# Changes / New features

from
Firmwareversion V 1.99 as of 26.06.2003
to
Firmwareversion V 2.27 as of 05.06.2018

product description / type : REG-D / PAN-D / REG-DA

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# I. Firmware V2.23 (18.12.2012) - V2.27 (05.06.2018)

**New features, changes and Reg-L command reference:**

Logbook

1. Change of logbook presentation with detailed display of the events.

2. Logbook entries now with listing of the source (cause of the event).

3. Extension of logbook events for following parameter changes (activating per group):
   - Systemparameters
   - Analog Channels
   - Regulator Parameters
   - Recorder S1
   - Recorder S2
   - Network/SCADA
   - Transformer Monitoring
   - COM3-Devices

4. Logbook events enhanced for transformer monitoring TM.

5. Extensions of the system events:
   - Battery status
   - Parallel status
   - Parallel error

6. Amount of maximum logbook entries extended to 2047 for feature S2

Extended communication interfaces

7. Devices with feature S2 have four separated communication interfaces now:
   - COM1: RS 232 interface (front interface)
   - COM2: RS 232 interface (mostly used for connection to SCADA card)
   - COM3: RS 485 interface (ANA-Ds, BIN-Ds, COM-Modbus Converter)
   - COM4: RS 232 interface (replaces optionally COM1-S interface)

Changes regarding high-speed switching functionality

8. Additional limit bases for high-speed switching forward and backward available and parameterizable via the following REG-L commands:
   - RegMSchnRck = <mode> // mode for the high-speed switching backward
   - RegMSchnVor = <mode> // mode for the high-speed switching forward
   - <mode> can have the following values:
     0: setpoint without current influence
     1: setpoint with current influence
     2: free configurable value
     3: U=100V
     4: U=110V

9. The free adjustable high-speed switching base can be set via the following REG-L commands:
   - RegUSchnRBez = <value> // limit base for high-speed backward
   - RegUSchnVBez = <value> // limit base for high-speed forward
   - <value> is the voltage base in volts within the limits 30.0V - 170.0V

Transformer Monitioring

10. TM algorithm modified: The switching between heat up and cool down phase is now done with a certain hysteresis in order to improve the behaviour with slighly fluctuating load current.

11. Additional alarm limit for oil temperature „Oil temperature trip“

12. Additional limit, delay and hysteresis for „Oil temperature trip“:
    - "TPTMPOIL": limit „Oil temperature trip“
    - "TPTMPOILD": delay „Oil temperature trip“
    - "TPTMPOILH": hysteresis „Oil temperature trip“
    - Additional relay function / LED function: "OilTrip"

13. Moisture Monitor Modul (TM2):
    3 new screens show the Moisture Monitor Mudule calculations.

14. 5 analog input functions added:
    "iCO2", "iC2H2", "iC2H4", "iC2H6", "iCH4"

15. LED/Relay functions extended:
    "CO2","C2H2","C2H4","C2H6","CH4"

16. New Input- / Output-Assigment:
    “PressTrp”

17. The new limit can be set with the following REG-L commands:
    - CO2
      TmSGCO2: maximum value in ppm
      TmSGCO2D: delay in seconds
      TmSGCO2H: hysteresis in ppm
    - C2H2
      TmSGC2H2: maximum value in ppm
      TmSGC2H2D: delay in seconds
      TmSGC2H2H: hysteresis in ppm
    - C2H4
      TmSGC2H4: maximum value in ppm
      TmSGC2H4D: delay in seconds
      TmSGC2H4H: hysteresis in ppm
    - C2H6
      TmSGC2H6: maximum value in ppm
      TmSGC2H6D: delay in seconds
      TmSGC2H6H: hysteresis in ppm
    - CH4
      TmSGCH4: maximum value in ppm
      TmSGCH4D: delay in seconds
      TmSGCH4H: hysteresis in ppm

Intelligent Master Follower parallel program

18. If a tap difference between master and slave is detected after the parallel program was started, a synchronization procedure is started that tries to achieve the same tap position of master and slave taking in consideration of the voltage. A setpoint influence will also be taken into account. The method is derived from the method “Delta I * sin (phi)”. Instead of the circulating reactive current, the tap position difference is evaluated. The control influence for the voltage is calculated as with the regular voltage regulation. Following relevant measured values and parameters are fetched from the master: Voltage, KNU, controlled variable, influence setpoint, 100% setpoint, tolerance band, tap position, reference level/tap position. Sync-Mode also supports PQ mode. It is regulated to the control value

active or reactive power (P / Q) depending on the mode. If the value can not be retrieved by the master, regulation mode will be switched to manual. The slave is starting the follower mode only in case the TC in operation signal of the master is not high.

19. New feature "SYSCTRL3"
    The synchronization mode can be deactivated and switched to the familiar Master-Follower mode using the feature "SYSCTRL3 = 1".

20. Group switching manual/auto changed:
    MasterPrio has only influence during the start of the parallel operation. After that, a switch to manual at the slave also forces the master into manual mode.

21. The Sync mode has two start circumstances:
    - Change of the parallel status
    - Change from manual to auto mode

22. The synchronization mode will be finished when
    - stage equality has been established
    - the step equality remains an adjustable time "RegMFSyncQD"(default = 20s)

Modifications on the ParaGramer

23. New commands for setting up ParaGramer strings:
    Strings in main screen (max. 8 signs) for:
    - RegMaStr = <str8> Master-mode (Default: Master)
    - RegSlStr = <str8>Slave-mode (Default: Slave)
    - RegIndStr = <str8> Independent-mode (Default: Ind)

24. Signs in ParaGramer screens (1 sign) for:
    - RegMaChr = <str1> Master-mode (Default: M)
    - RegSlChr = <str1> Slave-mode (Default: S)
    - RegIndChr = <str1> Independent-mode (Default: I)
    - RegMaSelChr = <str1> Subindex for pre-chosen Master (Default: M)
    - RegSlSelChr = <str1> Subindex for pre-chosen Slave (Default: S)

25. MultiMaster: RegMultiMa = {0,1}:
    0: Master cannot be chosen more than one time
    1: (Default) Master can be chosen more than one time

26. Reference step / step offset in parallel mode Master-Follower is available with "RegBaseTap" in the range from -64 to 64.

27. Time for ParErr at Ikr circulating current excess [s] (default 2s) is exceeded "RegMaParErrT=n"

28. The feature Crosslink has been extended to three bus bars with following binary input functions:
    - PG_C3a: Section left hand side of coupling on LV side
    - PG_C3b Section right hand side of coupling on LV side
    - PG_H_C3a: Section left hand side of coupling on LV side
    - PG_H_C3b: Section right hand side of coupling on LV side
    - PG_Q1A: Coupling LV between busbar 1 and 2
    - PG_Q2A: Coupling LV between busbar 2 and 3
    - PG_Q3A: Coupling LV between busbar 3 and 1
    - PG_H_Q1A: Coupling HV between busbar 1 and 2
    - PG_H_Q2A: Coupling HV between busbar 2 and 3
    - PG_H_Q3A: Coupling HV between busbar 3 and 1

Extensions regarding binary/analog inputs and outputs

29. Up to 128 binary inputs available

30. Up to 64 binary outputs for Relays and LEDs (128 Relay with feature S2) available.

31. Extension of LED commands
    RegLEDMAP
    RegLEDMAPI
    RegLEDMAPMAX
    RegLEDMAXCH
    RegLED
    DevLED

32. Possibility to change the LED color at BIN-Ds:
    DevLEDCOL <dev> <1..16> = <led_color>
    RegLEDCOL <chan> = <led_color>
    <led_color> Bits 7..4 : "OFF-COLOR" 0=aus, 1=Red, 2=Green, 3=Yellow

33. Maximum amount of analog channels extended for feature S2 to 128.

34. Additional analogue input function "iT_Amb"

35. Additional output function (relay and LED) "176: BattErr" for REG-D and "30: BatErr" for PAN-D

36. Double assignment of the following input functions now possible (evaluation with "OR conjunction"):

| *** REG-D *** | *** PAN-D *** |
|---|---|
| 7: TC.i.Op | 9: TC.i.Op |
| 24: Inh.Low | |
| 25: Quick | |
| 42: Up | |
| 43: down | |

Adjusted and extended limits, definition ranges and parameters

37. The maximum value of the parameter „maximum tap difference" is extended from 6 to 128.

38. Transformer rated power for parallel operation program "dIsinPHI[S]" has been extended to a maximum value from 500MVA to 9999MVA

39. The LDC parameter menu now allows values with three decimal places.
    Furthermore, the defintion range of LDC parameters R and X are extended from +/- 30 Ohm to +/- 100 Ohm.

