

7 Settings

(continued)

| | | | |
|---|-----|---------------------------------|-----------|
| DTOC: tI>>> | PSx | 017 007 073 021 074 021 075 021 | Fig. 3-84 |
| Setting for the operate delay of the third overcurrent stage. | | | |
| DTOC: Ineg> | PSx | 072 011 073 011 074 011 075 011 | |
| Setting for operate value Ineg> (Ineg = negative-sequence current). | | | |
| DTOC: Ineg> dynamic | PSx | 076 200 077 200 078 200 079 200 | |
| Setting for operate value Ineg> dynamic (Ineg = negative-sequence current). | | | |
| This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | | |
| DTOC: Ineg>> | PSx | 072 012 073 012 074 012 075 012 | |
| Setting for operate value Ineg>> (Ineg = negative-sequence current). | | | |
| DTOC: Ineg>> dynamic | PSx | 076 201 077 201 078 201 079 201 | |
| Setting for operate value Ineg>> dynamic (Ineg = negative-sequence current). | | | |
| This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | | |
| DTOC: Ineg>>> | PSx | 072 013 073 013 074 013 075 013 | |
| Setting for operate value Ineg>>> (Ineg = negative-sequence current). | | | |
| DTOC: Ineg>>> dynamic | PSx | 076 202 077 202 078 202 079 202 | |
| Setting for operate value Ineg>>> dynamic (Ineg = negative-sequence current). | | | |
| This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | | |
| DTOC: tIneg> | PSx | 072 023 073 023 074 023 075 023 | |
| Setting for the operate delay of overcurrent stage Ineg> (Ineg = negative-sequence current). | | | |
| DTOC: tIneg>> | PSx | 072 024 073 024 074 024 075 024 | |
| Setting for the operate delay of overcurrent stage Ineg>> (Ineg = negative-sequence current). | | | |
| DTOC: tIneg>>> | PSx | 072 025 073 025 074 025 075 025 | |
| Setting for the operate delay of overcurrent stage Ineg>>> (Ineg = negative-sequence current). | | | |
| DTOC: Evaluation IN | PSx | 072 128 073 128 074 128 075 128 | Fig. 3-88 |
| This setting determines which current will be monitored: the current calculated by the P130C P130CP130Cor the residual current measured at the T 4 current transformer. | | | |
| DTOC: IN> | PSx | 017 003 073 015 074 015 075 015 | Fig. 3-89 |
| Setting for the operate value of the first overcurrent stage (residual current stage). | | | |
| Caution! The range of setting values includes operate values that are not permitted as continuous current values (see 'Technical Data'). | | | |

7 Settings

(continued)

| | | |
|---|---------------------------------|-----------|
| DTOC: IN> dynamic PSx | 017 081 073 035 074 035 075 035 | Fig. 3-89 |
| Setting for the operate value of the dynamic first overcurrent stage (residual current stage). This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | |
| Caution! The range of setting values includes operate values that are not permitted as continuous current values (see 'Technical Data'). | | |
| DTOC: IN>> PSx | 017 009 073 016 074 016 075 016 | Fig. 3-89 |
| Setting for the operate value of the second overcurrent stage (residual current stage). | | |
| Caution! The range of setting values includes operate values that are not permitted as continuous current values (see 'Technical Data'). | | |
| DTOC: IN>> dynamic PSx | 017 086 073 036 074 036 075 036 | Fig. 3-89 |
| Setting for the operate value of the second overcurrent stage in dynamic mode (residual current stage). This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | |
| Caution! The range of setting values includes operate values that are not permitted as continuous current values (see 'Technical Data'). | | |
| DTOC: IN>>> PSx | 017 018 073 017 074 017 075 017 | Fig. 3-89 |
| Setting for the operate value of the third overcurrent stage (residual current stage). | | |
| Caution! The range of setting values includes operate values that are not permitted as continuous current values (see 'Technical Data'). | | |
| DTOC: IN>>> dynamic PSx | 017 087 073 037 074 037 075 037 | Fig. 3-89 |
| Setting for the operate value of the dynamic third overcurrent stage (residual current stage). This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | |
| Caution! The range of setting values includes operate values that are not permitted as continuous current values (see 'Technical Data'). | | |
| DTOC: tIN> PSx | 017 008 073 027 074 027 075 027 | Fig. 3-89 |
| Setting for the operate delay of the first overcurrent stage (residual current stage). | | |
| DTOC: tIN>> PSx | 017 010 073 028 074 028 075 028 | Fig. 3-89 |
| Setting for the operate delay of the second overcurrent stage (residual current stage). | | |
| DTOC: tIN>>> PSx | 017 019 073 029 074 029 075 029 | Fig. 3-89 |
| Setting for the operate delay of the third overcurrent stage (residual current stage). | | |
| DTOC: Puls.prol.IN>,intPSx | 017 055 073 042 074 042 075 042 | Fig. 3-89 |
| Setting for the pulse prolongation time of the hold-time logic for intermittent ground faults. | | |
| DTOC: tIN,interm. PSx | 017 056 073 038 074 038 075 038 | Fig. 3-89 |
| Setting for the tripping time of the hold-time logic for intermittent ground faults. | | |
| DTOC: Hold-t. tIN>,intmPSx | 017 057 073 039 074 039 075 039 | Fig. 3-89 |
| Setting for the hold-time for intermittent ground faults. | | |

