)	23
Emergency cut-off, 7. triggering option SKS (external)	24
Emergency cut-off, 8. triggering option SKS (external)	25
Emergency cut-off, 9. triggering option SKS (external)	26
Emergency cut-off, 10. triggering option SKS (external)	27
Emergency cut-off, 11. triggering option SKS (external)	28
Emergency cut-off, 12. triggering option SKS (external)	29
Emergency cut-off, 13. triggering option SKS (external)	30
Emergency cut-off, 14. triggering option SKS (external)	31
Emergency cut-off, 15. triggering option SKS (external)	32
Emergency cut-off, 16. triggering option SKS (external)	33
Waiting time after opening due to triggered active closing edge protection / option SKS	34
Opening drive group stop due to RDZ end-position “OPEN” (only pole-change operation)	35
Opening drive group stop due to RDZ end-position “CLOSED” (only pole-change operation)	36
DEF_BSY_FEH_ANSWER_FAULT_SIGNAL_SLAVE	37
Communications fault BSY+	38
Communications fault BSY+	39
Emergency cut-off, over-load active closing-edge-protection (internal)	40
Emergency cut-off, 1. over-load active closing-edge-protection (internal)	41
Emergency cut-off, 2. over-load active closing-edge-protection (internal)	42
Emergency cut-off, 3. over-load active closing-edge-protection (internal)	43
Emergency cut-off, 4. over-load active closing-edge-protection (internal)	44

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Emergency cut-off, 5. over-load active closing-edge-protection (internal)	45
Emergency cut-off, 6. over-load active closing-edge-protection (internal)	46
Emergency cut-off, 7. over-load active closing-edge-protection (internal)	47
Emergency cut-off, 8. over-load active closing-edge-protection (internal)	48
Emergency cut-off, 9. over-load active closing-edge-protection (internal)	49
Emergency cut-off, 10. over-load active closing-edge-protection (internal)	50
Emergency cut-off, 11. over-load active closing-edge-protection (internal)	51
Emergency cut-off, 12. over-load active closing-edge-protection (internal)	52
Emergency cut-off, 13. over-load active closing-edge-protection (internal)	53
Emergency cut-off, 14. over-load active closing-edge-protection (internal)	54
Emergency cut-off, 15. over-load active closing-edge-protection (internal)	55
Emergency cut-off, 16. over-load active closing-edge-protection (internal)	56
Communications fault BSY+	57
Internal usage	58
End-position “OPEN”, trail timeout	59
Lock drive (VLD 51-BSY+) service-position achieved	60
Emergency cut-off lock drive	61
Emergency cut-off	62
Waiting time “course-interruption” acoustic signal	63
Start delay acoustic signal	64
Control command “Position” target position achieved	65
Internal usage	66-255

5.3 ACB address (Modbus-ID)

5.3.1 Address-range of Modbus-ID

The Modbus-ID 247 is reserved for internal purposes. The address 0 will be used for broadcast / multicast-messages.

BSY+ Master-drive should get Modbus-IDs from 1 to 32.

BSY+ Slave-drives, which are also connected to ACB, do not need to get a special Modbus-ID. The factory-setting (245) can be retained. These drives are not relevant for the ACB operation.

5.3.2 Set a Modbus-ID

It is possible, to solely describe the register of the Modbus-ID at register-address 20512 (0x5020). Due to this the ID will be changed with the next (following) answer. Hence this method must not be used in combination with broadcast-messages, but only at direst addressing. In this way the answer of the ID change will be sent with the old/former ID. Subsequent the device is available via the new ID. For this method this register-address must be described exceptionally.

As an alternative the Modbus-ID of the opening drive can be parameterised / changed via its BSY+ interface by using the D+H Software-Tool SCS.

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5.4 Multicast-addressing for drive commands

Following possibilities do exist to send drive commands to the drives:

- Addressing of a drive by its Modbus-ID
- Broadcast-addressing: All connected Modbus drives take the drive command
- Multicast-addressing: This is also a broadcast-addressing of the drive command, that by simultaneous description of the registers 0x5004 and 0x5005, at “Simple”-ACB registers 2005 (0x07d5) up to 2036 (0x07f4), will be taken only from the drives that are defined there.

At the multicast drive command always an interrelated broadcast drive command must be sent to the registers 20482 (0x5002) up to 20485 (0x5005), at “Simple”-ACB register 2000 (0x07d0) up to 2004 (0x7d4). In the registers 20484 (0x5004) and 20485 (0x5005), at “Simple”-ACB registers 2005 (0x07d5) up to 2036 (0x07f4), the Modbus-IDs will be defined, for those the command supposed to be effective. Each bit, at “Simple”-ACB each register, corresponds to a Modbus-ID.

