Dynavert – Modbus TCP

For Dynavert the possibility has been created to communicate via MODBUS TCP now.

The MODBUS protocol is a worldwide distributed communication protocol which is based on a master/slave- resp. client/server architecture being available to all users and supported by many manufacturers. It was developed for the communication with programmable logic controllers.

Modbus has established itself as standard in the industry. Based on it MODBUS/TCP was developed for application in modern networks. Today, this protocol is an open Internet-Draft-Standard which was incorporated into the organization being responsible for the Internet standardization. Due to this availability all manufacturers and users may implement this protocol.

– By means of Modbus one Master (e.g. one PC) and several slaves (e.g. measuring and control systems) can be linked. For the data transfer it is differentiated between three different modes of operation:

- MODBUS ASCII
- MODBUS RTU
- MODBUS TCP

By the increasing expansion of the Ethernet communication, both in the industrial and office sector, MODBUS/TCP becomes more and more used in all branches. In particular, heterogenic system landscapes are typical fields of application.

MODBUS RTU for conventional serial communication has already been available for Dynavert for a long time, MODBUS/TCP was created as other communication possibility now.

Attached hereto you will find a document containing further information to the corresponding unit PCB as well as explaining the use. This PCB is available on request.

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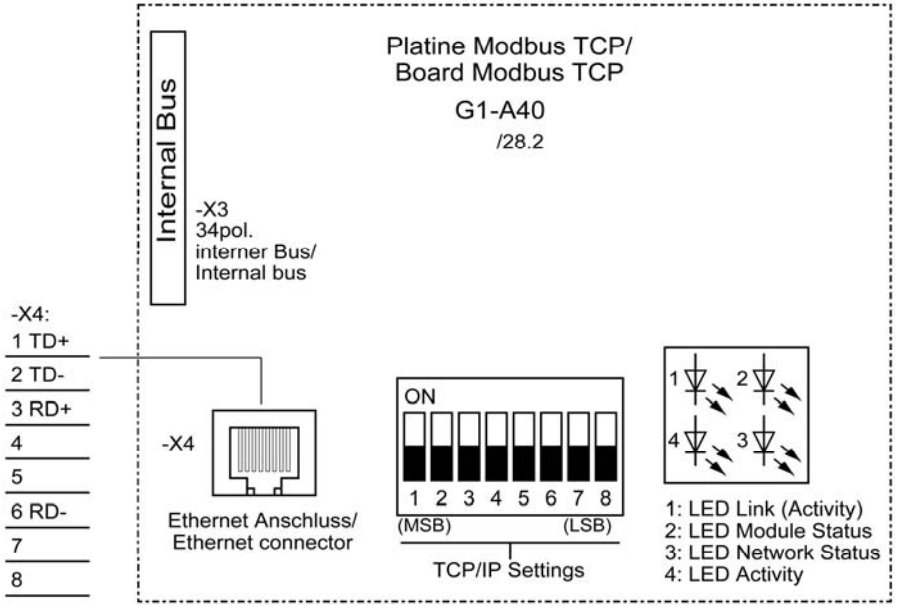
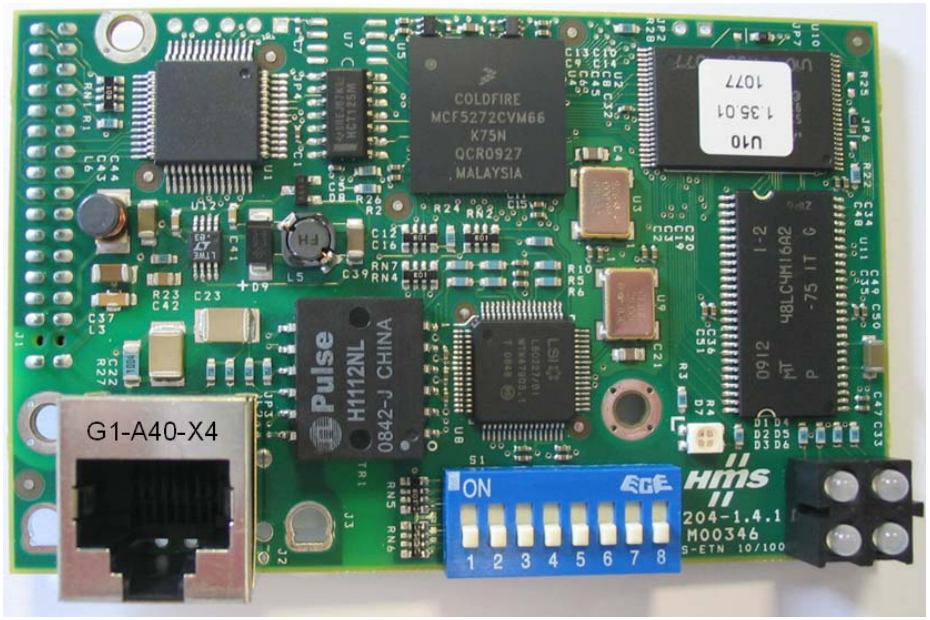
Modbus Parameter Mapping for DYNAVERT T-Drives

LOHER

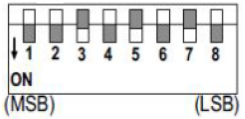
DYNAVERT Umrichter

Modbus communication board (Modbus TCP)



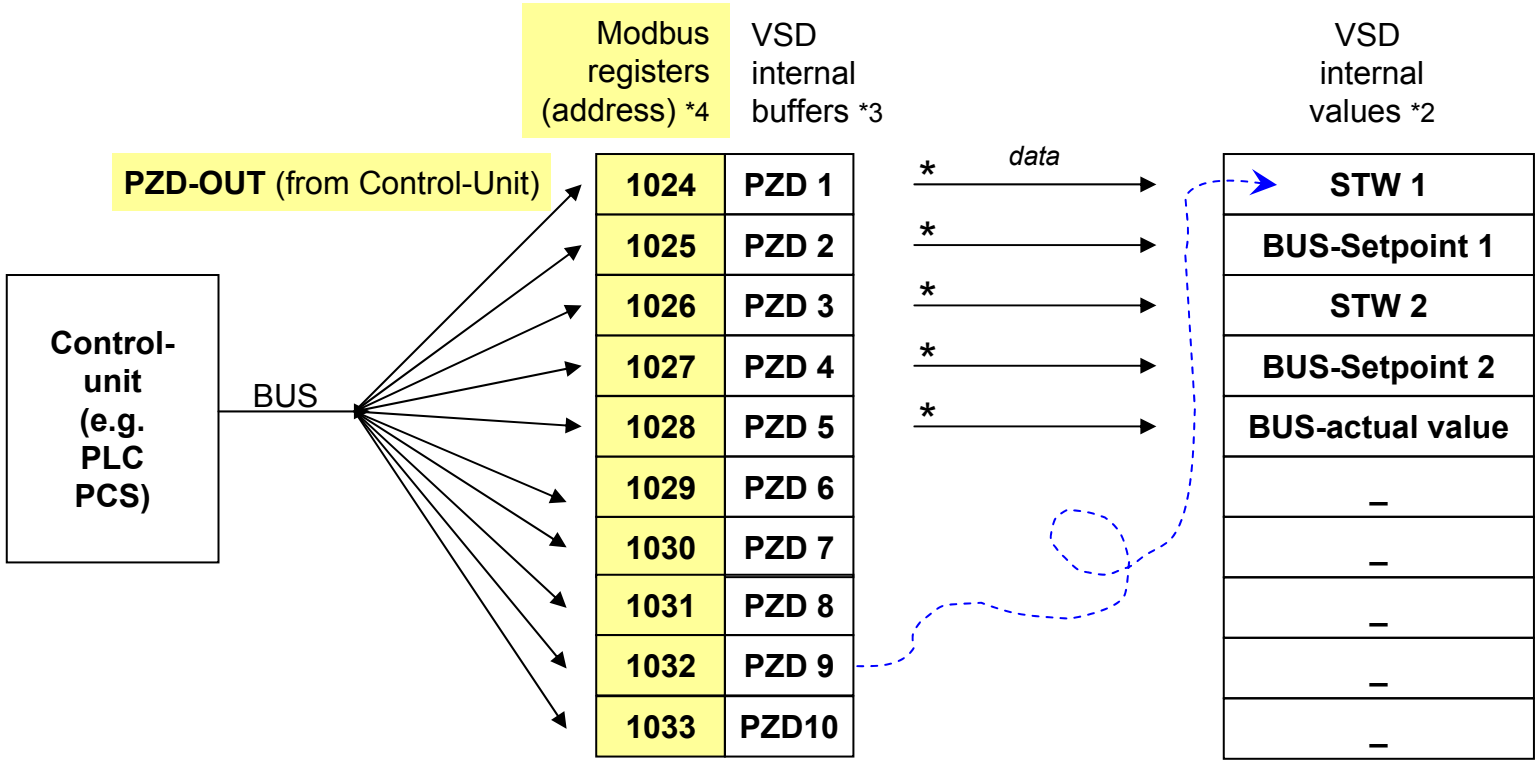


Component	Function	
LED 1 "Link (Activity)"	Aus	No Connection found
	Grün leuchtend	Connection found
LED 2 "Module Status"	Aus	No supply voltage for the module
	Grün blinkend (1 Hz)	No IP-address set by the configuration switches
	Rot blinkend (1 Hz)	No valid MAC-address (internal error)
	Rot blinkend (2 Hz)	Ethernet configuration could not be read from flash
	Rot blinkend (4 Hz)	Internal error (fatal)
	Rot	Already used IP-address found
LED 3 "Network Status"	blinkt n-mal	The amount of flashes of the LED equals the Modbus-TCP connections
LED 4 "Activity"	Grün blinkend	Data transfer in progress (send/receive)

Component	Function
Dip-Switches for configuration	The Dip-Switches define the last Byte of the IP-Address
	TCP/IP-settings with IMS-software: Select "PARAMETER" -> "P-INTERFACE" -> "P-Profibus/Modbus" -> "P-Modbus TCP". There the Parameters for IP-Address TCP/IP and Sub-Net TCP/SN as well as the Gateway TCP/GW can be selected. TCP/IP-settings with Hardware (Dip-Switches): To use the Hardware (Dip-Switches) you have to set the IP-Address to 0-0-0-0 (by use of the IMS-Software as described above). In case the IP is set to 0-0-0-0 the following standards will be used by completion with the setting of the Dip-Switches: IP-Address: 192.168.0.X (X is the value of the Dip-Switch) Gateway: 0.0.0.0 Subnet: 255.255.255.0 The Dip-Switches define the last Byte of the IP-Address (binary coded). The IP-Address of the example on the left is 192.168.0.42 (out of 32+8+2)

Control unit ***writes*** data to inverter (PCS) --> (VSD)

Variable Speed Drive (VSD) is always passive from Modbus communication point of view. VSD provides selected internal values to registers via internal buffers. The Control unit has to read or ***write*** to the VDS “registers”



(*4) Modbus-Register addresses from 1024 to 1033 are fixed set by the VSD-System and could not be changed or modified!