7 Settings

(continued)

Inverse-time overcurrent protection

| | | | |
|---|------------|-----------------------------|------------|
| IDMT: Enable | PSx | 072070 073070 074070 075070 | Fig. 3-94 |
| This setting defines the parameter subset in which IDMT protection is enabled. | | | |
| IDMT: Iref,P | PSx | 072050 073050 074050 075050 | Fig. 3-99 |
| Setting for the reference current (phase current system). | | | |
| IDMT: Iref,P dynamic | PSx | 072003 073003 074003 075003 | Fig. 3-99 |
| Setting for the reference current in dynamic mode (phase current system). This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | | |
| IDMT: Characteristic P | PSx | 072056 073056 074056 075056 | Fig. 3-99 |
| Setting for the tripping characteristic (phase current system). | | | |
| IDMT: Factor kt,P | PSx | 072053 073053 074053 075053 | Fig. 3-99 |
| Setting for factor kt,P of the starting characteristic (phase current system). | | | |
| IDMT: Min. trip time P | PSx | 072077 073077 074077 075077 | Fig. 3-99 |
| Setting for the minimum trip time (phase current system). As a rule, this value should be set as for the first DTOC stage (I>). | | | |
| IDMT: Hold time P | PSx | 072071 073071 074071 075071 | Fig. 3-99 |
| Setting for the holding time for intermittent short circuits (phase current system). | | | |
| IDMT: Release P | PSx | 072059 073059 074059 075059 | Fig. 3-99 |
| Setting for the release or reset characteristic (phase current system). | | | |
| IDMT: Iref,neg | PSx | 072051 073051 074051 075051 | Fig. 3-99 |
| Setting for the reference current (negative-sequence current system). | | | |
| IDMT: Iref,neg dynamic | PSx | 072004 073004 074004 075004 | |
| Setting for the reference current in dynamic mode (negative-sequence current system). This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | | |
| IDMT: Character. neg. | PSx | 072057 073057 074057 075057 | |
| Setting for the tripping characteristic (negative-sequence current system). | | | |
| IDMT: Factor kt,neg | PSx | 072054 073054 074054 075054 | |
| Setting for factor kt,neg of the starting characteristic (negative-sequence current system). | | | |
| IDMT: Min.trip time neg | PSx | 072078 073078 074078 075078 | |
| Setting for the minimum trip time (negative-sequence current system). As a rule, this value should be set as for the first DTOC stage (I>). | | | |
| IDMT: Hold time neg | PSx | 072072 073072 074072 075072 | |
| Setting for the holding time for intermittent short circuits (negative-sequence current system). | | | |
| IDMT: Release neg. | PSx | 072060 073060 074060 075060 | |
| Setting for the release or reset characteristic (negative-sequence current system). | | | |
| IDMT: Evaluation IN | PSx | 072075 073075 074075 075075 | Fig. 3-102 |
| This setting determines which current will be monitored: the current calculated by the P130C P130CP130Cor the residual current measured at the T 4 current transformer. | | | |

7 Settings

(continued)

| | | | |
|---|------------|---------------------------------|------------|
| IDMT: Iref,N | PSx | 072 052 073 052 074 052 075 052 | Fig. 3-103 |
| Setting for the reference current (residual current system). | | | |
| IDMT: Iref,N dynamic | PSx | 072 005 073 005 074 005 075 005 | Fig. 3-103 |
| Setting for the reference current in dynamic mode (residual current system). This operate value is effective only while the timer stage MAIN: Hold-time dyn. param. is elapsing. | | | |
| IDMT: Characteristic N | PSx | 072 058 073 058 074 058 075 058 | Fig. 3-103 |
| Setting for the tripping characteristic (residual current system). | | | |
| IDMT: Factor kt,N | PSx | 072 055 073 055 074 055 075 055 | Fig. 3-103 |
| Setting for factor kt,N of the starting characteristic (residual current system). | | | |
| IDMT: Min. trip time N | PSx | 072 079 073 079 074 079 075 079 | Fig. 3-103 |
| Setting for the minimum trip time (residual current system). As a rule, this value should be set as for the first DTOC stage (IN>). | | | |
| IDMT: Hold time N | PSx | 072 073 073 073 074 073 075 073 | Fig. 3-103 |
| Setting for the holding time for intermittent short circuits (residual current system). | | | |
| IDMT: Release N | PSx | 072 061 073 061 074 061 075 061 | Fig. 3-103 |
| Setting for the release characteristic (residual current system). | | | |