40. The time program "CONST" definition range of T1/T2 is extended to 1..3600s (former 1..600s).

41. Parameter "Invers with swapped relays" is now also available at PAN-D:
    Feature INVERS=2 or command RegINVERS=2

42. PQ-Control extensions:
    - Maximum set point value extended to +/-200%
    - Permissible deviation in case of a P or Q setpoint extended to 100% (former 10%).
    - Extension of definition range for over- and undervoltage limits:
        - RegUUEBER> 25% ➔ 50%
        - RegUUNTER< -25% ➔-50%

43. Grouplist for parallel operation extended:
    - Maximum 15 members / transformers with feature S2
    - Maximum 10 members / transformers with feature S0/S1

44. Noise suppression for U and I is now configurable:
    - RegUNOISE [= <proz>] // Percentage of 100V, Default = 0.5% == 0.5V
    - RegINOISE [= <proz>] // Percentage of 1A (5A), Default = 1% == 0.01A (@ 1A) Range: 0..5% (floating point)

45. Redefined status check
    Only a distinction is made between devices with MRAM or without MRAM (based on the global variable MRAM):
    without MRAM (MRAM = 0) → Status relay coupled
    with MRAM (MRAM> 0) → Status relay not coupled
    With a version upgrade to V2 + 3.27, the status relay is now decoupled when MRAM is detected

Additional parameters for different SCADA protocols

46. SCADA menu, amount of possible modes extended.
    0: SCADA
    1: IEC61850
    2: IEC104
    3: DNP3.0
    4: DNP3.0-Eth
    5: IEC103/101
    6: COMServer
    7: MODBUS

47. Network protocols
    - IP-Settings
    - ParaEthernet Redundancy Protocol

48. Serial protocols
    - Baudrates: {9600,19200, 38400,57600,115200},
    - with IEC103/101 only {9600, 19200}

# II. Firmware V2.22 (24.05.2012) - V2.23 (18.12.2012)

**New features, changes and Reg-L command reference:**

1. Renaming of LAN to E-LAN Status in all languages (REG-D + PAN-D):

| | | | |
|---|---|---|---|
| LAN-STATUS | --> | E-LAN STATUS | [under Setup 6 → Status] |
| LAN-L | --> | ELAN-L | [under Setup 6 → RS232 → MODE] |
| LAN-R | --> | ELAN-R | [under Setup 6 → RS232 → MODE] |

2. Regulator-mode Slave:
   Is an AVR a Slave no deviation is displayed any more in the regulator main menu (arrow and procentual deviation). In addition the current influenced setpoint is set to zero as long as the regulator is in Slave mode.

3. Structure generation - new R-Reference:
   10: ulong time
   11: uint milliseconds of time
   12: ulong utctime
   Online-help D+E modified.

# III. Firmware V2.20 (24.02.2009) - V2.22 (24.05.2012)

**New features, changes and Reg-L command reference:**

1. Relays 1+2 are free programable. Default: Rel-1=31:up, Rel-2=32:down
   If the default configuration of relays 1+2 has been changed a warning message on the panel appears, whether the relays 1+2 really shall be changed.

2. The permissible Tolerance Band can be adjusted in 0.05% steps between 0.10% and 10%. The Bandwidth in the Regulator screen will be displayed with two fractional digits.

3. The active setpoint can be chosen from the setpoints 1..4 via panel [Setup 1→Setpoint Values→Index]. The setpoints are displayed in the index menu with their primary and secondary values. If the feature PQCtrl is activated, the setpoints 3+4 are displayed as “P-Setpoint Value” and “Q-Setpoint Value”.
   Reg-L commands:

   | | |
   |---|---|
   | RegSWi | // index of actual setpoint |
   | RegSW | // actual setpoint |
   | RegSWn | // setpoint with index n |
   | RegSWA | // 100% value of actual setpoint |
   | RegSWAn | // 100% value of setpoint with index n |
   | RegSWP | // percentage value of actual setpoint |
   | RegSWLL | // absolute actual setpoint |

4. Beside the existing function “Setpoint Adjustment with <> Keys” (0.1% - 2.0% per key stroke; only applicable for active setpoint 1), also the setpoint index can be set as function for the <> keys [Setup 5 → AddOns 6]. Is this function applied, the actual index + setpoint value appear in a message box in case a different setpoint index is chosen per keystroke on the <> keys.
   Reg-L commands: RegSWINCDEC, ListSWINCDEC

5. The active setpoint 1 can be adjusted in addition with the binary input functions “20:SP-incr.” (Increment) and “21:SP-decr.” (Decrement). The referring procentual steps are also configured in [Setup 5→AddOns 6] under “Setpoint Adjustment with inputs” (0.1% - 2.0% per rising edge).
   Reg-L commands: RegSWINCDECE, ListSWINCDECE

6. New features regarding tap position:

   - New BCD input function ’82: BCD 40’ implemented
   - Total amount of tap positions via BCD-Code extended to +/- 79
   - Tap position statistics extended to +/- 60
   - Total amout of Tap-Changes extended to 9.999.999
   - TapLimiter implemented [Setup 5 → AddOns 8], the feature ‘Invers’ will be taken into account accordingly. The tap position indication [Setup 5 → AddOns 1] has to be activated for using the TapLimiter. If one of the tap limits has been reached and an additional tapping command will be given, the message ‘TAP-LIMITER MAX’ and ‘TAP-LIMITER MIN’ occurs, respectively, a logbook entry “TapLimMa” or “TapLimMi” will be added (provided that tapping up and down commands are logged).
   - Reg-L commands: RegTapLim // {0:OFF,1:ON}, Default:0:OFF
     RegTapMax // char +/-63
     RegTapMin // char +/-63
   - Tap position 0 longer (6s) debounced: [Setup 5 → AddOns 8]
     Reg-L command: RegTap0Dly // {0:OFF,1:ON}, Default:1:ON

7. New features regarding current influenced setpoint adjustment:

   - Setpoint percentage value and setpoint absolute value are displayed in the Regulator screen with influence of setpoint adjustment.
     Reg-L commands: RegSWINF // act. nominal setpoint incl. current influence
     RegSWINFLL // act. primary setpoint incl. current influence
     RegSWINFP // act. percentage setpoint incl. current influence
     ➔ With extension ‘_‘ only current influence value, respectively

   - Gradient <I> is now adjustable for negative and positive current range. When updating the firmware to V2.22 the gradient for the negative current range will be set one time to the present positive gradient.
     Reg-L commands: RegISTEILN // gradient for negativ current range 0..400 V/In
     RegISTEILP // gradient for positiv current range 0..400 V/In

   - Unit of Gradient <I> changed from [%] to [V/In], because 1% has always been equal 1V. Beside the secondary value, the primary value is displayed in the configuration menu as well.

   - Unit of Limitation <I> changed from [%] to [V]. Additional to the secondary value, the primary value is displayed in the configuration menu.

8. Additional Lock Times for the Creeping Net Breakdown (1m,3m,5m,10m,15m,20m,Hand)
   [Setup 5 → AddOns 4]

9. High-Speed Switching can be deactivated [Setup 5 → AddOns 3].
   Reg-L command: RegBLOCKHSSW // {0:Off, 1:ON}, Default:0:OFF

10. Parallel programs:
    - Circulating current will be set to zero, if parallel program is deactivated (Off).

11. New funciton „Manu/Auto Balace at M/F Start“. The function determines the auto/manual mode of a parallel group during startup. That means in case of Master-Follower or MSI parallel program start (or if a slave joins a existing group), the new function decide on whether the group turns into auto or manual mode . If MasterPrio is chosen, the whole group takes the actual mode of the master. If ManualPrio is chosen, the whole group goes into manual mode, if one of the group participants is in manual mode.

12. The definition range of the parameter „1.ParErr after n*TCinOperation“ is extended to 0..15 (before 2..15).

13. The definition range of the parameters T1 and T2 for time program Const is extended to 1..600s.

14. The Reg-L commands RegEFUS, RegRELFUS and RegLEDFUS accept negative arguments. With this functionality inverted functions can be assigned immediately.

15. New relay and LED output functions:

    85:AMaster
    86:ASlave
    87:Ind
    88:ParProg+
    89:BCD1
    90:BCD2
    91:BCD4
    92:BCD8
    93:BCD10
    94:BCD20
    95:BCD40
    96:BCDminus

    The functions 85:AMaster, 86:ASlave, 87:Ind indicate if an AVR is working as active Master (M), Slave (S) or Independent (Ind). The function 88:ParProg+ is a group signal of the active states Parallel (P), Master (M) and Slave (S).