5.5 Tips for conversion of hexadecimal numbers

To work with the manual, it is inevitable to follow up with hexadecimal numbers and to use them. Background is, that on the one side the register-addresses are indicated as hexadecimal, but whereas in some Modbus tools must be indicated as decimal. Another reason is, that several information is summarised in the registers and therefore is a binary or hex information necessary.

The Modbus-registers are 16 bits respectively 2 bytes huge.

For indication of a hexadecimal numbers it starts with “0x”, followed by the numbers. At 16 bit it is 4 numbers “0x0000”. Thereby a byte has two numbers. See image 3.

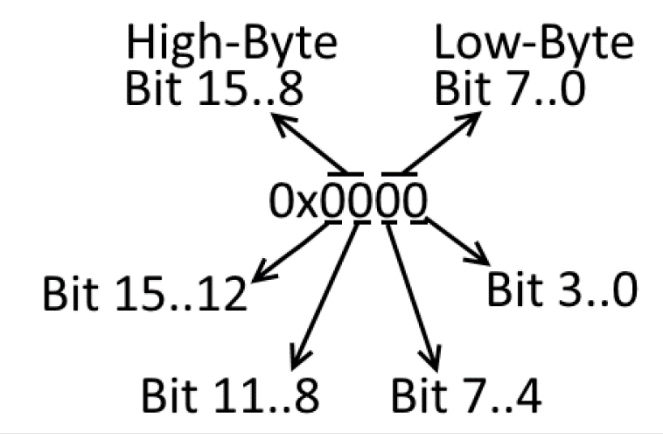

image 3

In binary writing there are 16 numbers whereby each number one bit represents. The hexadecimal number mapped in image 3 looks in bit-writing as follow: 0000 0000 0000 0000
The most significant bit is at left position and right side of it in descending order the low-order bits written.
For the conversion from decimal- to hexadecimal- or binary numbers e.g. the “Windows”-calculator can be used. This must be switched to mode “Programmer”. For this see image 4.

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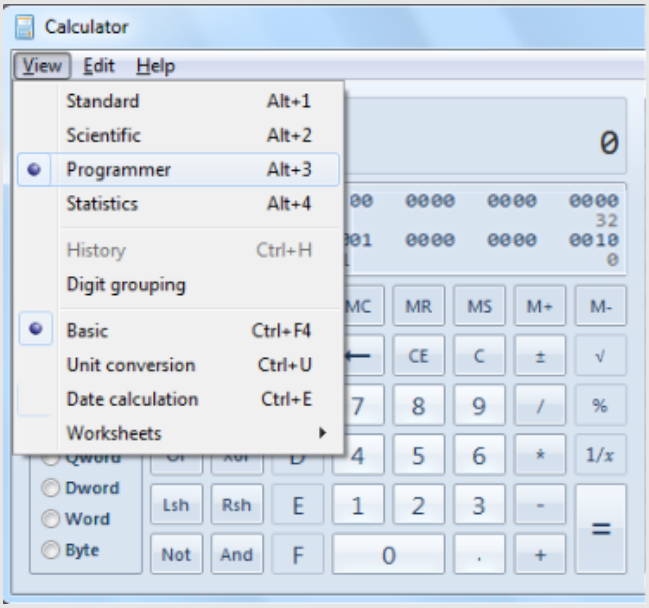

image 4

To convert the hexadecimal number 0x5002 into decimal following inputs are necessary:

- Click on button “Hex”
- Input of number 5002
- Click on button “Dez”

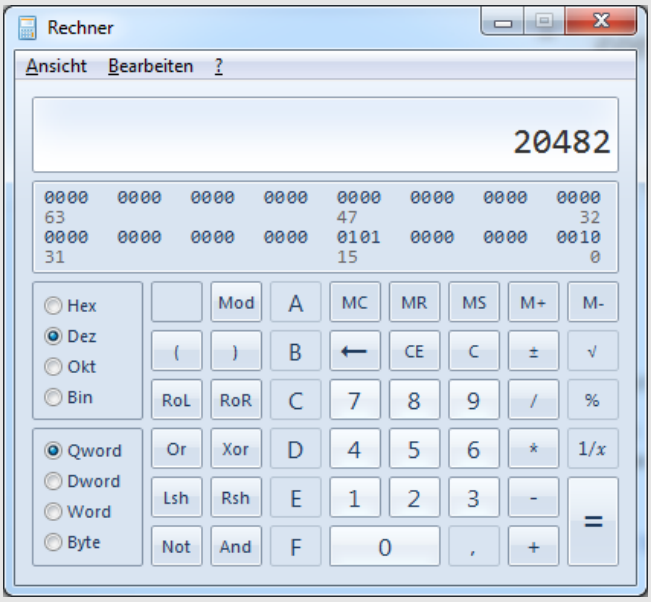

image 5

The displayed result is the number 20482.