Short-circuit direction determination

| | | | |
|---|------------|---------------------------------|------------|
| SCDD: Enable | PSx | 076 235 077 235 078 235 079 235 | Fig. 3-106 |
| This setting defines the parameter subset in which the short-circuit direction determination function is enabled. | | | |
| SCDD: Trip bias | PSx | 017 074 077 236 078 236 079 236 | Fig. 3-110 |
| This setting determines whether an overcurrent direction determination in forward direction shall be formed when the direction determination of the phase current and residual current stage is blocked. | | | |
| SCDD: Direction tl> | PSx | 017 071 077 237 078 237 079 237 | Fig. 3-110 |
| This setting for the measuring direction determines whether a tl> trip signal in the DTOC phase current stage will be issued for forward, backward or non-directional fault decisions. If the ARC is enabled and has been set accordingly then a starting will trigger the associated ARC tripping time. | | | |
| SCDD: Direction tl>> | PSx | 017 072 077 238 078 238 079 238 | Fig. 3-110 |
| This setting for the measuring direction determines whether a tl>> trip signal in the DTOC phase current stage will be issued for forward, backward or non-directional fault decisions. If the ARC is enabled and has been set accordingly then a starting will trigger the associated ARC tripping time. | | | |
| SCDD: Direct. tlref,P> | PSx | 017 066 077 239 078 239 079 239 | Fig. 3-110 |
| This setting for the measuring direction determines whether a tlref,P> trip signal in the IDMT phase current stage will be issued for forward, backward or non-directional fault decisions. If the ARC is enabled and has been set accordingly then a starting will trigger the associated ARC tripping time. | | | |

7 Settings

(continued)

| | | |
|--|---------------------------------|------------|
| SCDD: Direction tIN> PSx | 017.073 077.240 078.240 079.240 | Fig. 3-114 |
| This setting for the measuring direction determines whether a tIN> trip signal in the DTOC residual current stage will be issued for forward, backward or non-directional fault decisions. If the ARC is enabled and has been set accordingly then a starting will trigger the associated ARC tripping time. | 017.075 077.241 078.241 079.241 | Fig. 3-114 |
| SCDD: Direction tIN>> PSx | 017.075 077.241 078.241 079.241 | Fig. 3-114 |
| This setting for the measuring direction determines whether a tIN>> trip signal in the DTOC residual current stage will be issued for forward, backward or non-directional fault decisions. If the ARC is enabled and has been set accordingly then a starting will trigger the associated ARC tripping time. | 017.067 077.242 078.242 079.242 | Fig. 3-114 |
| SCDD: Direct. tlref,N> PSx | 017.067 077.242 078.242 079.242 | Fig. 3-114 |
| This setting for the measuring direction determines whether a tlref,N> trip signal in the IDMT residual current stage will be issued for forward, backward or non-directional fault decisions. If the ARC is enabled and has been set accordingly then a starting will trigger the associated ARC tripping time. | 017.076 077.243 078.243 079.243 | Fig. 3-113 |
| SCDD: Charact. angle G PSx | 017.076 077.243 078.243 079.243 | Fig. 3-113 |
| Setting for the characteristic angle for the residual current stage in correspondence to the measuring relation. Using this setting, a wide range of conditions in dependence of the system neutral grounding impedance can be accommodated, including the following: | 017.077 077.244 078.244 079.244 | Fig. 3-112 |
| <input type="checkbox"/> System neutral with relatively high resistance $\alpha_G = 0^\circ$ <input type="checkbox"/> System neutral with relatively low resistance $\alpha_G = 45^\circ$ <input type="checkbox"/> System neutral effectively grounded $\alpha_G = -75^\circ$ <input type="checkbox"/> System neutral reactance-grounded $\alpha_G = -90^\circ$ <input type="checkbox"/> System with isolated neutral $\alpha_G = +90^\circ$ | 017.078 077.245 078.245 079.245 | Fig. 3-114 |
| SCDD: VNG> PSx | 017.077 077.244 078.244 079.244 | Fig. 3-112 |
| Setting for operate value VNG>. This setting value is an enabling criterion of the base point release of short-circuit direction determination. In choosing this setting, the set nominal voltage MAIN: VNG,nom V.T. sec. should be taken into account. | 017.078 077.245 078.245 079.245 | Fig. 3-114 |
| SCDD: Block. bias G PSx | 017.078 077.245 078.245 079.245 | Fig. 3-114 |
| This setting defines whether the trip bias of the residual current stage should be blocked in the event of a phase current starting. | | |