16. New relay output functions:

    22:TapMiMa // TapMin or TapMax active
    35:TapMin // TapLimiter Min active
    36:TapMax // TapLimiter Max active

17. New LED output functions:

    20:TapMiMa // TapMin or TapMax active
    32:TapMin // TapLimiter Min active
    33:TapMax // TapLimiter Max active

18. New analog output functions:

    32:SP // actual setpoint, 100V normalized
    33:SPINF // setpoint incl. current influence

19. Analog menus: beside the message of a duplicate assignment, a setup failure and communication failure
    will be shown.

20. A resistance input modul can now be evaluated without background program.
    - Complete parameterization within Setup 6→General→Analog→analog channel 1,3 and 5 (according to the slot where the resistance module has been pluged in, slot 1, 2 or 3)
    - Automatic detection, whether R1 or R3 module has been inserted.
    - The function “iTapPos” has to be assigned to the analog channel 1, 3, or 5 in order to use the analog input for tap position indication. Parameter setting of the tap range (TapMin and TapMax), of the dR as well as the Offset of the resistance input module can be adjusted in the submenu.

      Reg-L commands:

      | | |
      |---|---|
      | AnaScalY1 → RMTAPMAX | -63..0..+63 |
      | AnaScalY0 → RMTAPMIN | -63..0..+63 |
      | AnaScalX0 → RMdR | 1..200(R1) / 2000(R3) |
      | AnaScalX1 → RMRoff | 0..200(R1) / 2000(R3) |

    - If BCD-Code assignment has been made additional to a resistance input module setting, the BCD Code setting has priority.
    - An existing background program for the evaluation of the resistance input module has priority to a BCD-Code setting, as well as to the evaluation of a resistance input module via firmware.
    - Using an older resistance input modul in combination with firmware >=V2.22, the ID of the resistance input module (ANAMODID) has to be adjusted.

21. Modbus devices can be connected to the COM3 interface of a REG-D(A) / PAN-D with help of a Modbus-Converter. The Modbus-Converter is automatically detected by the device if the following setting has been made:
    Assign a free analog channel [Setup 6→General→Analog→Ana n→Parameter Selection→04:Modbus].
    Set the Modbus address, the Modbus Code+Type and the Modbus Data Adress; page [F1].
    The scaling factor, the offset and the sign range can be adjusted on the next page [F1].

    Reg-L commands:

    | |
    |---|
    | AnaPARMSEL, new selection possibility 4:MODBUS |
    | AnaSCALX0 → MODBUS-adress 1..255 |
    | AnaSCALX1 → MODBUS-Code.Type, see also ListMBCODE |
    | AnaSCALX2 → MODBUS register-adress -10000..9999 |

22. Within the analog menus for every channel the Min/Max values are displayed with time stamp and date (without year date). Via F-key the values can be reset to zero for each reffering analog channel .

23. There are two new Reg-L events, which can be used to react to a key stroke:
    Event 23 = KeyMANU
    Event 24 = KeyAUTO

24. English Translation for E/A functions:
    Hand --> Manual, Hand+ --> Manual+, Dreiwick --> 3Winding

25. In case of active simulation mode, the actual setpoint is used as measured voltage UN1. Voltage UN2 is set to 100V (if feature 3winding is activated - else the voltage UN2 is equal to UN1), the phase angle PHI=0° and the current IN=0A. Additionally the word ‘SIM’ will be dispayed in the Regulator- and Transducer screen to highlight the activated simulation mode.

26. Serial numbers can be displayed with up to ten digits.

27. New Status-Screens ‘Error Status‘, ‘Time/Date’ and ‘H/P/Q Programs’ in REG-D(A) and PAN-D. The ‘Error Status’ screen shows all device errors, analog-channel errors and h-code errors. On the ‘H/P/Q Programs’ screen all H-, P- and Q-lines can be viewed completely. In addition the cycle time of the h-code (resolution 1ms) is displayed on this screen.
    Reg-L command: SYSHPCT → outputs cycle time in seconds; if HBREAK active → output STOP

28. The time setting menu is newly designed. [Setup 6 → General 2 → Time Setting]
    The menu for setting the time configuration consist of the adjustable clock time, date, UTC time zone and Daylight Saving Time (DST) configuration. The DST can be configured with a list [F5], which can be adjusted individually. Furthermore there exists an assistant [F5] for the DST list, which can be used to choose one of the following presets:

```
------NORTH------
 *EU* TZ dependent     // EU and Greenland, 1h/2h, 2h/3h or 3h/4h dep. on the chosen time
                          zone
 *EU* 1h/2h            // EU 1h/2h
 *EU* 2h/3h            // EU 2h/3h
 *EU* 3h/4h            // EU 3h/4h
 CDN/USA MAR-NOV       // USA + Canada        MAR,2.SU 2h-NOV,1.SU 2h
 MEX APR-OCT           // MEX (Mexico)        APR,1.SU 2h-OCT,L.SU 2h
 ------SOUTH------
 AUS OCT-APR           // AUS (Australia)     OCT,1.SU 2h-APR,1.SU 3h
 BR  OCT-FEB           // BR  (Brasil)        OCT,3.SU 0h-FEB,3.SU 0h
 NZ  SEP-APR           // NAM (Namibia)       SEP,1.SU 2h-APR,1.SU 2h
 NZ  SEP-APR           // NZ (New Zealand)    SEP,L.SU 2h-APR,1.SU 3h
 -----VARIOUS-----
 Fix 22.3-22.9 0h      // e.g. IR (Iran) for  2011: 22.03 0h-22.09 0h
 All year ON           // DST ON   z.B. Russia since 2012
 All year OFF          // DST OFF
```

    The configuration of the DST list can finally be saved for the chosen year or for all years up to 2078. In case of DCF-operation the clock time cannot be adjusted, however the time zone / DST can be.

29. There is a new basic screen ‘PQIView’, important measurement values of a PQI-D (ELAN user) will be displayed.

30. In the TM module an ‘overload prediction’ is implemented. The permissible overload is calculated for a configurable time window within the permissible winding temperature. In case the load does not change, the time is calculated until the “permissible winding temperature” has reached.
    Reg-L commands:

    tmOVLTmMax: maximal time window until overload (parameter)
    tmOVLTm: remaining time until overload (output)
    tmOVLTmpMAX: maximal permissible winding temperatur upon overload is reached (parameter)
    tmOVLLdMax: maximal permissible load, which is possibel for the time until overload (output)

31. New parameters for calculation in TM module [Menu 1→Monitor→Setup→F1→Calculation]:

| | |
|---|---|
| Type of Aircooling: | TmClTypeAir = n // 0: AN 1: AF (new for IEC60076) |
| Limited Oilflow: | TmClFlowLim = n // 0: Yes 1: No (new for IEC60076) |
| Type of Oilcooling: | TmClTypeOil = n // 0: ON; 1: OF; 2: OD; 3: ON/OF; 4: ON/OD<br>(alternatively: TmCoolType = n) |
| IEC Formula: | TmFormula = n // 0: IEC_60354 1: IEC60076 |

32. Automatic data restore of RAM Backup from Flash, if RAM Parameters will be recognized defective after PowerOn. The backup of RAM into Flash requires Bootloader version V2.12 or newer.

33. Remote start of bootloader.
    For this purpose a special feature has to be released first, also a Bootloader version >=2.12 has to be installed. The Bootloader is started with the command sysreset=0.n. Through modification of the command the interface configuration can be chosen:
    SYSRESET=0.n Assignment:
    0.1 : Bootloader starts with COM1, adapted
    0.2 : Bootloader starts with COM2, adapted
    0.3 : Bootloader starts with COM1, fix on 115k,RTS,P-
    0.9 : starts with COM1 or COM2, Baudrate+Parity adapted,
    COM interface is chosen upon actual COM interface übernommen.

34. PAN-D phasefall detection revised. With the feature ADAPT.Bit1 the following wiring is taken into account (after a firmware upgrade >=V2.21 the default value is Bit1=0):

    - Bit1=0 → Default since V2.21; is used, if first voltage instrument transformer of REG-D(A) and PAN-D are parallel wired and second voltage instrument transfomer of PAN-D is wired alone.
    - Bit1=1 → Implicitly up to V2.20; is used, if first and second voltage instrument transformer of REG-D(A) and PAN-D are wired parallel or only the first voltage instrument transformer of REG-D(A) and PAN-D are wired, respectively, or PAN-D is in ‚stand-alone' operation.