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5.6 Usage of Modbus for operation of D+H ACB drives

With program Modbus Poll and the D+H converter BI-USB-V3 the ACB communication can be tested. At the predecessor model BI-USB-V2 the hardware coding has to be adapted by two slide switches or jumper to ensure a function.

To that the following four examples will be shown to you. In a similar manner the communication from a building management automation could be implemented.

In preparation the interface-parameters of program Modbus have to be adjusted. To that see image 6.

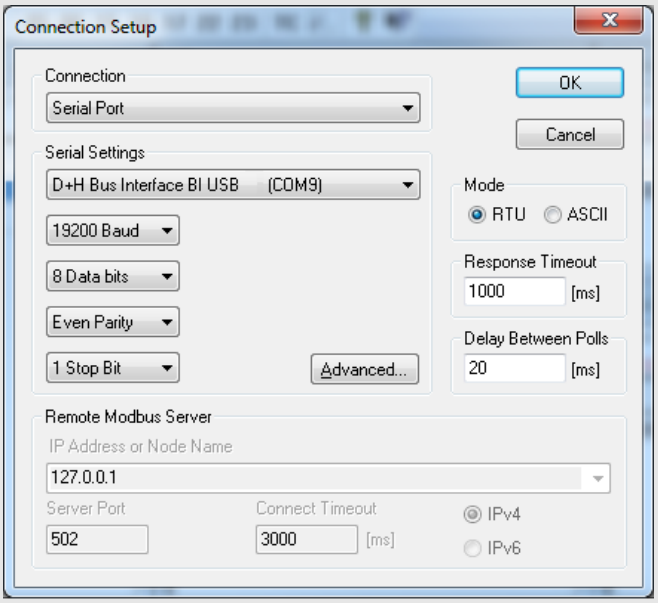

image 6

5.6.1 Example 1 “Modbus-ID 1 move to position 50%” register-address 20482 (0x5002)

The ACB drive can be driven to position, by describing the holding register address 20482 (0x5002) with the corresponding movement command within the Modbus function 6.

Click on “File” in the menu bar in program Modbus Poll and choose there the menu item “New”. A new window pops up on the desktop. To setup the Modbus function for this window now click “Setup” in the menu bar and choose “Read/Write Definition” in the following.

In window “Read/Write Definition” following adjustments have to set:

- Slave ID: Enter the Modbus-ID of the D+H ACB drive here. In this case the address “1”
- Function: Choose the function 6 “Write Single Register”
- Address: With the holding register address 20482 (0x5002) the movement command of the D+H ACB drive will be set. The register-addressing happens in decimal in Modbus Poll. The hexadecimal register-address 0x5002 correspondents with the value 20482 in decimal. Enter this value
- Quantity: Set to “1”
- View-Rows: Click button “Fit to Quantity”

For this see image 7.

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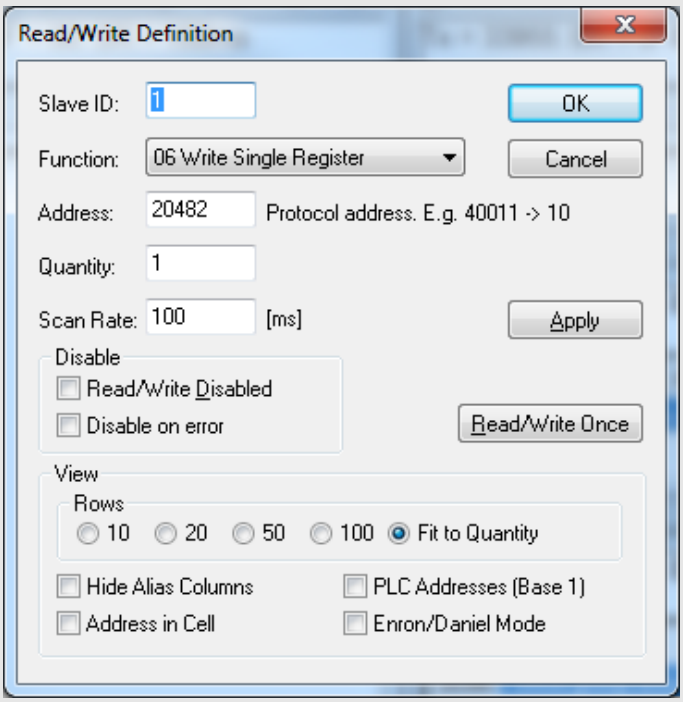