7 Settings
(continued)

Protective signaling

| | | | |
|---|-----|-----------------------------|------------|
| PSIG: Enable | PSx | 015014 015015 015016 015017 | Fig. 3-117 |
| This setting defines the parameter subset in which protective signaling is enabled. | | | |
| PSIG: Tripping time | PSx | 015011 024003 024063 025023 | Fig. 3-119 |
| The tripping time replaces timer stage t1,ze of distance protection when protective signaling is ready. | | | |
| PSIG: Release t. send | PSx | 015002 024001 024061 025021 | Fig. 3-119 |
| This setting determines the duration of the send signal. | | | |
| PSIG: DC loop op. mode | PSx | 015012 024051 025011 025071 | Fig. 3-119 |
| This setting defines whether the transmitting relay will be operated in energize-on-signal mode ('open-circuit principle') or normally-energized mode ('closed-circuit principle'), i.e., <i>Transm. relay make contact</i> or <i>Transm. relay break contact</i> , respectively. | | | |
| PSIG: Direc.dependence | PSx | 015001 015115 015116 015117 | Fig. 3-119 |
| This setting governs the evaluation for the directional dependence of protective signaling. The following settings are possible: <i>Without</i> <i>Phase curr. system</i> <i>Residual curr. system</i> <i>Phase/resid.c.system</i> | | | |

7 Settings

(continued)

Auto-reclosing control

| | | |
|--|---------------------------------|------------|
| ARC: Enable PSx | 015 046 015 047 015 048 015 049 | Fig. 3-123 |
| This setting defines the parameter subset in which ARC is enabled. | | |
| ARC: CB clos.pos.sig. PSx | 015 050 024 024 024 084 025 044 | Fig. 3-125 |
| This setting defines whether the CB closed position will be scanned or not. If the setting is <i>With</i> , a binary signal input must be configured accordingly. | | |
| ARC: Operating mode PSx | 015 051 024 025 024 085 025 045 | Fig. 3-122 |
| The operating mode setting defines which of the following reclosure types is permitted. | | |
| <input type="checkbox"/> TDR only <input type="checkbox"/> HSR or TDR <input type="checkbox"/> Test HSR only | | |
| ARC: Operative time PSx | 015 066 024 035 024 095 025 055 | Fig. 3-134 |
| Setting for operative time 1. | | |
| ARC: HSR trip.time GS PSx | 015 038 024 100 024 150 025 100 | Fig. 3-130 |
| Setting for the HSR tripping time and start via a general starting condition. | | |
| ARC: HSR trip.time I> PSx | 015 072 024 040 025 000 025 060 | Fig. 3-126 |
| The HSR tripping time replaces timer stage t1,ze of distance protection or the operate delay of backup overcurrent-time protection – provided that the BUOC operating mode is set accordingly – if a HSR is permitted and protective signaling is not ready. | | |
| ARC: HSR trip.time I>>PSx | 015 074 024 101 024 151 025 101 | Fig. 3-126 |
| Setting for the HSR tripping time and start via a phase current starting in the second DTOC overcurrent stage. | | |
| ARC: HSRtrip.time I>>>PSx | 014 096 024 102 024 152 025 102 | Fig. 3-126 |
| Setting for the HSR tripping time and start via a phase current starting in the third DTOC overcurrent stage. | | |
| ARC: HSR trip.time IN>PSx | 015 076 024 103 024 153 025 103 | Fig. 3-126 |
| Setting for the HSR tripping time and start via a residual current starting in the first DTOC overcurrent stage. | | |
| ARC: HSRtrip.time IN>>PSx | 015 031 024 104 024 154 025 104 | Fig. 3-126 |
| Setting for the HSR tripping time and start via a residual current starting in the second DTOC overcurrent stage. | | |
| ARC: HSRtrip.t. IN>>> PSx | 014 098 024 105 024 155 025 105 | Fig. 3-126 |
| Setting for the HSR tripping time and start via a residual current starting in the third DTOC overcurrent stage. | | |
| ARC: HSRtrip.t. klref>PSx | 015 094 024 106 024 156 025 106 | Fig. 3-128 |
| Setting for the HSR tripping time and start via a starting in the IDMT phase current system. | | |
| ARC: HSRtrip.t.klNref>PSx | 015 096 024 107 024 157 025 107 | Fig. 3-128 |
| Setting for the HSR tripping time and start via a starting in the IDMT residual current system. | | |
| ARC: HSRtrip.t. Ineg> PSx | 015 034 024 108 024 158 025 108 | Fig. 3-128 |
| Setting for the HSR tripping time and start via a starting in the IDMT negative-sequence current system. | | |