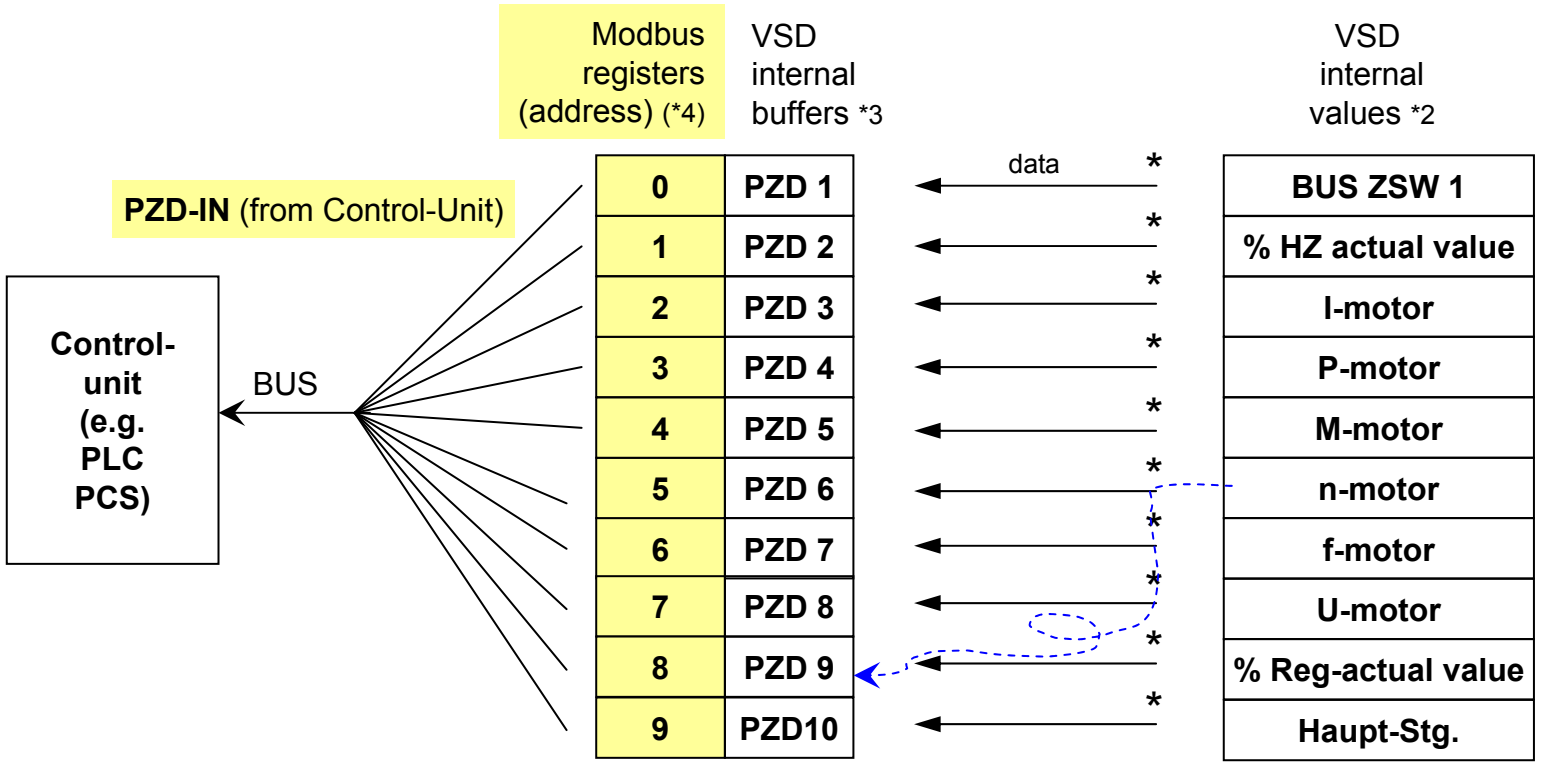
(*) Each correlation between internal value of the VSD and the internal PZD-buffer could be changed individual if needed (-> e.g. like with the blue lines shown)

(*2) From the Host accessible Internal VFD-values are: STW 1, BUS-Setpoint 1, STW 2, BUS-Setpoint 2, BUS-actual value. This values could be arranged by use of the Inverter Management System (IMS) to any of the PZD-buffers

(*3) Each VSD offers 10 PZD-buffers (registers) in both directions

Control unit *reads* data from inverter (PCS) <-- (VSD)

Variable Speed Drive (VSD) is always passive from Modbus communication point of view. VSD provides selected internal values to registers via internal buffers. The Control unit has to *read* or write to the VDS “registers”



(*4) Modbus-Register addresses from 0 to 9 are fixed set by the VSD-system and could not be changed or modified!

(*) Each of the correlation between internal values of the VSD and the internal buffer could be changed individual if needed (-> e.g. like with the blue lines shown)

(*2) Other internal VFD-values could be chosen (selected) by use of the Inverter Management System (IMS)

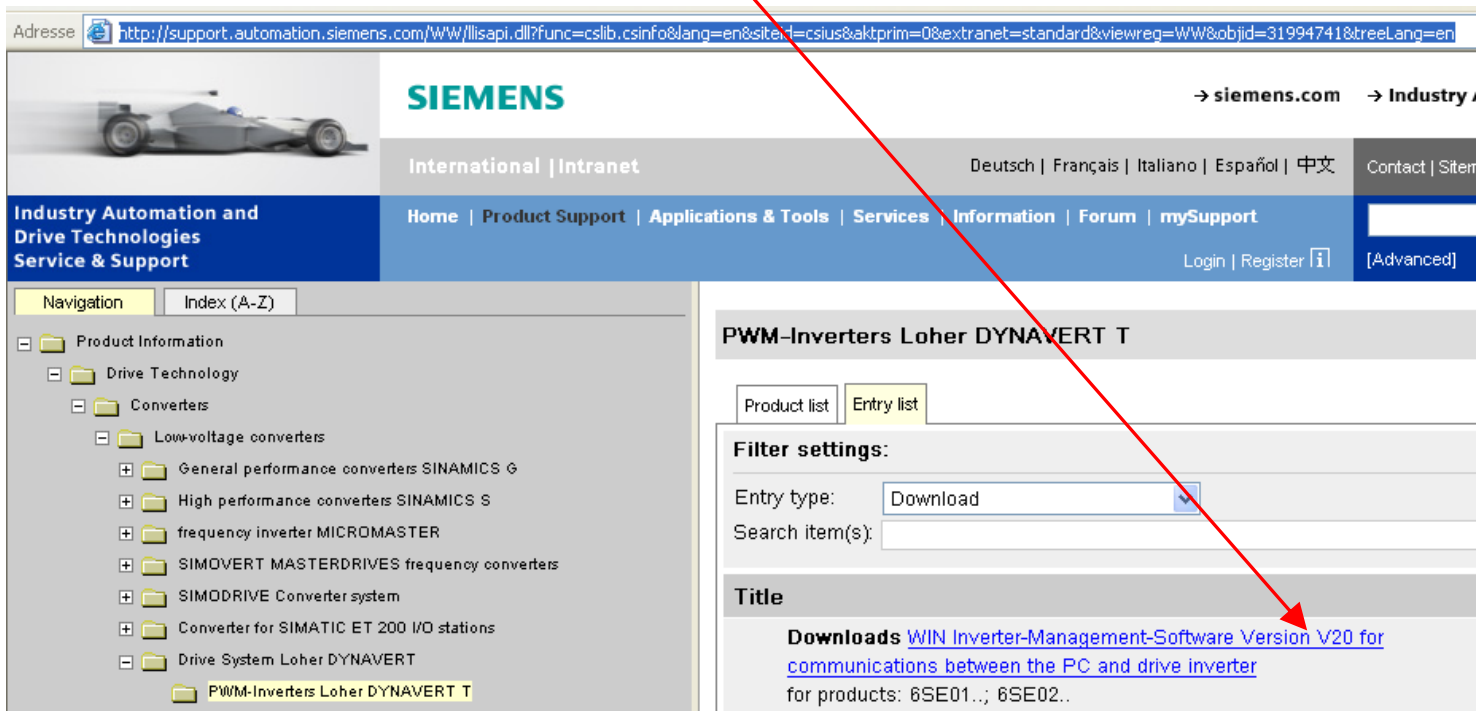
*3 Each VSD offers 10 PZD-buffers (registers) in both directions

Setup of the VSD buffers with internal values – How does this work?