image 7

Choose “Display” in menu item and click in the following menu on “Hex”. For this see image 8.

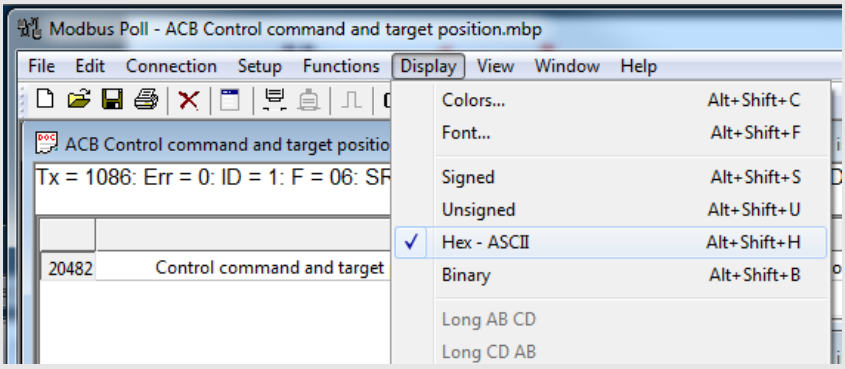

image 8

Next the command “Position” and “50%” have to be set in the register.

The register 20482 (0x5002) “Nominal travel-action-command” is composed as follows:

- **Bit 4..0**: Set operation command “Position” to **6**
- **Bit 7..5**: Set to value **0**
- **Bit 15..8**: Set nominal-position for position-operation-command to value **50**%

The low-values must be converted to hex numbers:

- Operation-command “Position”: 6 has been converted to hexadecimal 0x06
- Nominal-position for “Position-operation-command” 50%: 50 has been converted to hexadecimal 0x32

Merging the low-values results to value: 0x3206

By double-clicking on value of the registers it can be set to “3206”. For this see image 9 and 10.

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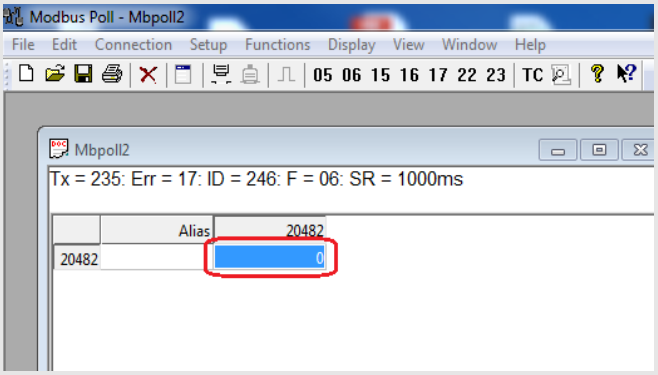

image 9

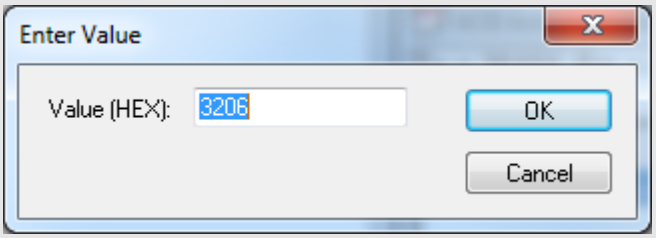

image 10

After clicking on “OK”-button the D+H ACB drive moves to position 50%.

5.6.2 Example 2 “Modbus-ID 1 read out drive-position in %” register-address 16386 (0x4002)

Click on “File” in the menu bar in program Modbus Poll and choose there the menu item “New”. A new window pops up on the desktop. To setup the Modbus function for this window now click “Setup” in the menu bar and choose “Read/Write Definition” in the following.