7 Settings

(continued)

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|--|-----------------------------|------------|
| ARC: HSR trip t.GFDSS PSx | 015078 024109 024159 025109 | Fig. 3-129 |
| Setting for the HSR tripping time and start via 'ground fault direction determination using steady-state values'. | | |
| ARC: HSRtrip.t. LOGIC PSx | 015088 024110 024160 025110 | Fig. 3-131 |
| Setting for the HSR tripping time and start via programmable logic. | | |
| ARC: HSR block.f. I>>>PSx | 015080 024111 024161 025111 | Fig. 3-132 |
| The selection of the HSR blocking by I>>> defines whether an HSR is blocked during an I>>> starting. | | |
| ARC: HSR dead time PSx | 015056 024030 024090 025050 | Fig. 3-134 |
| Dead time setting for a three-pole HSR. | | |
| ARC: No. permit. TDR PSx | 015068 024037 024097 025057 | Fig. 3-134 |
| Setting for the number of time-delay reclosures permitted. With the '0' setting, only one HSR is carried out. | | |
| ARC: TDR trip.time GS PSx | 015039 024112 024162 025112 | Fig. 3-130 |
| Setting for the TDR tripping time and start via a general starting condition. | | |
| ARC: TDR trip.time I> PSx | 015073 024041 025001 025061 | Fig. 3-127 |
| The TDR tripping time replaces timer stage t1,ze of distance protection or the operate delay of backup overcurrent-time protection – provided that the BUOC operating mode is set accordingly – if a TDR is permitted and protective signaling is not ready. | | |
| ARC: TDR trip.time I>>PSx | 015075 024113 024163 025113 | Fig. 3-127 |
| Setting for the TDR tripping time and start via a phase current starting in the second DTOC overcurrent stage. | | |
| ARC: TDRtrip.time I>>>PSx | 014097 024114 024164 025114 | Fig. 3-127 |
| Setting for the TDR tripping time and start via a phase current starting in the third DTOC overcurrent stage. | | |
| ARC: TDR trip.time IN>PSx | 015077 024115 024165 025115 | Fig. 3-127 |
| Setting for the TDR tripping time and start via a residual current starting in the first DTOC overcurrent stage. | | |
| ARC: TDRtrip.time IN>>PSx | 015032 024116 024166 025116 | Fig. 3-127 |
| Setting for the TDR tripping time and start via a residual current starting in the second DTOC overcurrent stage. | | |
| ARC: TDRtrip.t. IN>>> PSx | 014099 024117 024167 025117 | Fig. 3-127 |
| Setting for the TDR tripping time and start via a residual current starting in the third DTOC overcurrent stage. | | |
| ARC: TDRtrip.t. kIref>PSx | 015095 024118 024168 025118 | Fig. 3-128 |
| Setting for the TDR tripping time and start via a starting in the IDMT phase current system. | | |
| ARC: TDRtrip.t.kINref>PSx | 015097 024119 024169 025119 | Fig. 3-128 |
| Setting for the TDR tripping time and start via a starting in the IDMT residual current system. | | |
| ARC: TDRtrip.t. Ineg> PSx | 015035 024120 024170 025120 | Fig. 3-128 |
| Setting for the TDR tripping time and start via a starting in the IDMT negative-sequence current system. | | |

7 Settings

(continued)

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|---|---------------------------------|------------|
| ARC: TDR trip t.GFDSS PSx | 015 079 024 121 024 171 025 121 | Fig. 3-129 |
| Setting for the TDR tripping time and start via 'ground fault direction determination using steady-state values'. | | |
| ARC: TDRtrip.t. LOGIC PSx | 015 099 024 122 024 172 025 122 | Fig. 3-131 |
| Setting for the TDR tripping time and start via programmable logic. | | |
| ARC: TDR dead time PSx | 015 057 024 031 024 091 025 051 | Fig. 3-134 |
| Setting for the TDR dead time. | | |
| ARC: TDR block.f. I>>>PSx | 015 081 024 124 024 174 025 124 | Fig. 3-132 |
| The selection of the TDR blocking by I>>> defines whether an TDR is blocked during an I>>> starting. | | |
| ARC: Reclaim time PSx | 015 054 024 028 024 088 025 048 | Fig. 3-134 |
| Setting for the reclaim time. | | |
| ARC: Blocking time PSx | 015 058 024 032 024 092 025 052 | Fig. 3-124 |
| Setting for the time that will elapse before the ARC will be ready again after blocking by a binary signal input. | | |