35. Binary input BI1 of PAN-D free programmable and invertable. Default: RegEFU 1= 09:TC.i.Op

36. New PAN-D LED output funcitons: Default: RegLEDFU 7 = 29:TC.i.Op
    Default: RegLEDFU 8 = 10:Phasefail

37. The DCF input, which is integrated in REG-D(A) and PAN-D hardware since May 2009, is now supported by firmware. That means the time synchronization via DCF signal can now be used via this separate input (TBus). Signals in RS485 standard can be connected. The status of time synchronization is displayed on the Time/Date screen in the status menu.

# IV. Firmware V2.17 (07.08.2007) - V2.20 (24.02.2009)

### Changes

1. Portuguese screens implemented.
   Language selection modified (case insensitive):
   Previously: LANGUAGE = P // first letter 'P' --> Polish
   Now: LANGUAGE = POL // Polish (first 3 letters "POL")
   LANGUAGE = POR // Portuguese (first 3 letters "POR")

2. REG-CPU-V1.2 with 4MB SRAM is now supported.

3. The screen of the paragramer feature now displays the real operating condition.

4. Changes in MSI and paragramer view
   Preselected masters (normal paragramer) or preselected masters and slaves are displayed.
   AVR base display with preselected slave in MSI mode is displayed as IND(S).

### New features

5. The 61850 client now is fully supported.

6. Asymmetric current influence
   With the programs for current dependent setpoint influence it is possible now to parametrise not only an upper limit (maximum value) but also a lower limit (minimum value).

   The Reg-L parameters are:
   RegIBEG (as previously the maximum value)
   RegIBEGL (new: the minimal value)
   RegIBEGH (new: the maximum value, identical with RegIBEG)

   In the REG-D setup it is possible now to switch between maximum value and minimum value in the menu Limitation (I).

7. Feature RingLink implemented
   Instead of two busbars now a ring shaped busbar is being displayed depending on the feature RingLink (note: do not use in combination with feature CrossLink!)

### New REG-L commands

8. New command SYSRAMx
   New command SYSRAMx for reading the RAM implemented:
   SYSRAMB <address> [= <byte>]
   SYSRAMW <address> [= <word>]
   SYSRAML <address> [= <long>]

# V. Firmware V2.15 (01.03.2007) - V2.17 (07.08.2007)

**Changes**

1. Bugfixs
   - Analoge input processing
     During recording of analog input channels there was app. every 30min. one spike which was definitely not existing.

   - ParERR
     If AVRs in M-F, MANUAL and a tap difference was existing every 9h06'07'' a ParERR was created.

   - Some menus in PAN-D were not available in engish language

2. Trafomonitoring, Changes in REG-L syntax for settings of 2nd oilpump

**New features**

3. Trafomonitoring, Spanische language available

4. SN (serial number) is indicated in first status menu

5. Inversion of transformer mounting of current and voltage transformer
   With left or right button a second page of CT/VT Configuration will be called and the inversion for U1, U2, I1 and I2 selected.
   Changes are immediately set in feature MISWAP.
   Swap of transformer (U1<->U2, I1<->I2) is not executable, but if they are swapped by REG-L command there will be a remark via text.
   If feature MISWAP is fixed changes have no influence to the configuration and ** FIXED ** will be indicated.
   FIXED will be active if feature M2=2.

# VI. Firmware V2.11 (18.08.2006) - V2.15 (01.03.2007)

**Changes**

1. ELAN-Err revised

2. Recorder

   - Setup menus revised.
   - Possibility to record analog channels
   - Possibiltiy to switch on/off grid
   - Scalability via pushbuttons
     After push button F5:dx new key board layout for F1..F5 will appear. The actual displayed records will be frozen. So it is possible to display modifications at scaling very fast. Like in RegVIEW it is possible to shift curves left and right and to compress and extend the them.
   - New dt "2 Min.", now available: 14s,1M,2M,5M,10M.
   - Display name of curve in small letters in bottom right corner of chart window.
   - Indication state AUTO/MAN near F2 push button wight letters on black background.
   - Indication STOP near F3 push button
   - Indication DEMO normal letters, left centered
   - Curve selction is also possible via LEFT + RIGHT buttons.

3. Trafomonitoring
   Cycling fan control revised

4. State indication of binary inputs
   In case of mapping the state of all 64 possible binary inputs will be indicated in menu STATUS (1) in HEX-code:
   E01..E32 : 0000.0000
   E33..E64 : 0000.0000
   Mapping : activ

5. REG-D/PAN-D binary output-/LED-assignment PhasFall renamed to PhasFail

6. MMU-Display
   Now completed with P,Q,S.
   Swap signe of Q-, up to now it was invers to RegQ

**New features**

7. Paragramer

   - Paragramer with 3 busbars
     Now there are additional binary input assignments available:
     PG_IS3: low-voltage side, disconnector 3
     PG_CP2: low-voltage side, bus coupling 2-3
     PG_CP3: low-voltage side, bus coupling 3-1
     PG_SC3: low-voltage side, bus tie 3
     PG_H_IS3: high- voltage side, disconnector 3
     PG_H_CP2: high-voltage side, bus coupling 2-3
     PG_H_CP3: high-voltage side, bus coupling 3-1
     PG_H_SC3: high-voltage side, bus tie 3
     If you use Paragramer with 3 busbars feature Crosslink is not allowed.

   - Monitoring Paragramer inputs
     If two inputs are used for one Paragramer-input-assignment(one inverted the other not inverted) a non valid state of the inputs will be indicated via rotating Paragrgamer symbols.
     Additional there is a LED/REL assignment with "PG_INERR" possible which will indicate this state.

8. Possibilty of inverted function of inputs, outputs and LEDs
   Via feature this new possibility can be suppressed(old display).

9. Expansion of logbook functionallity
   Logging LEDs is possible.

10. Editable register/storage

11. COM3

    - Parametrization of COM3 devices via WinREG and regulator
      (BIN-Ds, ANA-Ds and additional modules at LEVEL II in REG-DA )
      Assumption is a preassignment by manufacturer
    - COM3-error detection extened
      Now there will be detected a deviation of the number of stations(devices) and the adress position.
      There is a check every secound and if there is a deviation Bit0 in DevERR will be set.
      After PowerOn regulator waits 10s until a check will be executed.
    - New REL/LED-output assignment COM3Err (REG-D/PAN-D)
      REG-D: 21:COM3Err, PAN-D: 28:COM3Err
      In menu COM-3 STATUS there is a possibility to set COM 3 error detection via F4 : "ERR-TST".

12. Trafomonitoring, 2nd oilpumpe

13. PAN-D

- Recorder in PAN-D
  The recoder in PAN-D will be displayed and controlled via REG-D. For this in recorder menu of REG-D, PAN-D have to be choosen. Assumption is the connection PAN-D to REG-D, a activated recorder and PAN-D has not to be in stand-alone operating mode.
  The kind of operator control is the same, only datas come and go to PAN-D. In titelbar there is a hint in evidence.
  If there are shown analog channels the corresponding ANAFU will be indicated and if ANAFU==1:ANA also the translation of the string will be shown "#ERL" if it is used.

- New analog output assignment:
  8: oU1
  9: oU2
  10:oTapPos
  11:oSP

# VII. Firmware V2.10 (01.03.2006) - V2.11 (18.08.2006) -

**Changes**

1. COM-Baudrate 76800 is lnot longer eligible.

2. Extended logbook function REG-D/REG-DA/PAN-D
   Now it is possible to log binary input, binary output and system events
   The masking of events of the logbook in REG-D and REG-DA has to be done either via WinREG or via special REG-L-commands.
   The masking of events of the logbook in PAN-D has to be done special REG-L-commands.

3. Harmonize numbers of relays at REG-D:
   New relays 6..9
   Neue Relais 6..9 take over BA 1..4
   The outgoing commands for BA-relays will remain. Direct relay commands are been extended.
   The relay numbers will be inicated as BA1/R6, .. BA4/R9.
   BA 1 -> BA1/R6
   BA 2 -> BA2/R7
   BA 3 -> BA3/R8
   BA 4 -> BA4/R9
   Note: Until now with REL6 the state of AUTO/MANUAL could be read. (at REG-DA at REL 12)
   This is not longer intended.

4. Harmonize numbers of relays at PAN-D:
   PAN-D BA-relays are now like in REG-D/DA added to the "normal" relays:
   new: REL 1..14+15..18 up to now: REL 1..14, BA 1..4
   BA 1 -> BA1/R15
   BA 2 -> BA2/R16
   BA 3 -> BA3/R17
   BA 4 -> BA4/R18
   The outgoing commands for BA-relays will remain. Direct relay commands are been extended.