In window “Read/Write Definition” following adjustments have to set:

- Slave ID: Enter the Modbus-ID of the D+H ACB drive here. In this case the address “1”
- Function: Choose the function 4 “Read Input Registers”
- Address: With input register-address 16386 (0x4002) the nominal-position of the D+H ACB drive will be read out in %. The hexadecimal register-address 0x4002 corresponds with the value 16386 in decimal. Enter this value.
- Quantity: Set to “1”
- View-Rows: Click button “Fit to Quantity”

For this see image 11.

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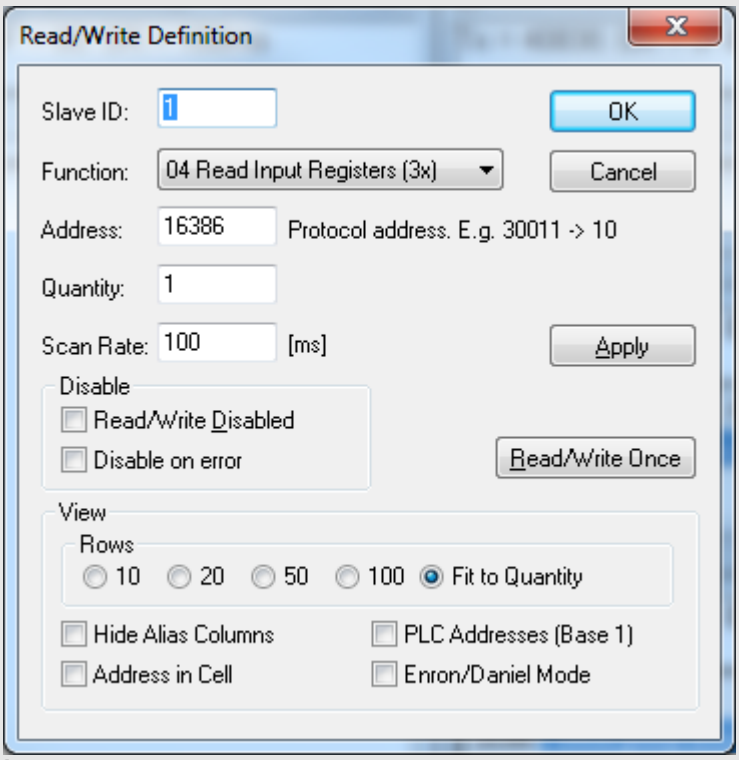

image 11

Choose for menu item “Display” and click in the following menu on “Hex”. For this see image 12.

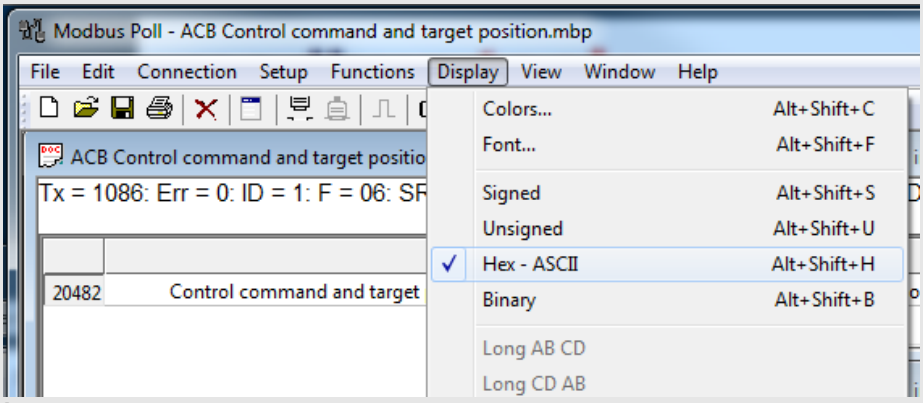

image 12

In the window the position of the drive will be shown in % as a hexadecimal number. For this see image13.

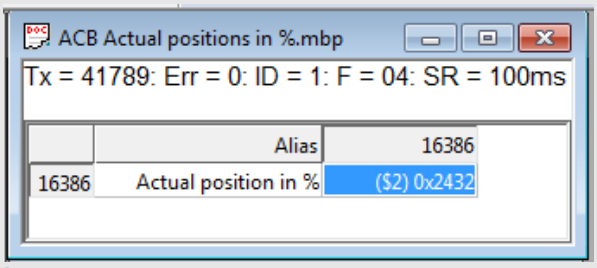

image 13

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In the displayed register 16386 (0x4002) the number 0x2432 will be indicated. The low-values of bit 7..0 are the current position in %.

The hexadecimal number “0x32” corresponds with the value 50 in decimal, which is the ventilation position **50%**. The low-values of bit 15..8 are used internally and can be ignored.