7 Settings

(continued)

Motor protection

| | | | |
|--|------------|---------------------------------|------------|
| MP: Enable | PSx | 024.148 024.147 024.197 025.147 | Fig. 3-153 |
| This setting defines the parameter subset in which motor protection is enabled. | | | |
| MP: Iref | PSx | 017.012 024.131 024.181 025.131 | Fig. 3-154 |
| For the determination of the reference current, the nominal motor current needs to be calculated first from the motor data. | | | |
| $I_{\text{nom,motor}} = \frac{P_{\text{nom}}}{\sqrt{3} \cdot V_{\text{nom}} \cdot \eta \cdot \cos \varphi}$ | | | |
| The reference current is the nominal motor current as projected onto the transformer secondary side and is thus calculated as follows: | | | |
| $\frac{I_{\text{ref}}}{I_{\text{nom,(relay)}}} = \frac{I_{\text{nom,motor}} / T_{\text{nom}}}{I_{\text{nom,(relay)}}}$ | | | |
| Example: | | | |
| <u>Motor and System Data</u> | | | |
| Nominal motor voltage V_{nom} : | 10 kV | | |
| Nominal motor power P_{nom} : | 1500 kW | | |
| Efficiency η : | 96.6 % | | |
| Active power factor $\cos \varphi$: | 0.86 | | |
| Nominal transformation ratio T_{nom} of the main current transformer: | 1 A | | |
| <u>Determination of the Nominal Motor Current</u> | | | |
| $I_{\text{nom,motor}} = \frac{1500 \text{ kW}}{\sqrt{3} \cdot 10 \text{ kV} \cdot 0.966 \cdot 0.86}$ $= 104 \text{ A}$ | | | |
| Determination of the reference current | | | |
| $\frac{I_{\text{ref}}}{I_{\text{nom,(relay)}}} = \frac{104 \text{ A} / 100}{1 \text{ A}} = 1.04$ | | | |

7 Settings

(continued)

| | | | |
|--|-----|---------------------------------|------------|
| MP: Factor kP | PSx | 017 040 024 132 024 182 025 132 | Fig. 3-154 |
| The starting factor k should be set according to the maximum permissible thermal continuous current: | | | |
| $k = \frac{I_{\text{therm,motor}}}{I_{\text{nom,motor}}}$ | | | |
| Example: | | | |
| <u>Motor Data:</u> | | | |
| Maximum permissible continuous thermal motor current | | | |
| $I_{\text{therm,motor}} = 1.1 I_{\text{nom,motor}}$ | | | |
| <u>Determination of the Starting Factor</u> | | | |
| $k = \frac{1.1 I_{\text{nom,motor}}}{I_{\text{nom,motor}}} = 1.1$ | | | |
| MP: tStUp> | PSx | 017 053 024 133 024 183 025 133 | Fig. 3-159 |
| Setting for the current threshold for the operational status determination 'machine starting up'. | | | |
| MP: tIStUp> | PSx | 017 042 024 134 024 184 025 134 | Fig. 3-159 |
| Setting for the operate delay for the operational status determination 'machine starting up'. Usually, the default setting can be retained. | | | |
| MP: Character.type P | PSx | 017 029 024 135 024 185 025 135 | Fig. 3-159 |
| The selection of the tripping characteristic defines the restrictiveness of the motor protection function. For low overcurrents, the logarithmic characteristic provides significantly higher tripping times than the reciprocally squared characteristic since the latter neglects any heat transfer to the cooling medium in the overload range. | | | |

7 Settings

(continued)

MP: t_{6Iref}

PSx

017.041 024.136 024.186 025.136

Fig. 3-159

This setting for the overload tripping time t_{6Iref} is determined from the cold machine data, using $I_{ref} = I_{nom,motor}$.

For the reciprocally squared characteristic we set:

$$t_{6Iref} = t_{block,cold} \cdot \frac{\left(\frac{I_{startup}}{I_{nom,motor}} \right)^2}{36}$$

For the logarithmic characteristic we set:

$$t_{6Iref} = t_{block,cold} \cdot \frac{1}{36 \cdot \ln \frac{\left(\frac{I_{startup}}{I_{nom,motor}} \right)^2}{\left(\frac{I_{startup}}{I_{nom,motor}} \right)^2 - 1}}$$

Based on the setting value thus determined, the tripping time for a warm machine is now defined as follows.