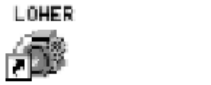
To better understand the setup of the internal buffers download the **IMS-Software** and install it.
You will work in “offline mode” and see directly, what is possible to do and what values are available in the system.
Don’t worry, the software is small and easy to operate and you will really better understand the system within minutes!
-> Use this link for download:

http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=en&siteid=csius&aktprim=0&extranet=standard&viewreg=WW&objid=31994741&treeLang=en

-> The Link will show you this page, click on the download and install the software!

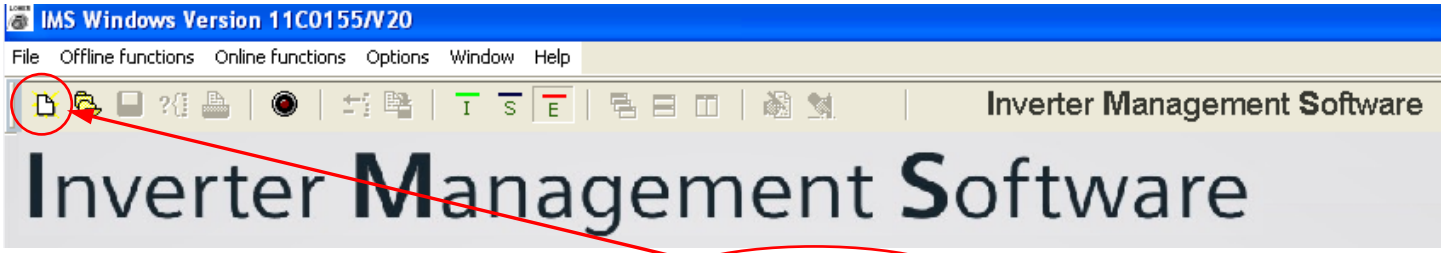


-> After Installation you get this icon to start IMS with:

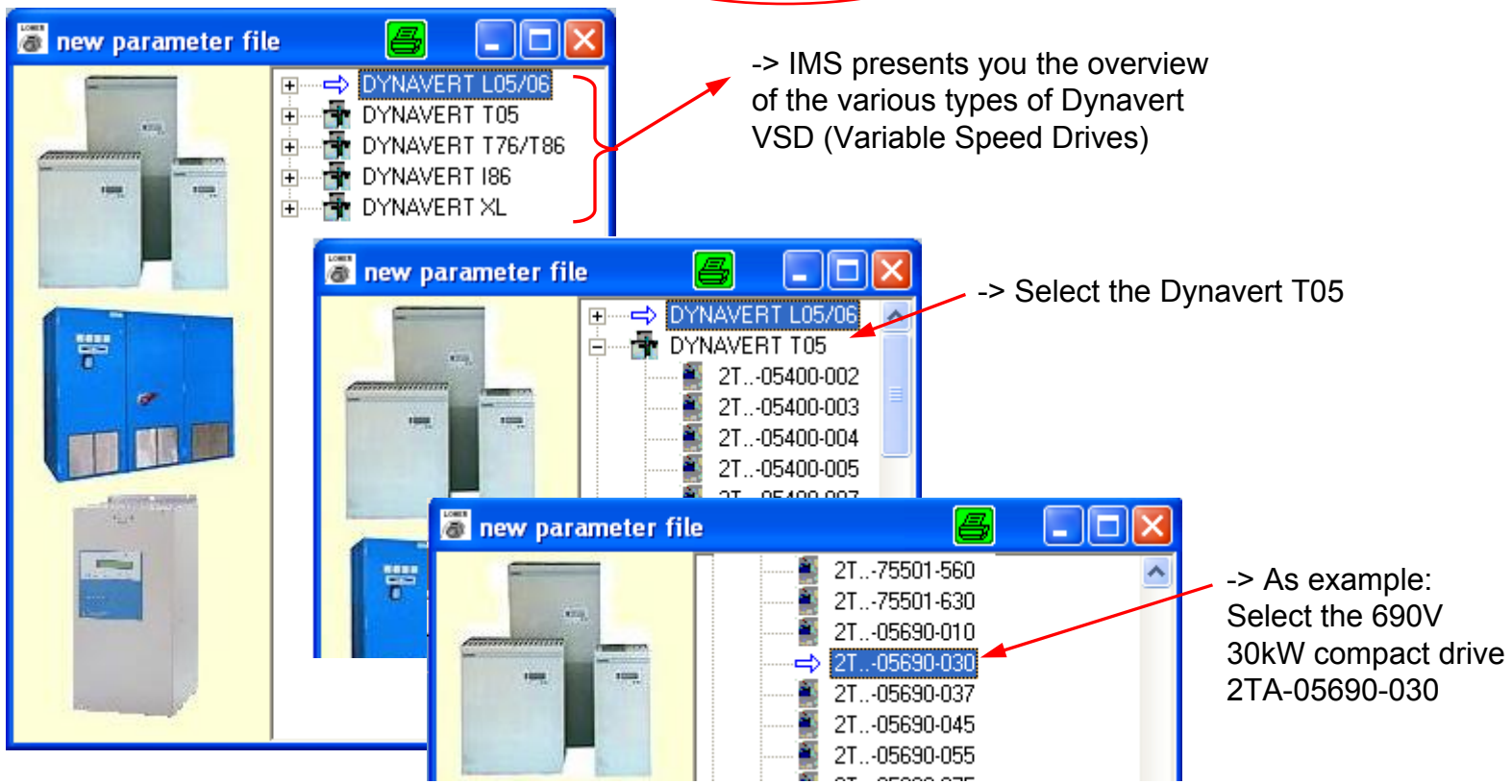


Setup of the VSD buffers with internal values – How does this work?

-> IMS starts with a screen like this….



-> You can start immediately by click on the "set up new Inverter" button (you are automatically in "offline")



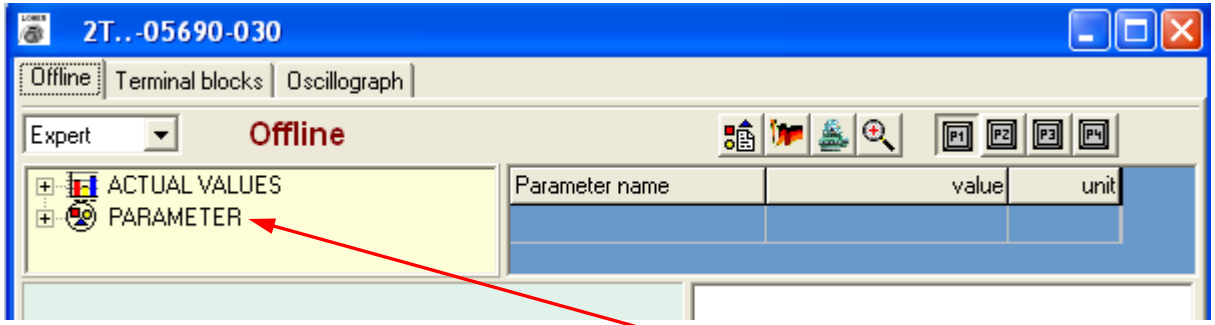
-> IMS presents you the overview of the various types of Dynavert VSD (Variable Speed Drives)

-> Select the Dynavert T05

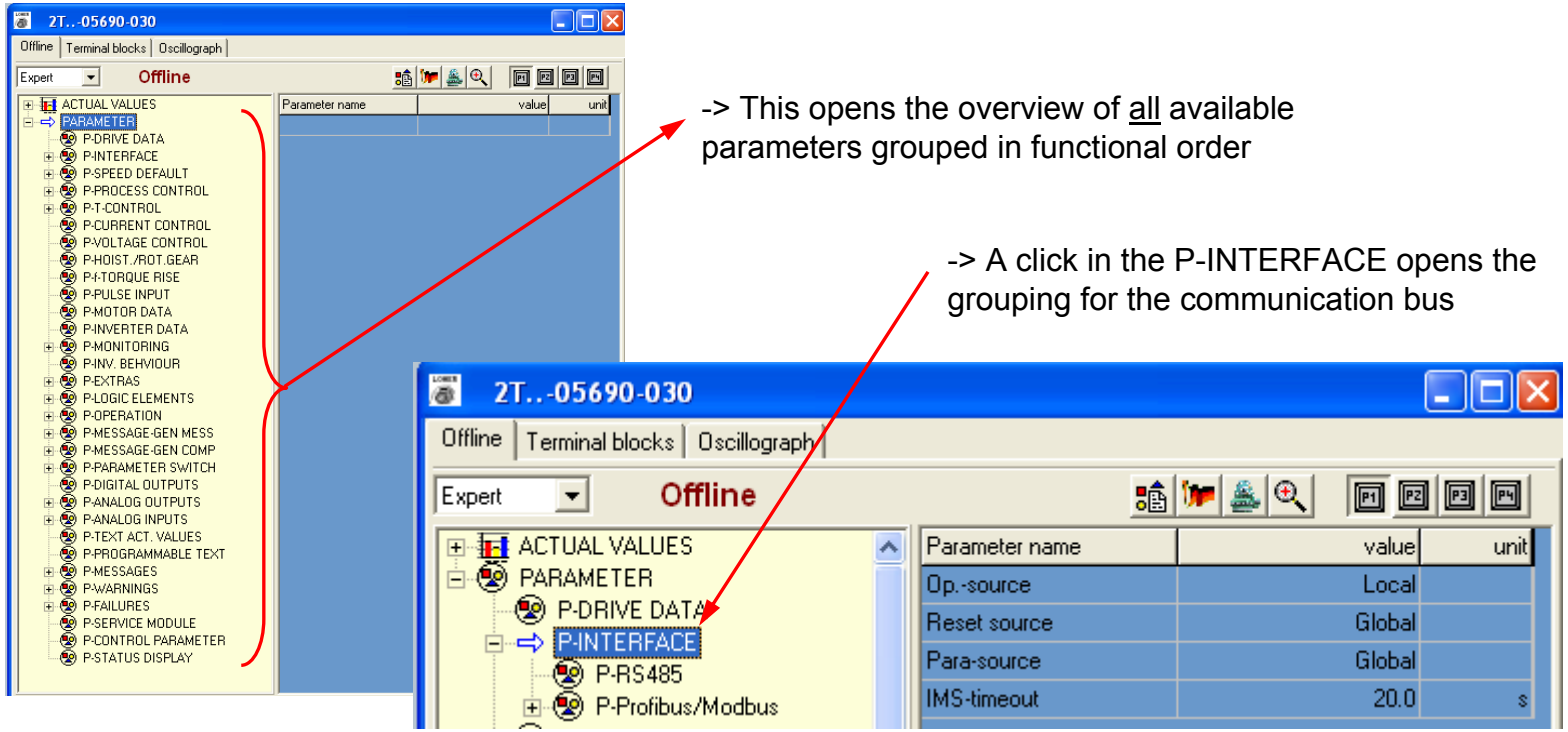
-> As example: Select the 690V 30kW compact drive 2TA-05690-030

Setup of the VSD buffers with internal values – How does this work?