5.6.3 Example 3 “Modbus-ID 1 read out drive-position in mm” register-address 16387 (0x4003)

Click on “File” in the menu bar in program Modbus Poll and choose there the menu item “New”. A new window pops up on the desktop. To setup the Modbus function for this window now click “Setup” in the menu bar and choose “Read/Write Definition” in the following.

In window “Read/Write Definition” following adjustments must be set:

- Slave ID: Enter the Modbus-ID of the D+H ACB drive here. In this case address “1”
- Function: Choose the function 4 “Read Input Registers”
- Address: With the input register-address 16387 (0x4003) the nominal-position of the D+H ACB drive will be read out in mm. The hexadecimal address 0x4003 corresponds with the value 16387 in decimal. Enter this value.
- Quantity: Set to “1”
- View-Rows: Click the button “Fit to Quantity”

For this see image 14.

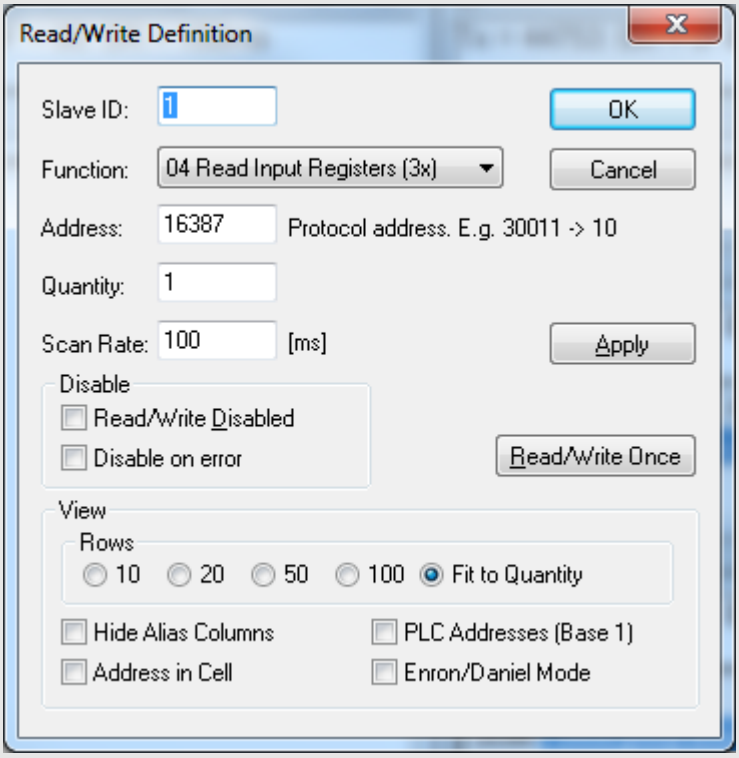

image 14

At input register 0x4003 (16387) no low-values will be used. For this choose for menu item “Display” and click on “Unsigned” in the menu, what stands for a positive decimal number.
Choose for menu item “Display” and click on “Hex” in the following neu. For this see image15.

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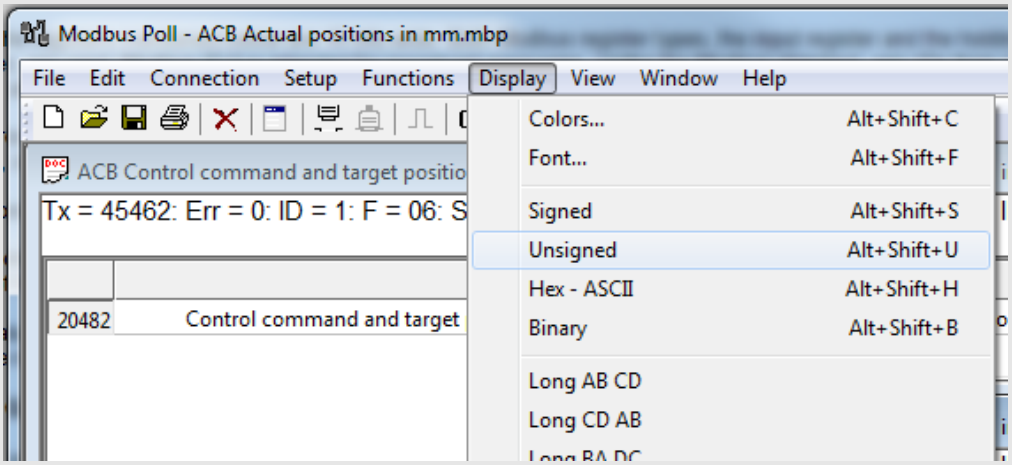

image 15

In the window the position is shown in “mm”. If needed a description of the register-address can be added. For this, double-click on table cell “Alias” and enter a labelling. For this see image 16.