5. UTC time zone is now possible in 15 minutes intervals
   example: UTCTZ = 5.75

6. PAN-D new menu for selecting main menu
   with it, logbook could be read out

**New features**

7. New feature SYSCTRL2.B4 : NoQuickInhibitLow
   Is bit 4 active(B4=1), no quick detection of inhibit low during undervoltage will be executed. Means, in every case the delay will be active for „Inhibit low“

8. New feature SYSCTRL2.B5 : NoInhibitHighEvaluation
   Is bit 5 active(B5=1), evaluation of inhibit high is switched off. The menu for the inhibit high settings will disappear.
   REG-L commands are still available but without any effect.

   Note: SYSCTRL2 is also at PAN-D available, because there could be also inhibit high parameterize.

9. Main menu (choice of basic screens) extended about one screen

10. "Rolling Screens"
    Now it is possible to activate at function 5 a time controlled change of the screens.
    The rolling screens are the main screen, different transducer modes and if applicable trafo monitoring.

11. REG-DA, BLOCKED-LED
    Until now it was not supported. Now function is like in PAN-D, means invers of state signal.

12. Regulator main menu
    The deviation is now inticated beside the arrow as a number with one decimal position.

13. New output function 82:dCosEmgy
    1: dCos-emergency programm activ
    0: Normal operation

14. Introduction of COT process

15. New format of date indication 4+5:

| | | |
|---|---|---|
| | 01:tt.mm.jj | |
| | 02:mm/tt/jj | // american |
| | 03:mm-tt-jj | |
| (neu) | 04:tt/mm/jj | // british |
| (neu) | 05:tt-mm-jj | |

# VIII. Firmware V2.07 (16.03.2005) - V2.10 (01.03.2006)

**Changes**

1. Inhibit High, new limits (REG-D/PAN-D): -35%..+50% (previous: *0..+35/50%)

   | Labelling: | Limiting values: | Limiting value reference/notes: |
   |---|---|---|
   | Triggering | : -35..35 % | 100V |
   | -35..50 % | with: REG-DA or ext. range | |

2. Current influence LDC R+X range: instead of 0..30 now 0..+/-30

3. Rename "HAND" in English to "MANUAL".
   Unchanged stay the RegL-command names with "HAND", the E5/E6 input labels "HAND/AUTO", and the function list elements.

4. Knu1/2
   Figure input menu
   The lower value 0.01 was so far represented as zero. Now the commonly used figure input menu can display lower and higher values with up to three right-to-comma-positons (Floating point).

   Limits raised
   knu: 4000 --> 9000 (REG-D/DA and PAN-D)
   kni: 10000 --> 90000 (REG-D)

5. Characteristic Crosslink
   Previous:
   With active feature Crosslink two closed isolators simulated a closed bus coupler between the Crossling isolators.
   New:
   With active feature Crosslink two closed isolators simulate a closed bus coupler left to the Crosslink isolators.

6. Characteristic HVLVControl
   The paragramer with the activated feature HVLVControl had the characteristic to evaluate only the switch position on the low voltage side if the high voltage side of the transformer was switched off.
   Now changed:
   If the transformers are switched off on the high voltage side then they are in independent operation.

**Improvements**

7. REG-D/PAN-D, new Relay-/LED-functions 101:Eing-01 ... 132:Eing-32
   For indicate the input status on a binary output or an LED. Display in English "Input-01". Multilingual intended, all foreign languages still identical with English.

8. An MSI2 mode is available now,
   which allows MSI with two groups. The MSI paragramer screens are accordingly modified, besides 'MSI_Sl1', 'MSI_Sl2', 'MSI_Ma1' and 'MSI_Ma2' are available as output, input and LED functions, which allow Master or Slave operation in the first or second group.
   Further there are now the Reg-L commands:
   RegMSI_Ma, RegMSI_Sl, RegMSI_Ind,
   RegMSI_MA1, RegMSI_MA2, RegSl1, RegSl2
   They act as out- and input functions (e.g. RegMSI_Ma=1 creates the Master operation).
   The query RegMSI_Ma supplies information whether Master operation is present or not.
   If one uses RegMSI_Ma or RegMSI_Sl in the MSI2 mode, then group 1 is selected.

9. REG-D: New binary/LED-output function 79:T1h/1s,
   is activated for one second to each full hour.

10. PAN-D: New Relay/LED-output function 27:T1h/1s
    is activated for one second to each full hour.

11. IP-address input (REG-D and PAN-D)
    New general menu:
    F3 - IP-Address
    F4 - IP-Netmask
    F5 - IP-Gateway

    New REG-L commands reading/writing of IP(s):
    SysIP [= <ip32>] // IP-Address
    SysIPNM [= <ip32>] // IP-Netmask
    SysIPGW [= <ip32>] // IP-Gateway
    <ip32> : number (32-Bit) 0 .. (2^32-1)

12. New feature SYSCTRL2.B1:RegLonExtendedMasterSlaveInfo
    With set Bit B1 the following data points are modified:
    REGLON.TC_Single_Parallel : IsActiveMaster ODER IsSlave
    REGLON.TC_Master : IsActiveMaster

13. New characteristic: SYSCTRL2.B2 : NoFastOnSPchangeIfVoltageReg
    With voltage set point control the automatically activated high speed switching possibly interfered during a set point change. The performance can be controlled now with bit (B2) in the SYSCTRL2-characteristic:
    SYSCTRL2.B2 : NoFastOnSPchangeIfVoltageReg

14. New characteristic: SYSCTRL2.B3 : NoFastOnSPchangeIfPowerReg
    With power set point control the automatically activated high speed switching possibly interfered during a set point change. The performance can be controlled now with bit (B3) in the SYSCTRL2-characteristic:
    SYSCTRL2.B3 : NoFastOnSPchangeIfPowerReg
15. New open feature "ADAPT"
    feature ADPAT.B0 (Pulse value=1):

If Bit-0 is set, the lower 8 Bits of AE_Reg_LED 4-Bit are swapped with RLONS <par> query t: B7..B0 --> B3..B0,B7..B3

normal: B0[STATUS <U >U >I LED1 LED2 LED3 LED4 AUTO HAND ...]
swapped: B0[LED1 LED2 LED3 LED4 STATUS <U >U >I AUTO HAND ...]

Note: The swap is only executed when querying with command RLONS with parameter (!) and only locally (Thus not with remote query or if for example the command RPS is used).

16. New, protected feature PG_SCHEME_1

17. TmCOOLBASE argument range from 0,1 to 0,1,2 extended

18. Programmability of input E5 and E6 enabled
    by extension of the RegHANDAUTO characteristic:

| | Index | List text | Art | EFU-Text | |
|---|---|---|---|---|---|
| | 0: | E5-A/E6-H | bistable | E5:[AUTO] | E6:[HAND] |
| | 1: | E5-PULS | Puls | E5:[A/H-PULS] | E6:[HAND-DLY] |
| (new) | 2: | E5+6-PROG | Prog. | E5:[PROG] | E6:[PROG] |

    Display in function menu:

| | | | |
|---|---|---|---|
| 0: | E5:A<br>E6:H | 1: E5:A/H<br>PULS | 2: E5+E6:<br>PROG |

    Note: in foreign languages PULS is substituted by PULSE.

19. Text assignment for the "01:PROG" selections EFU, RELFU, BAFU, LEDFU
    The assigned text should have no more than 8 digits and no blank.
    The assigned text is displayed in the menus for function assignment, not however, if the choice box is open. "01:PROG" is still displayed there.

20. Polish text is available

21. COT - Cause Of Transmission supported

22. Creeping Net Breakdown (2:PRIM)
    Three options can be selected now (0:OFF, 1:SEK (formerly ON), 2:PRIM).
    If PRIM is selected, the primary current is taken into account with the NZB detection.
    A list box is displayed in the menu for selection. The list is generated multi-lingual.
    ("OFF" is translated into all languages, "SEK" is German, in other languages "SEC", "PRIM" is always the same).

# IX. Firmware V2.03 (12.07.2004) - V2.07 (16.03.2005)

**Changes**

1. Extensive changes on REG-TM feature (for further function explanation please refer to TMM manual)

2. Application menus extended of 15 additional menues. Now 6 pages with 5 menues each are available for REG-D and PAN-D (up to now 3 pages). Further on empty rear menu pages are not visible any more. A menu page is empty if all five application menues have assigned: MenuApp = -1 and MenuAppN = "". The number of application menues is calculated on opening the application menu. If also empty menues shall be display (like up to now), a MenuAppN has to be assigned with " "(with a space) instead of "" (without a space).
   Online-help D+E complemented regarding MENUAPP.