-> You are now getting access to the parameters of the Dynavert T – Drive….



-> Open the parameter set with a click on “PARAMETER”

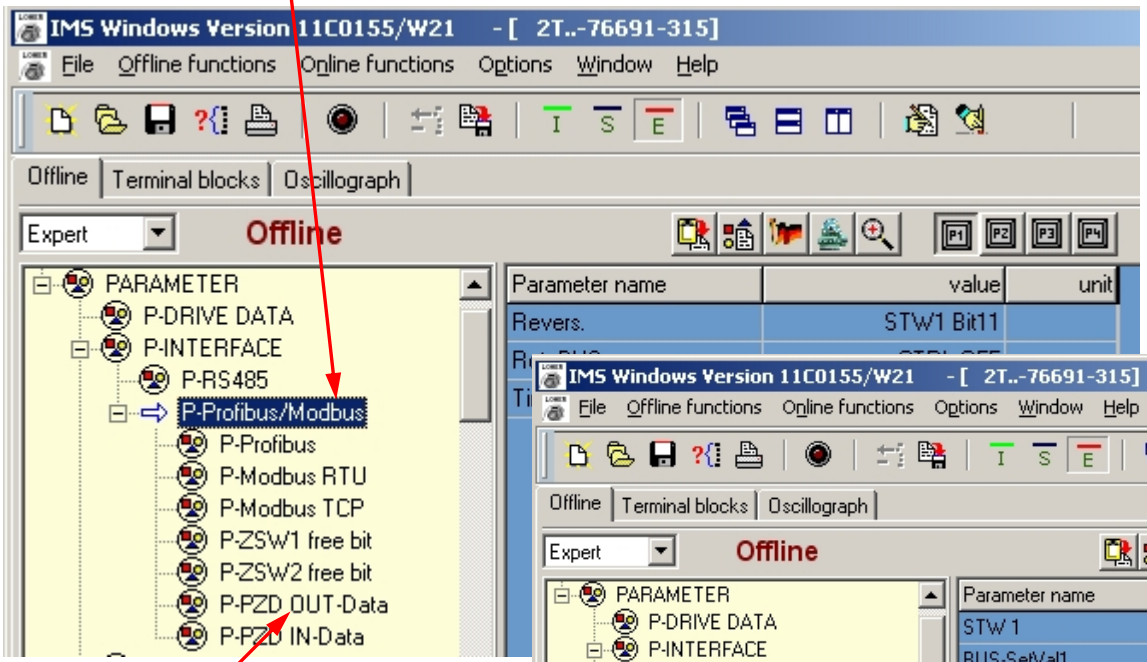


-> This opens the overview of <u>all</u> available parameters grouped in functional order

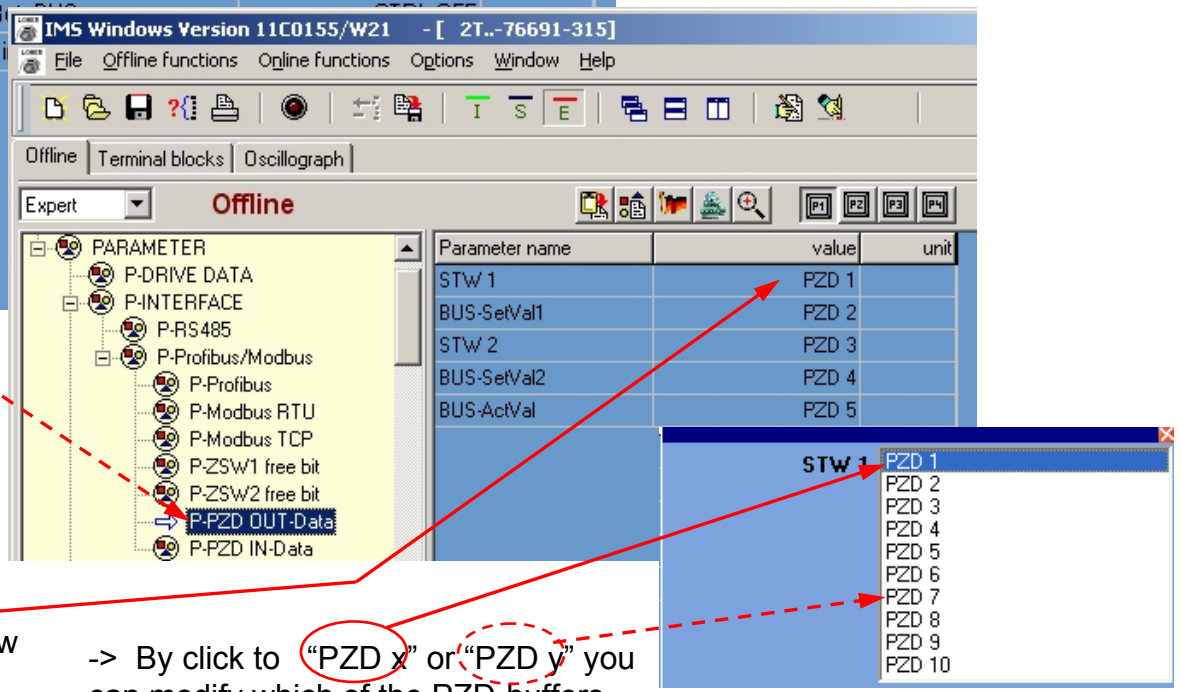
-> A click in the P-INTERFACE opens the grouping for the communication bus

Setup of the VSD buffers with internal values – How does this work?

-> Click to P-Profibus/Modbus to open the overview of the relevant parameter-groups for communication



-> Click to P-PZD OUT-Data opens the view for the correlation of the internal values to the PZD-buffers

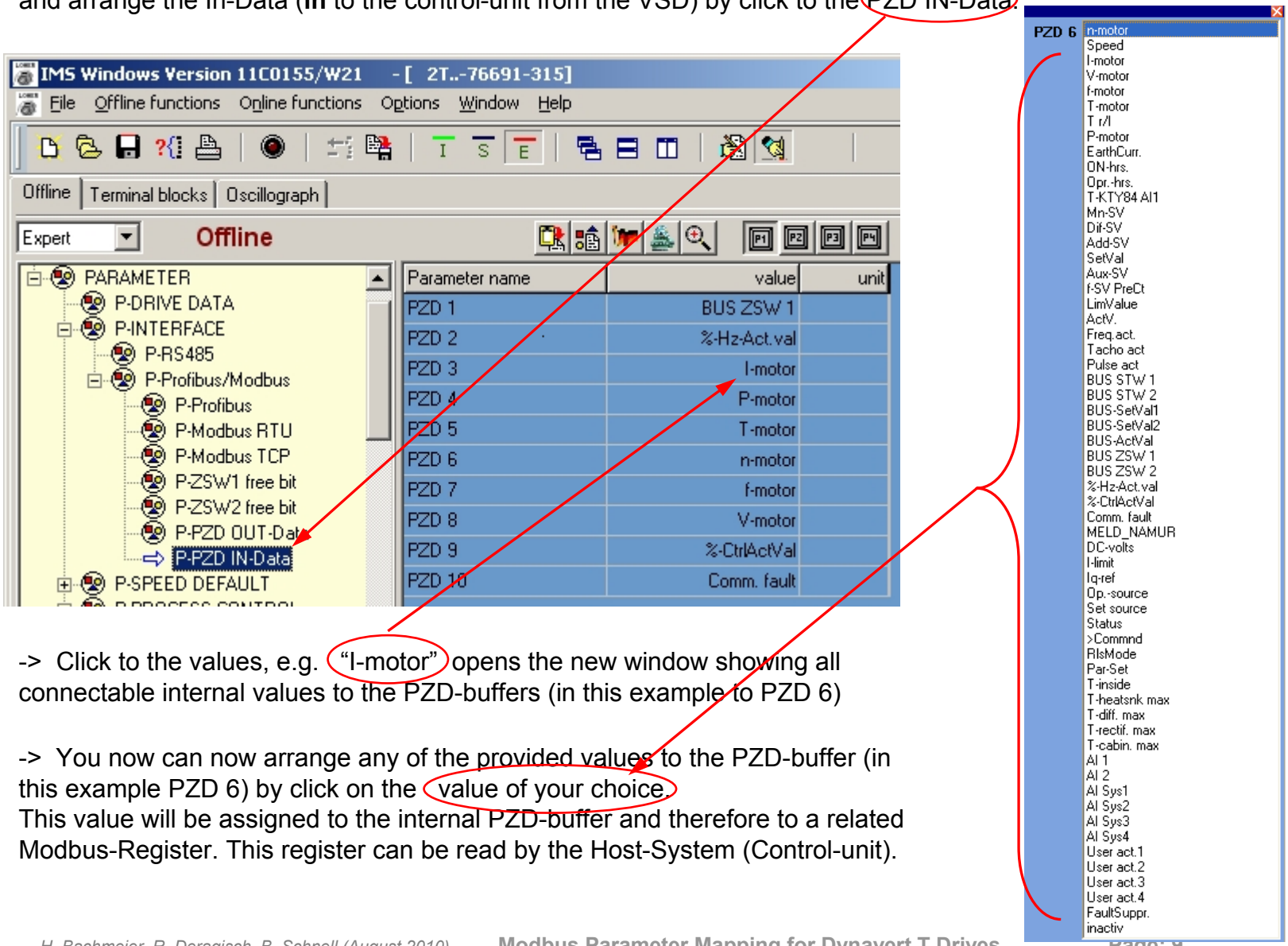


-> Click to PZD 1 opens the new window with the correlation of the internal values to the PZD-buffers

-> By click to "PZD x" or "PZD y" you can modify which of the PZD-buffers should contain the internal value (e.g. in this example the STW 1)

Setup of the VSD buffers with internal values – How does this work?