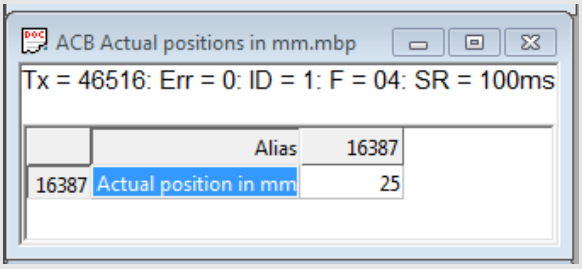

image 16

5.6.4 Example 4 „Modbus-ID 1 read out drive status register-address 16390 (0x4006)

Click on “File” in the menu bar in program Modbus Poll and choose there the menu item “New”. A new window pops up on the desktop. To setup the Modbus function for this window now click “Setup” in the menu bar and choose “Read/Write Definition” in the following.

In window “Read/Write Definition” following adjustment must be set:

- Slave ID: Enter the Modbus-ID of the D+H ACB drive here. In this case address “1”
- Function: Choose the function 4 “Read Input Registers”
- Address: With input register-address 16390 (0x4006) the nominal-position of the D+H ACB will be read out in mm. The hexadecimal register-address 0x4006 corresponds with the value 16390 in decimal. Enter this value.
- Quantity: Set to “1”
- View-Rows: Click to button “Fit to Quantity”

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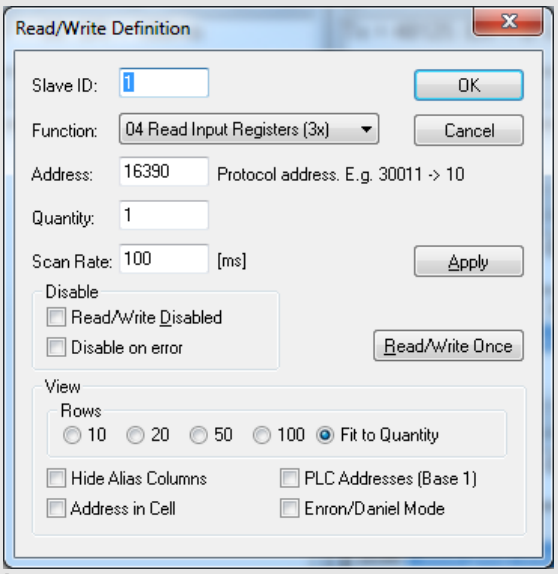

image 17

The status information stands bit by bit in the register. For this choose for menu item “Display” and click in the following menu on “Binary”. For this see image 18.

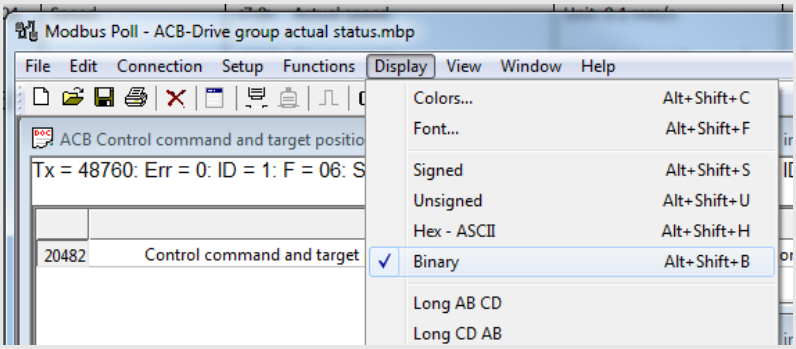

image 18

Each number of the indicated value stands for a bit.

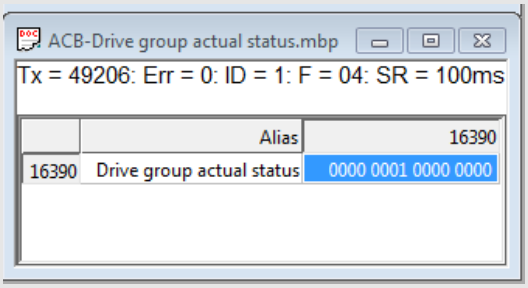

Image 19

The most significant bit 15 stands left side and in descending order right side of them the low-order points are written.