For the reciprocally squared characteristic we have:

$$t = (1 - 0.2) \cdot t_{6Iref} \cdot \frac{36}{\left(\frac{I_{startup}}{I_{nom,motor}} \right)^2}$$

For the logarithmic characteristic we have:

$$t = (1 - 0.) \cdot t_{6Iref} \cdot 36 \cdot \ln \frac{\left(\frac{I_{startup}}{I_{nom,motor}} \right)^2}{\left(\frac{I_{startup}}{I_{nom,motor}} \right)^2 - 1}$$

Example:

Motor Data

Motor startup current

$I_{startup}: 5.7 I_{nom,motor}$

Max. permissible locked-rotor time with cold machine $t_{block,cold}: 18 \text{ s}$

Max. permissible locked-rotor time with warm machine $t_{block,warm}: 16 \text{ s}$

7 Settings

(continued)

| | | |
|---|--|-------------------|
| <p><u>Determination of the Setting Value for the Reciprocally Squared Characteristic</u></p> $t_{6I_{ref}} = 18 \text{ s} \cdot \frac{5.7^2}{36} = 16.2 \text{ s}$ | | |
| <p><u>Control of Tripping Time with Warm Machine</u></p> $t = 0.8 \cdot 16.2 \text{ s} \cdot \frac{36}{5.7^2}$ $= 14.4 \text{ s} \leq 16 \text{ s} \quad (\text{o.k.})$ | | |
| <p>MP: Tau after st-up PSx</p> | <p>018 042 024 137 024 187 025 137</p> | <p>Fig. 3-159</p> |
| <p>Setting for the heat dispersion time constant after startup. Usually, the default setting can be retained.</p> | | |
| <p>MP: Tau mach.running PSx</p> | <p>017 088 024 138 024 188 025 138</p> | <p>Fig. 3-159</p> |
| <p>MP: Tau mach.stopped PSx</p> | <p>017 089 024 139 024 189 025 139</p> | <p>Fig. 3-159</p> |
| <p>Setting for the cooling time constant with a running or stopped machine, respectively.</p> <p>If the thermal time constants of the motor are unknown, the cooling time constant with machine running is best set to the highest setting value and the cooling time with machine stopped to the five-fold value of that with machine running.</p> | | |
| <p>MP: Perm. No.st-ups PSx</p> | <p>017 047 024 140 024 190 025 140</p> | <p>Fig. 3-159</p> |
| <p>Setting for the startup sequence of the motor as permitted by thermal considerations.</p> <p>Note: The heavy starting logic (addresses 017 043 and 017 044) can only be activated if the permissible startup sequence is set to two startups from cold and one startup from warm.</p> | | |
| <p>MP: RC permitted, $\Theta <$ PSx</p> | <p>018 043 024 141 024 191 025 141</p> | <p>Fig. 3-159</p> |
| <p>Setting for the threshold value of the overload memory for reclosure permission. Usually, the default setting can be retained.</p> | | |
| <p>MP: Operating mode PSx</p> | <p>018 041 024 142 024 192 025 142</p> | <p>Fig. 3-154</p> |
| <p>This setting defines whether motor protection will be operated together with thermal overload protection (THERM).</p> | | |

| | | |
|--|---------------------------------|------------|
| MP: St-up time tStUpPSx | 017 043 024 143 024 193 025 143 | Fig. 3-159 |
| MP: Blocking time tE PSx | 017 044 024 144 024 194 025 144 | Fig. 3-159 |
| <p>Using an overspeed monitor, the heavy starting logic can be activated if necessary. For this purpose, the load-torque-dependent operational startup time needs to be set for tStUp and the maximum permissible locked-rotor time (the 'tE time') with a machine at operating temperature needs to be set for tE.</p> <p>If the heavy starting logic is not used then the set startup time tStUp and the tE-time should be set to the same value; the default values can be retained.</p> <p>Note: The heavy starting logic (address 017 047) can only be activated if the permissible startup sequence is set to two startups from cold and one startup from warm.</p> | | |
| MP: I< PSx | 017 048 024 145 024 195 025 145 | Fig. 3-162 |
| <p>Setting for the operate value of the minimum current stage of the underload protection function of motor protection.</p> | | |
| MP: tI< PSx | 017 050 024 146 024 196 025 146 | Fig. 3-162 |
| <p>Setting for the operate delay of the minimum current stage of the underload protection function of motor protection.</p> | | |

7 Settings

(continued)