-> Analog to the OUT-Data (**out** of the control-unit with direction to the VSD Variable Speed Drive) you can select and arrange the In-Data (**in** to the control-unit from the VSD) by click to the PZD IN-Data.



-> Click to the values, e.g. "I-motor" opens the new window showing all connectable internal values to the PZD-buffers (in this example to PZD 6)

-> You now can now arrange any of the provided values to the PZD-buffer (in this example PZD 6) by click on the value of your choice.
This value will be assigned to the internal PZD-buffer and therefore to a related Modbus-Register. This register can be read by the Host-System (Control-unit).

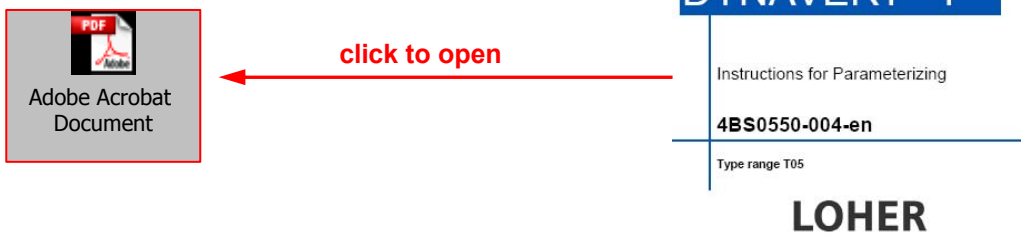
Control-unit to read data from the Drive…
To read motor current and motor speed

Motor current:
In the example the motor current is provided in PZD 3 (Modbus Register 2) and could be read from the control system with **function code 4 "*read input register*" to Register address 2.**

The scaling of e.g. the current value is depending on the power-size of the Inverter - e.g. 690V Drives with low Power (7,5kW, 11kW, 15kW, 22kW, 30kW) have a resolution of 1 digit after the decimal point (####,#A) -> resolution over the bus is 0,1A!
-> A value of e.g. 173 over the bus is equivalent 17,3 A

Motor speed (turnarounds):
Motor turnarounds **rpm** are in the example transferred to PZD 6 (Register 5) and could be read from the control system with **function code 4 "*read input register*" to Register address 5.**
The rounds per minute are always (in every size of the Dynavert drives) integer on the bus and are not scaled. 150 on the bus is equivalent 150rpm, 3000 is equivalent 3000rpm.

All further details to the normalization of the parameters and the "over the bus" available values could be found in the "DYNAVERT T Instructions for Parameterizing"
-> Look as well at the following pages in this instruction!



Control-unit to <u>read</u> data from the Drive…
Your way through the “DYNAVERT T Instructions for Parameterizing”

Beside of “motor speed” and “motor current” there are several other (internal) **PZD-IN** data of the Drive available to be swapped to the PZD-buffers.
A complete listing you find in the “DYNAVERT T Instructions for Parameterizing”
Attached the extracts of the PZD-IN data and the Normalization of the Drive data.

PZD-IN data (Page 44):

click to open

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7 Annexes

7.1 Actual values for status, analog output, comparison message and PROFIBUS

Explanations of titles on the table:

x in Smoothing	The respective signal is smoothened with the indicated ms-value.
x in Status	The actual value can be parameterized in a line of the inverter display.
x in AA	The actual value can be parameterized as an analog output signal
x in COMP	The actual value can be parameterized as an actual-signal for a comparison message
x in PZD-IN	The actual value can be parameterized and transferred via PROFIBUS in the PZD-IN area.
Short designation	Short designation of format of the actual value (normally used with Profibus, e.g. I2 = Integer with 2*8 Byte)
Format	Format of the actual value, e.g. Integer 16: from -32768 to +32767 or unsigned 16: from 0 to 65535
Display-unit	The unit displaying the actual value on the inverter display.
Physical quantity:	physical quantity of the actual value.
Quantities/conversion index:	Values are possibly needed for transfer with Profibus for presentation in another number format.
Standard value, analog outputs and comparison messages:	further information

Actual value	Explanation/ accuracy	Smoothing [ms]	Status	AA	COMP	PZD-IN	Short designation	Format	Display-unit	Physical quantity	Quantities index	Conversion-Index	Standard value Analog outputs and comparison messages
n-Motor	Motor speed Accuracy: ±1% with SVC with correctly set slip compensation ±0,1% at FOC of the nominal motor speed	320	x	x	x	x	I2	Integer 16	rpm	speed	11	67	n-Motor *1

Normalization of the Drive data (Page 54):

click to open

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7.2 Inverter-type dependent data normalization

If the conversion index is -1, the actual value will have one decimal place, and so on.

Inverter type	T-motor T-mot r/l Display unit	**I-motor** I-limit Conversion index	P-motor Conversion index	T-motor T-mot r/l Conversion index BUS
T07-7,5/690	Nm	-1	-2	-1
T07-11/690	Nm	-1	-2	-1
T07-15/690	Nm	-1	-1	-1
T07-22/690	Nm	-1	-1	-1
T05-30/690	Nm	-1	-1	-1
T05-37/690	Nm	-1	-1	-1

Control-unit to <u>read</u> data from the Drive…
To check the Drive status (generals)

To read the Status of the Drive the Host (Control-Unit) has to **read Modbus-Register 0** (equals Drive-internal PZD 1, which carries the Drive-Status-Value-Word **BUS ZSW1**).

The Host-System then has to evaluate the Drives-Status by checking the settings of the Bits in Register 0.
<u>Always:</u> Do not evaluate “Bit by Bit” in the Drive – you might loose integrity of the information!
–> Save time and read the whole register then evaluate this data afterwards in the Host!

To get a clear understanding of the dependencies of (and between) the bits see the following recommended 3 Pages of the “DYNAVERT T Instructions for Parameterizing”

Page 31 “BUS ZSW1 data”:

click to open

4.5 Status word BUS ZSW1

Bit	Value	Meaning as per profile	Meaning at the inverter
0	1	Ready for switching on	Electronics provided with voltage and initialized, no fault
	0	Not ready for switching on	Mains OFF
1	1	Ready for operation	No fault and no OFF1 given
	0	Not ready for operation	
2	1	Operation released	No fault, no OFF1 and ctrl release- given

Page 32 “BUS ZSW1 Bit-Pattern overwiev”:

click to open

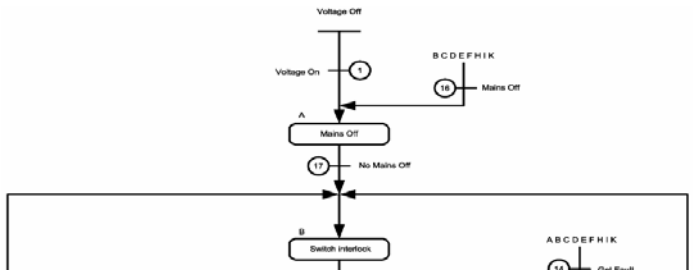
Bus ZSW1 Bit-Pattern overwiev

Status diagram position (s. page 6)	Bit value = 1 ⟶						Operating status	Leadership BUS	Deviation setpoint value to actual value within tolerance		Warning	Switch interlock	No OFF 3	No OFF2	Fault	Operation released	Ready for operation	Ready for switching on	
	BUS ZSW1	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
A	Mains OFF	x	x	x	x	x	0	1	0		0	0	1	1	0	0	0	0	X230 H
B	Switch interlock	x	x	x	x	x	0	1	0		0	1	1	1	0	0	0	0	X270 H
	Switch interlock of OFF2	x	x	x	x	x	0	1	0		0	1	1	0	0	0	0	0	X260 H
	Switch interlock of OFF 3	x	x	x	x	x	0	1	0		0	1	0	1	0	0	0	0	X250 H
	Switch interlock of OFF2 and OFF 3	x	x	x	x	x	0	1	0		0	1	0	0	0	0	0	0	X240 H
G	Fault (not ready for switching on)	x	x	x	x	x	0	1	0		0	0	x	x	1	0	0	0	X238 H

Page 6 “Drive Status diagram”:

click to open

2.2 Status diagram

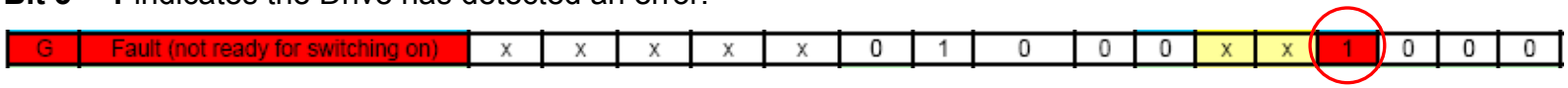


Control-unit to <u>read</u> data from the Drive…
To check the Drive status (Examples for “Drive in operation or not?”)