In our example is bit 8 “1” and all other bits of the registers 16390 (0x4006) are “0”. This means that the drive achieved its end-position.
Next the movement-command “1” CLOSED will be set in holding register-address 20482 (0x5002). This command moves the drive to end-position CLOSED and does not need a target-position.

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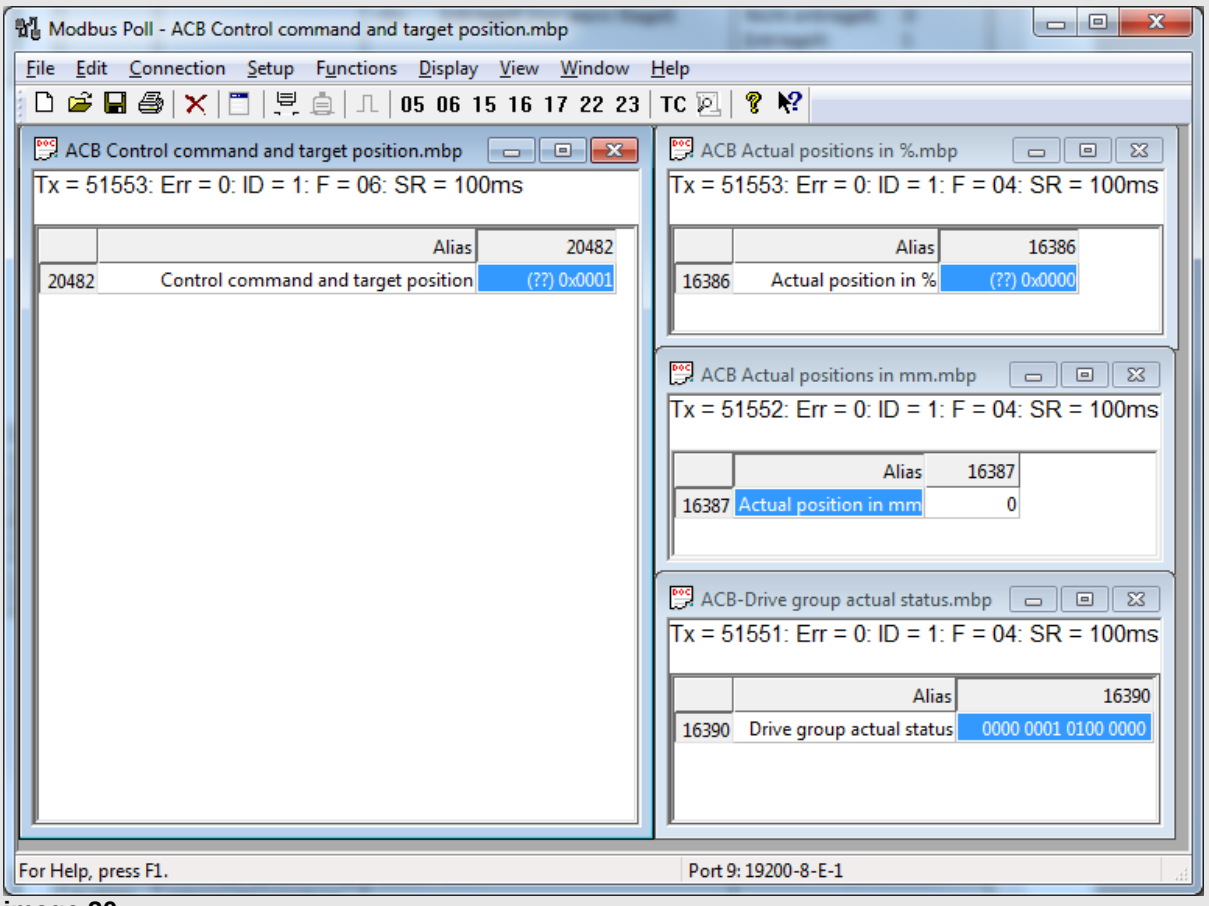

image 20

Image 20 shows, that the D+H ACB drive achieved the end-position CLOSED. The current position is 0% and 0 mm. The status registers bit 6 and 8 are set.

This means that the target-position has been achieved and the drive is closed completely.

Notice:
In case of using a drive group including additional D+H lock drive, e.g. VLD 51/038-BSY+, bit 4 will be set in addition, after successful locking. The “Target achieved” bit will be set only, if the drive and the lock drive are closed.

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