3. PAN-D menu General 2 and 3 was designated with 1 and 2, now okay.

**Changes / Improvment of REG-L commands**

4. Creeping Net Breakdown now visible in the regulator.

5. New analog output functions available for setpoints (100V-rated)
   28: oSP-1 [V]
   29: oSP-2 [V]
   30: oSP-3 [V]
   31: oSP-4 [V]

6. Regulator main menue in case of inhibit: up to now only for inhibit high a message was displayed on the screen, but for inhibit low no message was available. Now a inhibit mode is displayed as follows (D/E):

   Inhibit high: "-----AUSLÖSUNG-----" "----INHIBIT HIGH---"
   Inhibit low: "---STILLSETZUNG----""----INHIBIT LOW----„
   Other languages changed accordingly.

7. New relay/LED outputfunctions "74:OilPump", only available with TM feature.

8. SCADA message AE_Error_TC_Position new defined.
   New: Error with (tappos==99) || TAPERR || RegPan TC.i.Op.Err

9. TM feature also changed for ANSI-procedure.

10. New, second SYSCTRL feature SYSCTRL2 implemented.
    Bit-description:
    B0 - noAutomaticHandAuto; is the bit set, the manual and auto mode is not synchronized among parallel regulators (behavior like in V1.99)
    SYSCTRL2 is showed in the status menu.

11. The timeout-value for TMCOOLLEVEL = <w> reduced from 60s to 10s.

12. New analog output function: oTapPos
    Based on the debounced tap position (-40..0..+40, 99=error).

13. Regulator main menue, integrator presentation:
    Bar is displayed with 0xDD instead of 0x06, so WinREG can show this sign better. Older WinREG show with 0xDD a thicker bar than necessary.

# X. Firmware V1.99 (26.06.2003) - V2.03 (12.07.2004)

**Changes**

1. All reactive power units "Var" --> "VAr"

2. Menu, general number input: Scale now up to E+7 (before E+5)

3. Analog menu, edit of unit: if unit is not chooseable (because unit is fixed through ANAFU), a short message is displayed upon the choose of the analog function and the input dialog is not being started.

4. QSIGNED feature is displayed now in status menu.

5. DCF77 timezone is displayed in the DCF77 menu (the received DCF77 time is always showed in the actual transmitted timezone (GMT+1+SZ). This is most likely better for clarification.

6. In case UTC is used the time zone is displayed in the upper right corner. (e.g. Germany: GMT+1, GMT+2 with daylight saving time (DST) )

7. UTC can be used now also in timezone 0 without DST.

8. DCF77 operation also available for other timezones than Berlin (GMT+1+SZ), in this case the UTC operation has to be active.

9. Analog input function iTapPos,
   P0-X and P2-X are used as limits (5/4 FLOOR rounded)
   TapPos=99 (ErrorCode) is set if:
   (Analog-TapPos < P0-X) OR (Analog-TapPos > P2-X)
   The Tap Position is then equal to the regarding ANA-value
   (5/4 FLOOR-rounded, correlates with INTR).
   The tap information is handled as if it comes via BCD-Code inputs,
   so in consequence a debouncing is performed.
   Multi assignment detection active, if iTapPos and BCD-inputs are parameterized.
   Priority:
   1. RegTapPos = <tap position>
   2. BCD-input (Tap Position indication has to be activated)
   3. iTapPos (Tap Position indication has to be activated)

10. Feature 4Sollwerte / 4Setpoint not available any more. Now always four setpoints are available.

11. For activated feature display in the menu Setup now a second page is available (F5) in case more than nine features are activated. If a second page is available a note is displayed near F5.
    Also the feature sorting is modified: at first the company features are displayed, then all other features follow alphabetically sorted

12. Fixed delay for TapErr detection after TC.i.Op signal got low: 3s

13. Switch to manual in case of TapErr now chooseable

14. Recorder, choose of 03:[2]U+U2:
    U2 is always the not regulated voltage in case of feature 3winding. Otherwise (without feature 3winding) U2 is always the second measured voltage

15. “Jogging-wheel” implemented for general number input methode of menues.
    ANALOG - ANAFIX : Integer 10/1
    ANALOG - ANASCALX : 10/1
    ANALOG - ANASCALY : 1/0.1
    ANALOG - ANAFAC/OFF : 1/0.1
    ANALOG - ANARESO : Integer 100/10
    MENUEDIT : Scale/Integer programable with extensions
    Scales: from +/- 100000 to 0.0001
    With MENU one can switch to the old number input methode.

16. Panel LEDs Local/Remote show now in case of REG-D + REG-LR + REG-P (input function LR_LR is used) the actual local/remote mode if the status of LR_STAT is valid (=1). If status of LR_STAT is not valid (=0) both LEDs are off.
    For the LED and REL fuctions Local and Remote the same logic is implemented.

17. Renaming of frequenc output function: >F ---> oFREQ

18. Revision of suppression of smaller-messages (REG-D + PAN-D):

| Suppression of: | | New limit: | Old limit: |
|---|---|---|---|
| <U | (REG-D) | 20% | Inhibit |
| <I | (REG-D) | 20% | <=50% (10% below inhibit low) |
| <U1 | (PAN-D) | 20% | REG-D Inhibit |
| <<U3 | (PAN-D) | 20% | REG-D Inhibit |

    The percentage values relate to 100V.
    In combination with the following features no change has been done:
    ENBW : no suppression
    BBN4.4.3 (REG-D): supression with Inhibit & <I
    BBN4.4.3 (REG-D): suppression with REG-D inhibit & REG-D <I

19. Tightening up of analog menues with context sensivity:

Analog-Setup-Menus with AnaParmSel = 0:ALL

| | F2 | F3 | F4 | F5 |
|---|---|---|---|---|
| ASETUP1: | AnaFU | AnaUNIT | AnaFIX | AnaPARMSEL |
| ASETUP2: | AnaSCALX0 | AnaSCALY0 | AnaSCALX1 | AnaSCALY1 |
| ASETUP3: | AnaSCALX2 | AnaSCALY2 | --- | AnaLIMSEL |
| ASETUP4: | AnaFACTOR | AnaOFFSET | AnaSSEL | AnaRESO |

Analog-Setup-Menus with AnaParmSel = 1:Fac+Off

| | F2 | F3 | F4 | F5 |
|---|---|---|---|---|
| ASETUP1: | AnaFU | AnaUNIT | AnaFIX | AnaPARMSEL |
| ASETUP2: | AnaFACTOR | AnaOFFSET | AnaSSEL | AnaRESO |

Analog-Setup-Menus with AnaParmSel = 2:P0P2

| | F2 | F3 | F4 | F5 |
|---|---|---|---|---|
| ASETUP1: | AnaFU | AnaUNIT | AnaFIX | AnaPARMSEL |
| ASETUP2: | AnaSCALX0 | AnaSCALY0 | AnaSCALX2 | AnaSCALY2 |
| ASETUP3: | AnaLIMSEL | --- | --- | AnaRESO |

Analog-Setup-Menus with AnaParmSel = 3:P0P1P2

| | F2 | F3 | F4 | F5 |
|---|---|---|---|---|
| ASETUP1: | AnaFU | AnaUNIT | AnaFIX | AnaPARMSEL |
| ASETUP2: | AnaSCALX0 | AnaSCALY0 | AnaSCALX1 | AnaSCALY1 |
| ASETUP3: | AnaSCALX2 | AnaSCALY2 | AnaLIMSEL | AnaRESO |

20. With firmware update from version >= V1.99 AnaParmSel/DevParmSel is set automatically to 1:Fac+Off (up to now 0:All); in consequence the parameterization for users, who want to use Factor+Offset, will be more clearly.

21. Parallel program „MASTER-SLAVE“ removed from list.

22. Activation of parallel operation in case of MSI not implicitly any more, that means the parallel program activation has to be chosen.