The Drive is internally structured as a “State Machine” -> see **page 6** “Status diagram” and **page 32** “BUS ZSW1”.

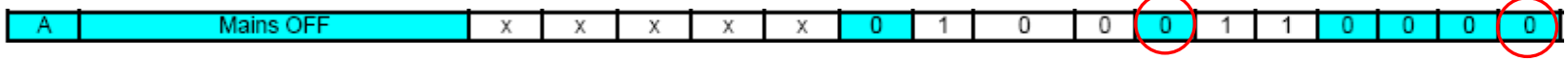
Main “Logical States” are:
G Failure, **B** Switch interlock, **C** Ready for switching on, **D** Ready f operation, **E** Operation released, **F** Operation

<u>“G” - Drive Failure:</u>
This is the most easy to evaluate Status, represented by Bit 3 of the BUS ZSW1 (= Modbus register 0).
Bit 3 = 1 indicates the Drive has detected an error!



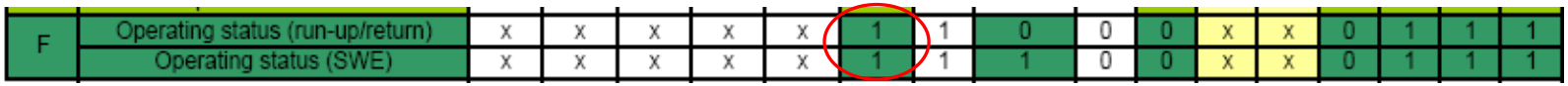
G	Fault (not ready for switching on)	x	x	x	x	x	0	1	0	0	0	x	x	1	0	0	0

<u>“A” - Drive (Inverter) is unavailable:</u>
Bit 0 indicates the Drive is in general available (**Bit 0 = 0** -> Drive is <u>not</u> ready for switching on, e.g. Mains are off)
Bit 6 indicates the Drive is not interlocked (**Bit 6 = 0** -> Drive is <u>not</u> interlocked)



A	Mains OFF	x	x	x	x	x	0	1	0	0	0	1	1	0	0	0	0

<u>“F” Drive (Inverter) is running:</u>
Bit 3 indicates the Drive has detected an error (Bit 3 = 0 -> No Error)
Bit 10 indicates the Drive is in operation (**Bit 10 = 1** -> Drive-System is running, speed ON and controller released)



F	Operating status (run-up/return)	x	x	x	x	x	1	1	0	0	0	x	x	0	1	1	1
	Operating status (SWE)	x	x	x	x	x	1	1	1	0	0	x	x	0	1	1	1

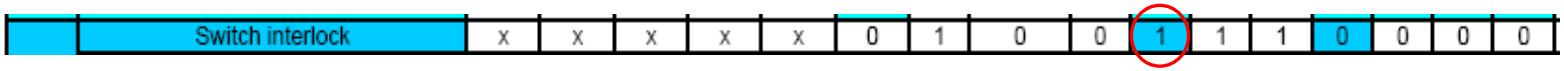
To consider: If the speed-set-point is 0 (zero), speed-output is as well 0
-> then the Drive is for certain “running” (and in operation)!

Control-unit to write data to the Drive…
To control the Drives operation -> start

Beside the already shown examples the state of the Drive needs to be known in the Control-Unit before the Control-Unit can control (send commands to) the Drive. -> All possible states to find on the page 32 table.

For the Distributed-Control-System that means:
1. Evaluate constantly what state the drive actual is in (some already explained – others to follow)
2. Decide what action (command) the drive requires to change this state (see the state diagram on page 6)

"B" Switch interlock:
If Mains are switched on the Drive is powered up and change state from "A" (Mains Off) to **"B" Switch interlock**.
Normally the DCS will find the drive after switching on in this state, waiting for commands (if no Error occurred).

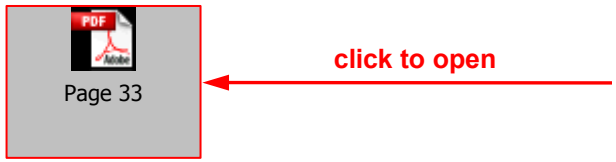


Unlock (and operate) the drive:
To set preset conditions (for stepping further in the Drive-state-machine) the DCS has to write to Modbus **register 1024** (to internal Drive-buffer PZD1 -> **STW1**) the value with the bit pattern as shown:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
STW 1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0

This sets in the **STW1** the **Bit 1 = 1** (No OFF1) and the **Bit 2 = 1** (No OFF2).
This (pre-) setting allows the DCS to control the drive by **Bit 0** only!
-> The DCS can now START and STOP the Drive with one Bit only!

Total functionality (content) of the **STW1** -> see page 33:



4.6 Control Word STW1

Bit	Value	Meaning as per profile	Meaning at the inverter
0	1	ON	No OFF1
	0	OFF1	Braking along ramp
1	1	Operating status	No OFF2
	0	OFF2	OFF2 activated
2	1	Operating status	No emergency stop

Control-unit to write data to the Drive…
To control the Drives operation -> start (continued)

"C" Ready for switching on:

After sending the STW1 to "unlock" the Drive-state changes from "B" to **"C" Ready for switching on.**

C	Ready for switching on	x	x	x	x	x	0	1	0	0	0	x	x	0	0	0	1

"F" Operation:

Setting of Bit 0 = 1 of the STW1 forces the Drive to leave state "C" and switch directly to "F" Operation.
The DCS has to write to Modbus register 1024 the value with the bit pattern as shown (-> set **Bit 0 = 1**):

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
STW 1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1

With this the Drive-state-machine founds all conditions fulfilled (Bit 0 = 1, Bit 3 = 1, Bit 6 = 1) and goes immediately to **"F" Operation.**

F	Operating status (run-up/return)	x	x	x	x	x	1	1	0	0	0	x	x	0	1	1	1
	Operating status (SWE)	x	x	x	x	x	1	1	1	0	0	x	x	0	1	1	1

If the setpoint is > 0 (more than 0) the Drive will accelerate the Motor according to the Drives Ramp setting.
If the Drive had not reached its setpoint value (with tolerance) Bit 8 will remain 0.
If the setpoint is reached Bit 8 will change to 1 as well.

If the setpoint is 0 the Drive will not accelerate the Motor -> no Motor speed, but Drive is operating (running)!

Control-unit to write data to the Drive…
To control the Drives operation -> stop

“H” Off 1

Like explained is it possible to control the drive by one bit only
-> any change of the Bit 0 in the STW1 will change the state of the drive!
To **stop** the Drive the DCS has to write to Modbus register 1024 the value with the bit pattern as shown (-> set Bit 0 = 0):

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
STW 1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	**0**

After setting Bit 0 of the STW 1 to 0, the drive falls to **“H” Off 1**.
The Drive decelerates with its settings of the ramp-down.
This action can be executed from state “F” as well as from “D” or “E” -> look it up in the state diagram!

Two ways to leave “Off 1”

- Until sped 0 is not reached, “Off 1” will be left if Bit 0 will be set to 1 again!
  The drive will in this case jump directly to state “F” again, as Bit 6 (setpoint released, Speed on) remains still 1.
- “Off 1” will be left if the speed 0 (stand still) is reached – the Drive change to state “C” ready for switching on.
  IGBTs of the Drive are locked and pulsing of the drive stopped.
  Drive is waiting there until Bit 0 will be switched to 1 again for running the drive.

“Off 2” and “Off 3” of Control Word STW1

- In **Control Word STW1** the **Bit 1 “Off 2”** and **Bit 2 “Off 3”** are designed for “fast” or “emergency” stop.
- If this Bits are used for a stop, the Drive remains afterwards in state “B” as conditions for stepping further are not fulfilled (either Bit 1 = 0 or Bit 2 = 0)!
- The Bit-position (status) of “Off 2” and “Off 3” could be read back (out of the Drive) with evaluating the BUS ZSW1 - there to look at the Bit 4 or Bit 5 (see page 32).
- “Off 2” or “Off 3” could be initiated (executed) by Bus-System or Digital inputs of the Drive.

Control-unit to write data to the Drive…
To control the Drives operation -> start and stop

In case you indicate an error:
Evaluate in what status the Drive is by reading the ZSW1 with "read Modbus register 0".
In case an error has happen, you find the Drive in operating status "Fault".

	BUS ZSW1	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
G	Fault (not ready for switching on)	x	x	x	x	x	0	1	0	0	0	x	x	1	0	0	0

To start the drive now you have to "toggle" Bit # 7 by writing register 1024 (to internal Drive-buffer PZD1 -> STW 1) with the Bit-pattern where Bit 7 is first set to "0" and afterwards to "1".