23. Menu entries (range) changes for following parameters:

| Parameter | new: | old: |
|---|---|---|
| <U | [-25% .. +10%] | [+10% .. -25%] |
| <U1 (PAN-D) | [-25% .. +10%] | [+10% .. -25%] |
| <<U3 (PAN-D) | [-25% .. +10%] | [+10% .. -25%] |
| FastFWD | [-35% .. 0%] | [0% .. -35%] |
| Inhibit | [-75% .. 0%] | [0% .. -75%] |

24. AnaPARMSEL / DevPARMSEL, two point scaling:
For parameterization P0 and P2 is used.
LISTPARMSEL:
    00:All
    01:Fac+Off
    02:P0P2
    03:P0P1P2

25. Analog-Default upon Master-Reset:

| | | |
|---|---|---|
| AnalogUnit | = "mA" | |
| AnaSCALX0 | = 0 mA, | AnaSCALY0 = 0 |
| AnaSCALX1 | = 20 mA, | AnaSCALY1 = 1 |
| AnaSCALX2 | = 20 mA, | AnaSCALY2 = 1 |
| AnaPARMSEL | = 02:P0P2 | |

26. Menu now with new, depending limit values:
    Setpoints, Inhibit high (REG-D and PAN-D).
    Whole list:

| name: | limits: | limit reference/note: |
|---|---|---|
| Inhibit high: | : 0..35 % | 100V |
| | 0..50 % | with: REG-DA or extended range |
| FastBWD | : 0..35 % | setpoint (SP) |
| >>U | : 0..+35 % | SP/100V/110V |
| >U | : 0..+25 % | SP/100V/110V |
| <U | : -25..+10 % | SP/100V/110V |
| <<U | : -35..+10 % | SP/100V/110V |
| FastFWD | : -35..0 % | setpoint (SP) |
| Inhibit low | : -75..0 % | SP/100V/110V |
| >I | : 0..<Imax%> % | in % of In |
| Reg3WLIM | : 0..+25% | SP/100V/110V |
| Setpoint | : 80..120 V | value 100V rated |
| | 60..140 V | with: REG-DA or extended range |

---

<Imax%> : hardware depending, range 100..250%(Default:135%)
extended range: hardware depending extended range

27. New feature SIMMODE:
    From V2.00 the start of measurement simulation (F5 in status menu)
    is only possible in relation with the feature SIMMODE. Following parameterizations
    are possible:
    <value> meaning
    0 no simulation / tap simulation permitted
    1 simulation / tap simulation permitted, but is finished in case of switch to AUTO
    2 simulation / tap simulation permitted, not depeding on AUTO or MANUAL mode

28. Tap simulation (with F4 in the status menu) is now automatically finished,
    if the simulation (with F5 in the status menu) is finished. Up to now the simulations
    were only disabled in case the background light delay time (=15min) was reached.

29. 4:TapSimul at AddOns – Tap Position Indication is only available if the function is enabled.

30. Tap Position Indication completed with 4:TapSimu. Is this function used,
the tap position is simulated all time. (change of tap position with RegTAPNV = <v>).
The INVERS feature is taken into account, that means with a tap up command
the tap position is reduced.
The value range is limited to +/- 40. The value from RegTAPNV is debounced like a normal
input value for 1s, so in consequence the tap position is available 1s after RegTAPNV command.
The tap position simulation (F4 in status menu in case of activated measurement simulation)
functions as before (overwrites the measured value as well as RegTAPNV value), as well as
the backgroundprogram command RegSTUFE=<v> with a timeout delay of 60s.

31. Panel, feature display in status menu:
M2 (only REG-D): v==1 --> "M2", v==2 --> "M2 (2)"
SYSCTRL (REG-D+PAN-D): now in addition to decimal view also a binary view is available:
"SYSCTRL=18/---4--1-"

32. In the regulator basic display the actual mode MANUAL/AUTO/STILL is showed in case
of SLAVE or active MASTER.

33. Slaves follow a Master (in case of Master-Follower operation) now optional also in MANUAL mode

34. TapErr detection only in case of enabled tap position indication. TapErr detection now also possible
without TC.i.Op signal.

35. General suppression of Up/Down commands during the whole Up/Down relay cycle, not only during
Up/Down relay pull time. In V1.99 this behavior could be forced.

36. Modification of REG-DA relays (with extensive code simplifications for all devices):
BA1..6 became REL6..11

37. Default values EFU, LEDFU and RELFU for REG-DA revised:
E1 : "Lauflampe"
E9 : "BCD-1"
E10 : "BCD-2"
E11 : "BCD-4"
E12 : "BCD-8"
E13 : "BCD-10"
E14 : "BCD-20"
E15 : "BCDminus"
LED-1 : "<U"
LED-2 : ">U"
LED-3 : ">I"
REL-6 : "Laufl-F."
REL-7 : "Remote"
REL-8 : "Local"
REL-9 : "<U"
REL-10: ">U"
REL-11: ">I"

38. Setpoint-menu: Hint for delta voltage implemented, to avoid mix-up with
phase-to-neutral voltage:

```
-----------------------------------------------------------
"Setting the 1."                    "Setting the 1."
"Setpoint Value:"                   "Setpoint Value:"
"                       "    ---->> "                      "
"        V     =100%"               "      V U-LL =100%"
"  ========     ----"               "  ========       ----"
```

39. Online help D+E regarding PRINT summarized (until now four chapters, now one remaining). The keywords remained the same.

40. Online help D+E for TIME complemented (Hint, that in case of UTC use time and date is put together).

41. REG-DA 1A/5A switching via software implemented.

42. REG-DA: in case of changing the current transformer characteristic no info-message for changing the jumper is displayed.

43. New CT Configuration value 7:OFF implemented for specific turning off (e.g. in case of no mounting): the measured current is ignored and set to zero, however in tap changing statistics always a tap change under load is assumed.

44. CT/VT Configuration menu: in case the 2.KNX-values are used, a new menu opens, if you want to change Knu oder Kni: F2:Knu 1, F3:Knu 2, F4:Kni 1, F5:Kni 2.
The input of numbers is analog to the analog-setup-menues. Are the 2.KNX-values not used, the input is just as before.

45. CT/VT Configuration menu supervises, whether in case one CT or VT is set to ARON mode the other transformer is set to ARON as well. If not the following message will appear:
"ARON Setting incomplete“.

46. CT/VT Configuration menu extended: 6:ARON
ARON has to be chosen in both transformer configurations. The following assignments are valid then:

| Wandler | Normalbetrieb | ARON |
|---|---|---|
| U1 | U1 | L12 |
| U2 | U2 | L23 |
| virtual | - | L31 |
| I1 | I1 | I1 |
| virtual | - | I2 |
| I2 | I2 | I3 |

47. Recorder changed to UTC-time.

48. New feature for PAN-D: STANDALONE
    If the feature is set, the PAN-D does not try to contact “his” REG-D and shows no error (no blinking of Status LED in case of missing REG-D). All relevant parameters have now to be set via RegL.
    Is a REG-D connected to a PAN-D with activated STANDALONE feature, the REG-D recognizes the PAN-D, however in the 6.Setup menu there is a hint that PAN-D is in Standalone mode (REG-D firmware >= V2.00, if firmware smaller no message will appear).
    The user can see that way, that PAN-D is disconnected from REG-D wrongly.
    Setting the feature: feature STANDALONE = 1
    Deleting the feature: feature STANDALONE = 0

**Änderungen / Neuerungen der REG-L Befehle**

49. Analog menu, analog unit: this unit is now depending on ANAFU.
    As soon as the unit can be derived from ANAFU, the specific unit is displayed and cannot be changed, otherwise the unit can be defined freely.
    For this purpose the extension ‘*’ was added for the vommand ANAUNIT:
    ANAUNIT <ch> : Read/Write of unit string
    ANAUNIT* <ch>: Read/Write depeding on ANAFU <ch>

50. 6 new analog output functions:

| | |
|---|---|
| 21:oArU12 | ARON Spannung U12 |
| 22:oArU23 | ARON Spannung U23 |
| 23:oArU31 | ARON Spannung U31 |
| 24:oArP | ARON Wirkleistung |
| 25:oArQ | ARON Blindleistung |
| 26:oArS | ARON Scheinleistung |

51. ARON values are only available with activated feature M2.

52. Change of analoge output function characteristic of functions 7..15:
    instead of rated values now scaled values are given

| | | |
|---|---|---|
| 07:oU | regulated delta voltage | |
| 08:oP | active power | |
| 09:oQ | reactive power | |
| 10:oS | apparent power | |
| 11:oU1 | delta voltage first measurement inputs | |
| 12:oU2 | delta voltage second measurement inputs | |
| 13:oI1 | current I1 | (with M2: ARON I1) |
| 14:oI2 | current I2 | (with M2: ARON I2) |
| 15:oI3 | current I3=0 | (with M2: ARON I3) |

    Nomenclatrue changed accordingly.

53. REG and DEV command groups differentiate now between string assignments and number assignments, in case the argument is inclosed by “” or ‘’.
    Note: this extension take only effect on command Reg3WBUSSTR at the moment.

54. New feature COM2FIX (REG-D and PAN-D) for fixing COM-2 interface settings (no change via Panel or REG-L possible any more)
    Enable: feature COM2FIX = <fix>
    Disable: feature COM2FIX = 0

55. Stack-reuse with command PLC.
    PLC // stack-index set to context of last execution
    PLC <n> // set explicit stack-index
    PLCI // for-i-variable = actual stack-index
    PLCLI // for-i-variable = stack-index of last execution

56. User defineable structure output:
    Now invers order possible with ´-´ sign before number assignment:
    "A-10" begins with A10, followed by A9,A8...

57. New variable block V (command V, VLIST) with volatile double variables implemented.
    System wide available, remote access possible since firmware version >= 2.00zy.
    After a Power-On (or Sysreset=0) these variables are set to zero initialy.

58. The actual busbar is now displayed in curly brackets {} in the REG-D and PAN-D main display and in the REG-D Transducer mode. The indication is only visible in case of activated 3Winding feature.
    Positions:
    - REG-D main display: in the middle above the bar graphic
    - REG-D MMU-display: in the first dateline (U..), left justified
    - PAN-D main display: in the title line "PAN-D", left justified

    New RegL command to define the busbar name:
    Reg3WBUSSTR 1..2 [= <busstr>] // max. 3 signs

    Default display:

| Zustand | | BUSSTR="" | BUSSTR != "" |
|---|---|---|---|
| nicht aktiv | : | " " | " " |
| SammelS. 1 | : | "{1}" | BUSSTR-1 (3 Zeichen) |
| SammelS. 2 | : | "{2}" | BUSSTR-2 (3 Zeichen) |

59. RegL-group REGxxxx, string assignment: Assignment of the string-clipboard now possible with “$”.

60. Menu-Application – MENUEDIT: new parameter and extensions:
    MENUEDIT <mode> <n> [<p_prog>] = <titel> [<min value> [<max value>]]

61. Enter of Paragramer-Activation/Number of transformers now available with Listbox OFF, ON-1..ON-6 (feature active) or without Listbox OFF/ON in demo mode (feature not active).

62. All RPS structurs (also RPS 1 == RLONS) the UTC-time can be requested (with Ext.'°'):

| LOC | UTC | |
|---|---|---|
| RPS n | RPS° n | // n : 0,1,2,3,... |
| RLONS | RLONS° | |

63. Online help D+E, new capital “EVENTLOG” with description of output of logbook.

64. New event:
    InhibitLow
    Renaming of existing events
    ce_Trigger --> ce_InhibitHigh, ce_Standstill --> ce_Inhibit
    ce_Inhibit not in logbook any more.
    Internal renaming:
    AE_Trigger --> AE_InhibitHigh
    AE_Standstill --> AE_Inhibit
    List of actual accessable events in logbook:

| | Logbook-events: | Text English: | Text German: |
|---|---|---|---|
| | ce_Local_Remote: | LOCAL | REMOTE |
| | ce_InhibitHigh: | Inh-High:YES | Auslsg:JA |
| | ce_Fast_Step_Up: | Fast-Up:ON | SchnellH:EIN |
| | ce_Fast_Step_Down: | Fast-Dwn:OFF | SchnellL:AUS |
| * not available any more Log: | ce_Inhibit: (Inhibit:NO | | Still:NEIN) |
| | ce_Over_Current: | >I:YES | >I:JA |
| | ce_Over_Voltage: | >U:NO | >U:NEIN |
| | ce_Under_Voltage: | <U:YES | <U:JA |
| | ce_Auto: | AUTO | HAND |
| | ce_poweron: | PowerON | PowerON |
| | ce_simulation: | Simul:ON | Simul:EIN |
| * new: | ce_InhibitLow: | Inh-Low:NO | Still:NEIN |

65. Modification of REGLON-structure (RPS 1):

| | | | |
|---|---|---|---|
| int AE_Inhibit:1; | // 50.7 | B7 | new |
| int AE_InhibitLow:1; | // 50.3 | B3 | instead of Inhibit |
| int AE_InhibitHigh:1; | // 50.0 | B0 | renamed |

66. Modification of RPS 2-structure:

| | | | |
|---|---|---|---|
| int AE_Inhibit:1; | // 4.5 | B5 | renamed |
| int AE_InhibitHigh:1; | // 4.2 | B2 | renamed |
| int AE_InhibitLow:1; | // 5.7 | B5 | new |

67. InhibitLow REL/LED function new.

68. REG-D: Approximation of REL- and LED function numbers beginning with 65:COM2ACT.

69. PAN-D: Approximation of REL- and LED function numbers beginning with 25:COM2ACT.

70. New REL/LED funciton „T60s/1s“ for output of an one second lasting pulse every 60s realtime synchronous (REG-D and PAN-D)

71. With the „time extension“ '_' the output of the index number can be suppressed when using the command ANAFU. This extension is also applicable with all REGxxxx commands, e.g. RegEFU.

72. SYSCTRL Bit 5 functionaly inverted:
    New: DisableGroupTappingDuringHAND

73. MMU-Display shows with „Dreiwickler Spezial“ now at first the simplified U1/U2 page, followed by the common transducer display on the second page.

74. RegI with parameters now working:

```
RegI        // current of the regulated side (I1 or I2)
RegI1       // current I1
RegI 1      // like RegI1
RegI2       // current I2
RegI 2      // like RegI2
```

    also available for RegIN...

75. New RegL command RegParErrTF [={0 ..14}] for entering the ParErr timefactor.
    Default after Master-Reset = 4.

76. Free feature MISWAP for control of the measurement transformer input permutation implemented:
    Feature MISWAP = <miswap>
    <miswap>: B7:~I2 / B6:~I1 / B5:~U2 / B4:~U1 / 00 / mm
    B7..B4 control the polarity of each input (1=invertion)

| | | |
|---|---|---|
| mm: | 0 : -- | no swap |
| | 1 : U1 <> U2 | swap U-transformers |
| | 2 : I1 <> I2 | swap I-transformers |
| | 3 : U1 <> U2, I1 <> I2 | swap U- and I-transformers |

77. Query of the valid settings <miswap>: RegMISWAPEFF
    3Winding input swap and M2=2 swap are taken into account

78. Temporary change of MISWAP, valid until the next PowerOn:
    RegMISWAP = <miswap> (requirement: M2 != 2).
    Note: with this command the value of MISWAP is changed, but is not saved in the EEPROM. Because of this the old value from the EEPROM is valid after a PowerON:

79. In case of M2 and and the swap of I1 <> I2 the feature M2=2 has to be set.
    The feature MISWAP is ignored then.

80. „3winding special“ with swap of measurement inputs U1<>U2, I1<>I2 implemented.
    In consequence the value “angle phi” of the regulated busbar is always available.

81. New AnaMODID for PT100-temperature-inputmodule implemented: 9:TI

82. REGxxx and DEVxxx groups accept now also parameters with for-i-variables i,j,k.
    Up to now such an assignment is taken as a string. However, in case the string “i” shall be assigned, the string as to be taken into “” or ‘’.

```
RegXXX = i          // new: assign the content of i
RegYYY = "i"        // Assignment of the string "i"
```

83. New command for deleting the logbook: EVENTLOG=0

84. Logbook (EVENTLOG) now with 127 entrys instead of 64 and non-volatile.
    New event: status of the simulation (ON/OFF)
    List of the actual available events in the logbook:

| Logbuch-Events: | Text E: | Text D: |
|---|---|---|
| ce_Local_Remote: | LOCAL | REMOTE |
| ce_Trigger: | Inh-High:YES | Auslsg:JA |
| ce_Fast_Step_Up: | Fast-Up:ON | SchnellH:EIN |
| ce_Fast_Step_Down: | Fast-Dwn:OFF | SchnellL:AUS |
| ce_Standstill: | Inh-Low:NO | Still:NEIN |
| ce_Over_Current: | >I:YES | >I:JA |
| ce_Over_Voltage: | >U:NO | >U:NEIN |
| ce_Under_Voltage: | <U:YES | <U:JA |
| ce_Auto: | AUTO | HAND |
| ce_poweron: | PowerON | PowerON |
| ce_simulation: | Simul:ON | Simul:EIN |

85. New Ext.'°' (isGrad) implemented for output/input of UTC time instead of local time.

86. As soon as the UTC-time control is active (UTCTZ!=0 OR UTCDST!=0),
    the command SOWI for DST-change in the background-program has always the value zero, so the background-program can not change the time +1h/-1h any more.

87. COMx handshake selection extended of „OFF“ ("--") .

88. RegKNU minimum decreased from 1.0 to 0.01.