First Bit 7 = 0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
STW 1	1	1	1	1	1	1	1	1	**0**	1	1	1	1	1	1	1

Then Bit 7 to 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
STW 1	1	1	1	1	1	1	1	1	**1**	1	1	1	1	1	1	1

Bit 7 again to 0

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
STW 1	1	1	1	1	1	1	1	1	**0**	1	1	1	1	1	1	1

The Drive changes its state to "B"

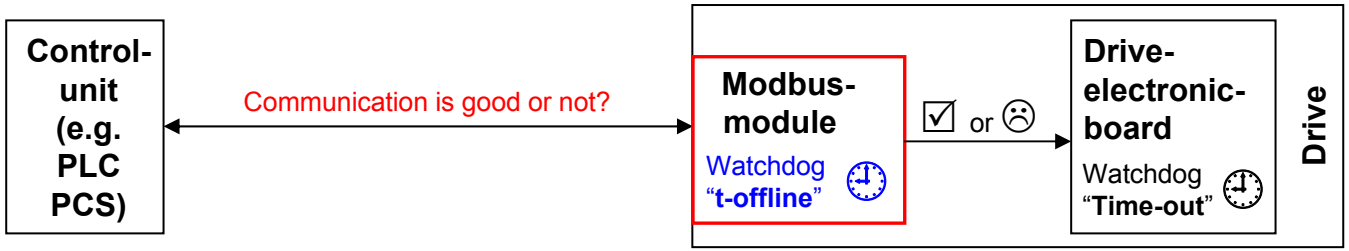
B	Switch interlock	x	x	x	x	x	0	1	0	0	1	1	1	0	0	0	0

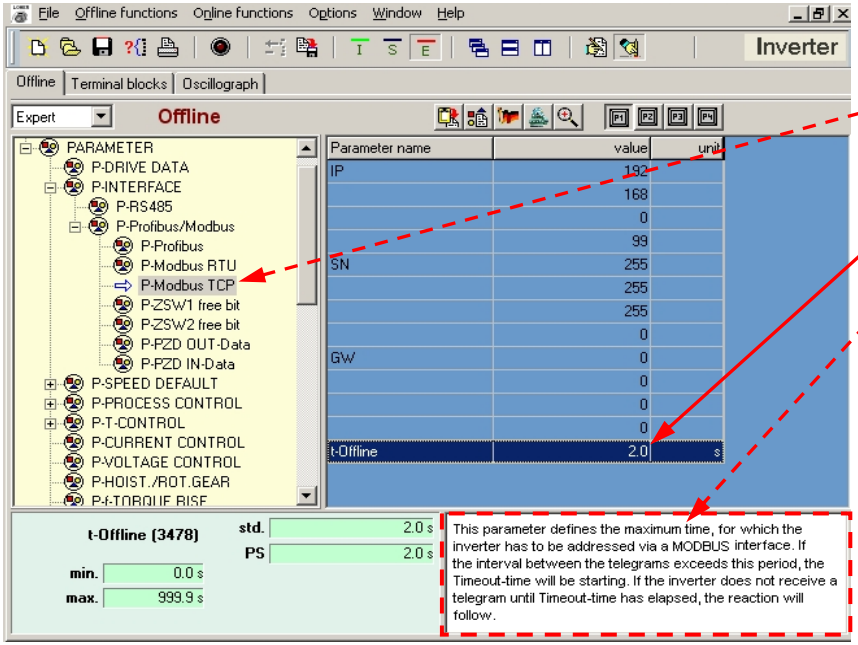
From there to start by setting Bit 0 to 0 -> Drive changes to "C" and then setting Bit 0 to 1 (-> see state diagram)

Control-unit to write data to the Drive…
"t-offline" of the Drive?

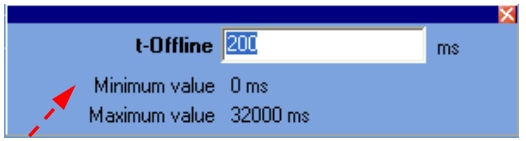
Parameter "t-offline":

- With "t-offline" the Modbus-Module is monitoring communication with the host system (independent from the drive-electronic-board!)
- For Modbus TCP the "t-offline" is re-triggered with each write-command (Code: 5, 6, 15, 16, 22, 23)
- In case there is no communication during the specified time, the communication-module generates a signal to start the "Time-out" timer
- The reaction of the Drive after "Time-out" can be selected (parameterized) with IMS using the parameter Rct. Bus
- In case the Host system is only monitoring the Drive "t-offline" is not needed (or from importance)





Selection of "t-offline"



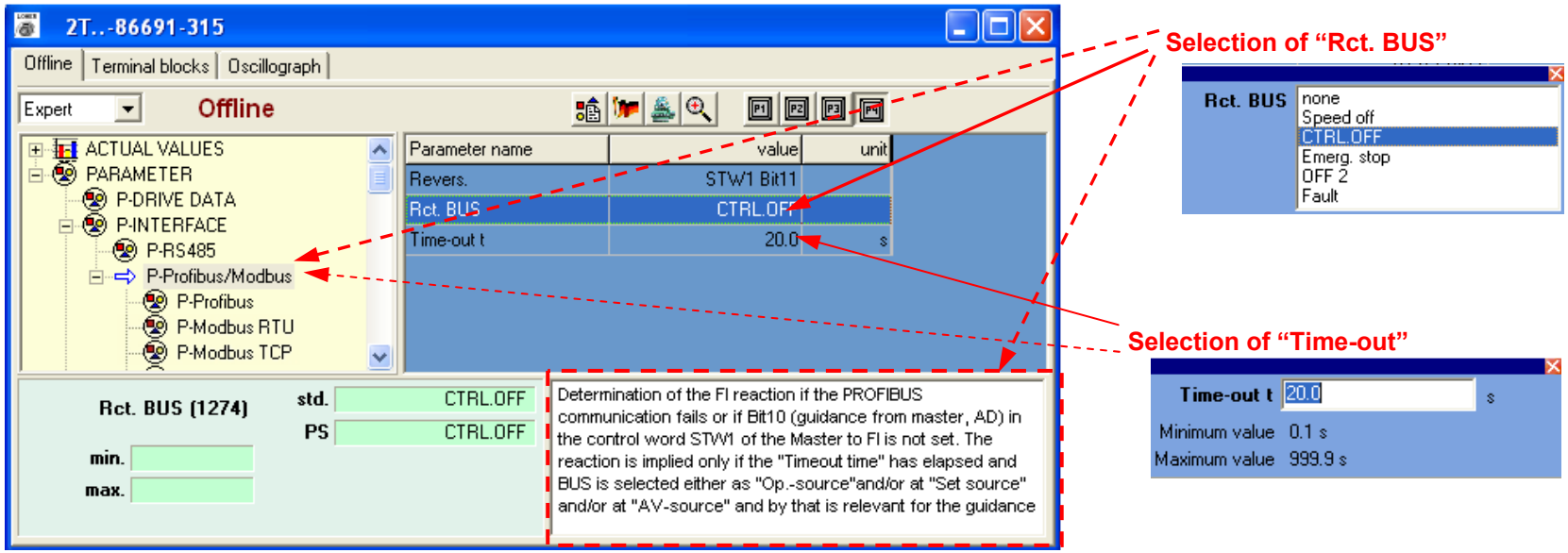
Setting "t-offline" to 0 (zero)?
Modbus TCP execution of...
- physical evaluation of the Ethernet-Link-Status (= evaluation Cable connected or not!)
- no evaluation of Modbus TCP telegrams

Modbus RTU:
- no evaluation of connection
- no evaluation of telegrams

Control-unit to write data to the Drive…
“Time-out” of the Drive?

Parameter “Time-out”:

- The two independent timers ”**Time-out**” and “**t-offline**” are working close together to coordinate the two in the communication involved physical hardware-components of the Drives (= communication-module and the drive-electronic-board).
- The communication-module does not link “time-information” through to the drive-system! Instead of “time” the communication-module serves the drive with a digital “good/not good” information (and saves with this pre-data-processing processor-capacity in the Drive)
- This “good/not good” information is generated by the “**t-offline**” timer, who is monitoring the communication-timing directly on the communication-module.
- In case the communication-module changes its information to “**not good**” or if **Bit10** (guide from master/AD) in the control word STW1 is not set to 1 -> the “**Time-out**” timer (on the drive-electronic-board) will be started.
- After elapse of the "Time-out” time the parameterized Reaction in parameter “Rct.Bus” is executed.



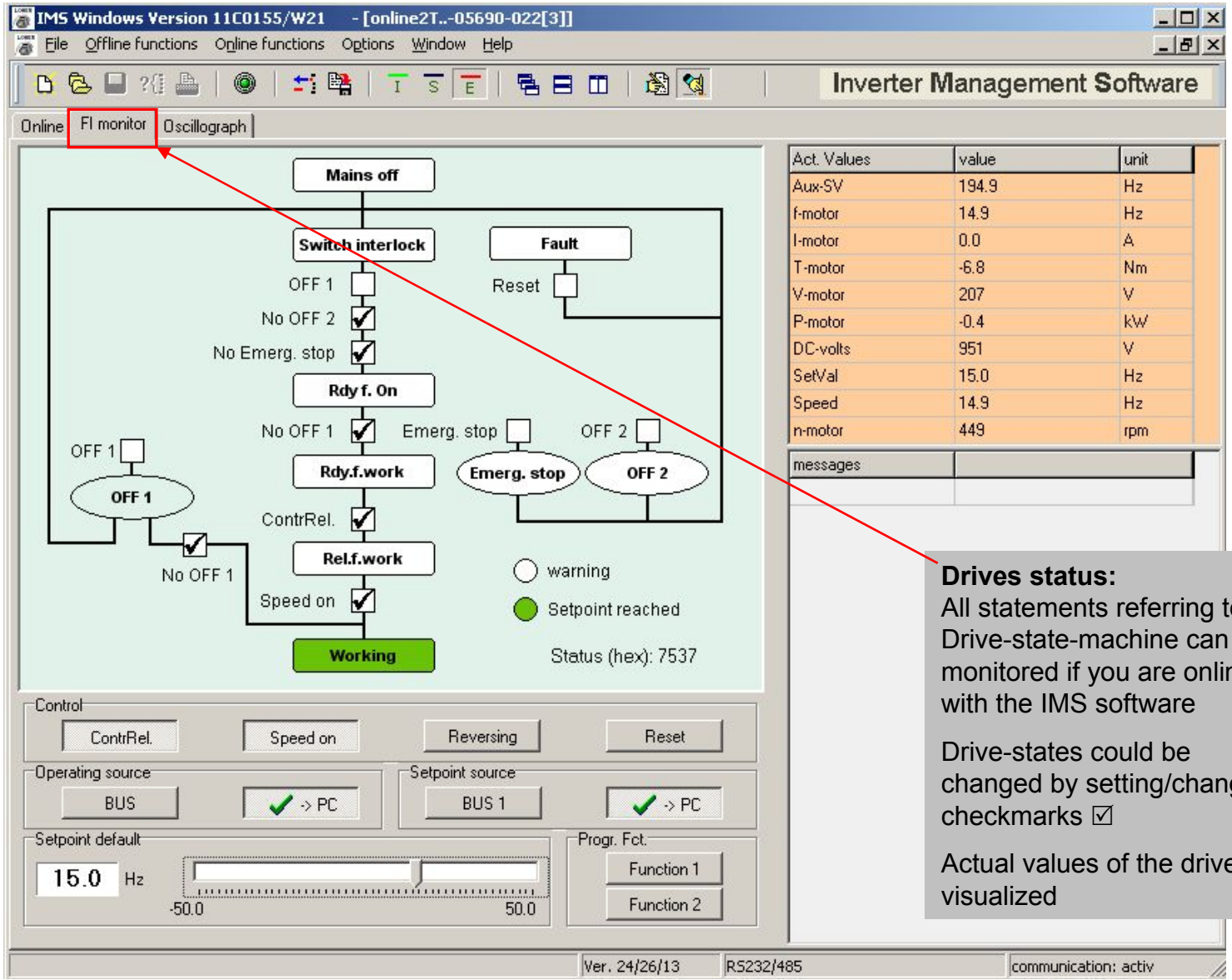
Bit 10 of the STW1:

10	1	Leadership from AG	Control word and setpoint valid
	0	No leadership	Control word and setpoint frozen

If Bit 10 = 0 then…

- Changes of the control-bits and set-point-values will not be accepted by the drive!
- “Time-out” will start

Backup…
Online functionality of IMS software



Drives status:
All statements referring to the Drive-state-machine can be monitored if you are online with the IMS software

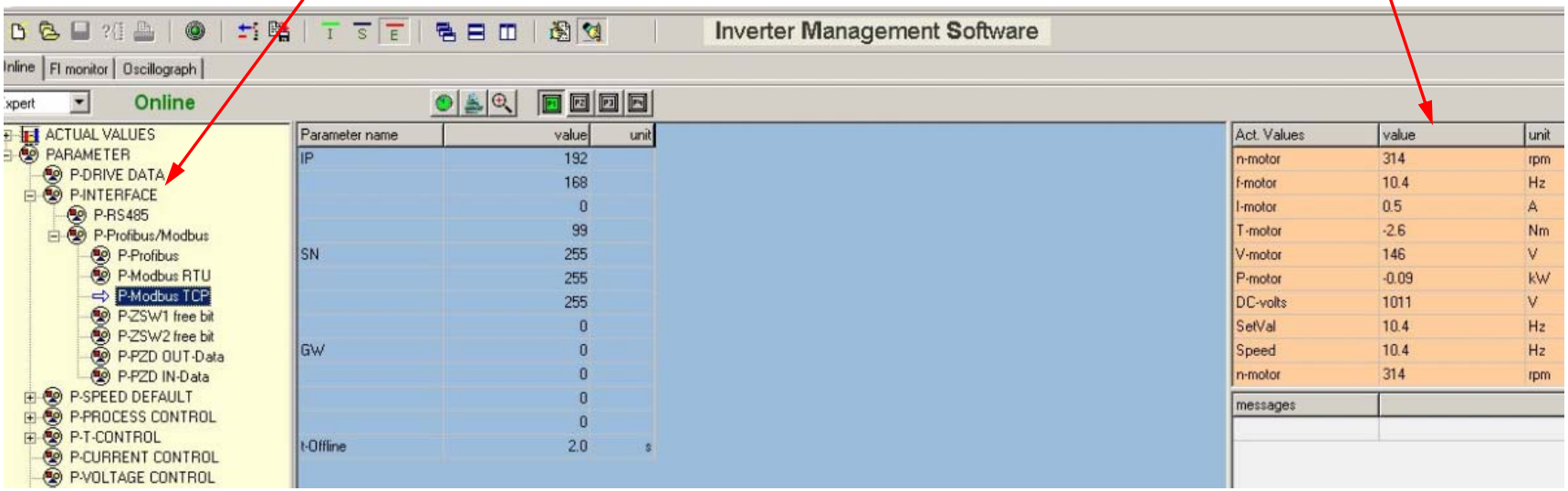
Drive-states could be changed by setting/changing checkmarks ☑

Actual values of the drive are visualized

Backup…
Online functionality of IMS software

Drives values:
Drives Values can be displayed online in the Window of the Modbus Parameters on the very right side

Setting of the IP-Adress and other Modbus parameters:
You find this in the Parameters for the Interface!



Backup…
Modbus TCP/IP-Settings with the Dip-Switches

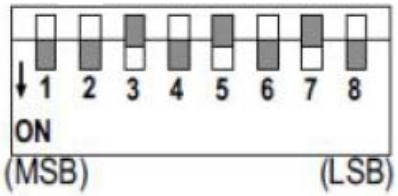
TCP/IP-settings with IMS-software:

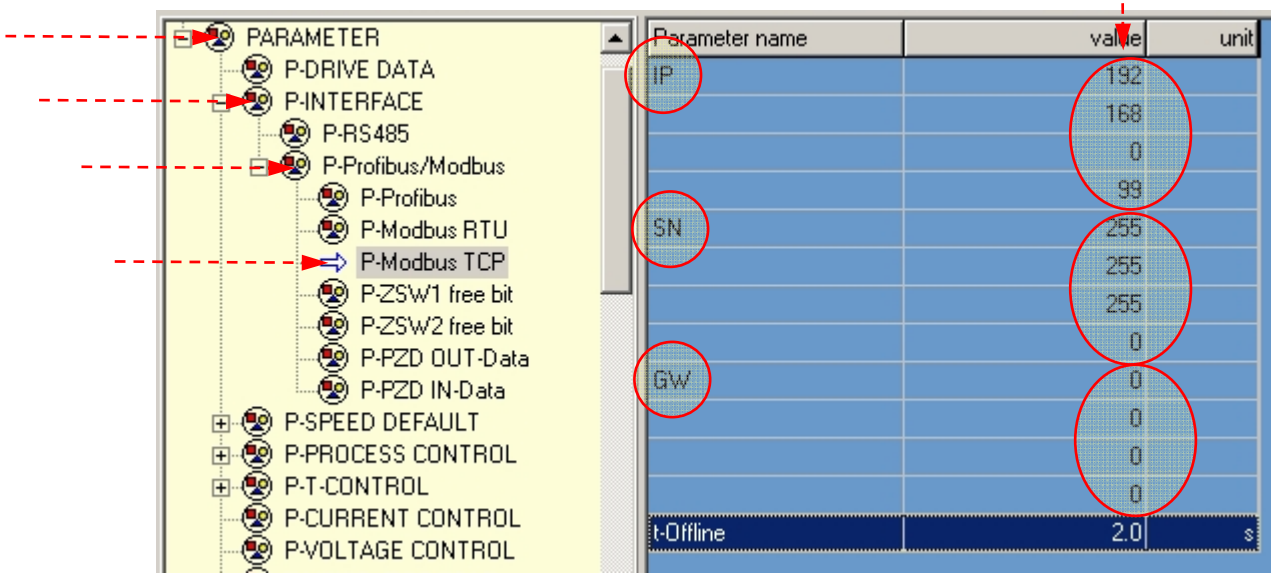
Select "PARAMETER" -> "P-INTERFACE" -> "P-Profibus/Modbus" -> "P-Modbus TCP".
There the Parameters for IP-Address TCP/IP and Sub-Net TCP/SN as well as the Gateway TCP/GW can be selected.

TCP/IP-settings with Hardware (Dip-Switches):

To use the Hardware (Dip-Switches) you have to set the IP-Address to 0-0-0-0 (by use of the IMS-Software as described above).
In case the IP is set to 0-0-0-0 the following standards will be used by completion with the setting of the Dip-Switches:
IP-Address: 192.168.0.X (X is the value of the Dip-Switch)
Gateway: 0.0.0.0
Subnet: 255.255.255.0

The Dip-Switches define the last Byte of the IP-Address (binary coded).
The IP-Address of the example on the right is 192.168.0.42
(out of 32+8+2)





Backup…
Modbus TCP/IP-Settings with the Dip-Switches

Component	Function
Dip-Switches for configuration	The Dip-Switches define the last Byte of the IP-Address
	TCP/IP-settings with IMS-software: Select "PARAMETER" -> "P-INTERFACE" -> "P-Profibus/Modbus" -> "P-Modbus TCP". There the Parameters for IP-Address TCP/IP and Sub-Net TCP/SN as well as the Gateway TCP/GW can be selected. TCP/IP-settings with Hardware (Dip-Switches): To use the Hardware (Dip-Switches) you have to set the IP-Address to 0-0-0-0 (by use of the IMS-Software as described above). In case the IP is set to 0-0-0-0 the following standards will be used by completion with the setting of the Dip-Switches: IP-Address: 192.168.0.X (X is the value of the Dip-Switch) Gateway: 0.0.0.0 Subnet: 255.255.255.0 The Dip-Switches define the last Byte of the IP-Address (binary coded). The IP-Address of the example on the left is 192.168.0.42 (out of 32+8+2)