Thermal overload protection

| | | | |
|--|-----|---------------------------------|------------|
| THERM: Enable | PSx | 072 175 073 175 074 175 075 175 | Fig. 3-163 |
| This setting defines the parameter subset in which thermal overload protection is enabled. | | | |
| THERM: Iref | PSx | 072 179 073 179 074 179 075 179 | Fig. 3-165 |
| Setting for the reference current. | | | |
| THERM: Start.fact.OL_RC | PSx | 072 180 073 180 074 180 075 180 | Fig. 3-165 |
| Setting for the starting characteristic factor kP. | | | |
| THERM: Tim.const.1,>Ibl | PSx | 072 187 073 187 074 187 075 187 | Fig. 3-165 |
| Setting for the thermal time constants of the protected object with current flow (Ibl: base line current). | | | |
| THERM: Tim.const.2,<Ibl | PSx | 072 188 073 188 074 188 075 188 | Fig. 3-165 |
| Setting for the thermal time constants of the protected object without current flow (Ibl: base line current). | | | |
| Note: This setting option is only relevant when machines are running. In all other cases, time constant 2 must be set equal to time constant 1. | | | |
| THERM: Max.perm.obj.tmp | PSx | 072 182 073 182 074 182 075 182 | Fig. 3-165 |
| Setting for the maximum permissible temperature of the protected object. | | | |
| THERM: Max.perm.cool.tmp | PSx | 072 185 073 185 074 185 075 185 | Fig. 3-165 |
| Setting for the maximum permissible coolant temperature. | | | |
| THERM: Default CTA | PSx | 072 186 073 186 074 186 075 186 | Fig. 3-165 |
| Setting for the coolant temperature to be used for calculation of the trip time if coolant temperature is not measured. | | | |
| THERM: Rel. O/T warning | PSx | 072 184 073 184 074 184 075 184 | Fig. 3-165 |
| Setting for the operate value of the warning stage. | | | |
| THERM: Rel. O/T trip | PSx | 072 181 073 181 074 181 075 181 | Fig. 3-165 |
| Setting for the operate value of the trip stage. | | | |
| Note: If the operating mode has been set to <i>Absolute replica</i> , the setting here will be automatically set to 100% and this parameter will be hidden as far as the local control panel is concerned. | | | |
| THERM: Hysteresis trip | PSx | 072 183 073 183 074 183 075 183 | Fig. 3-165 |
| Setting for the hysteresis of the trip stage. | | | |
| THERM: Warning pre-trip | PSx | 072 191 073 191 074 191 075 191 | Fig. 3-165 |
| A warning will be given in advance of the trip. The time difference between the warning time and the trip time is set here. | | | |

7 Settings
(continued)

Unbalance protection

| | | | |
|---|-----|-----------------------------|------------|
| I2>: Enable | PSx | 018220 018221 018222 018223 | Fig. 3-167 |
| This setting defines the parameter subset in which unbalance protection is enabled. | | | |
| I2>: Ineg> | PSx | 018091 018224 018225 018226 | Fig. 3-168 |
| Setting for the operate value of the first overcurrent stage. | | | |
| I2>: Ineg>> | PSx | 018092 018227 018228 018229 | Fig. 3-168 |
| Setting for the operate value of the second overcurrent stage. | | | |
| I2>: tIneg> | PSx | 018093 018230 018231 018232 | Fig. 3-168 |
| Setting for the operate delay of the first overcurrent stage. | | | |
| I2>: tIneg>> | PSx | 018094 018233 018234 018235 | Fig. 3-168 |
| Setting for the operate delay of the second overcurrent stage. | | | |

7 Settings

(continued)

Time-Voltage Protection

| | | | |
|--|------------|---------------------------------|------------|
| V<>: Enable | PSx | 076 246 077 246 078 246 079 246 | Fig. 3-169 |
| This setting defines the parameter subset in which time-voltage protection is enabled. | | | |
| V<>: Operating mode | PSx | 076 001 077 001 078 001 079 001 | Fig. 3-170 |
| This setting specifies whether the phase-to-ground voltages (<i>Star</i> operating mode) or the phase-to-phase voltages (<i>Delta</i> operating mode) will be monitored. | | | |
| <p>Note: In the settings for the operate values of the time-voltage protection function, the reference quantity is V_{nom} in the <i>Star</i> operating mode but $V_{nom}/\sqrt{3}$ in the <i>Delta</i> operating mode.</p> <p>To work out the settings for the over/undervoltage stages, consider the following example for $V_{nom} = 100\text{ V}$:</p> <p>Setting in the <i>Delta</i> operating mode for an operate value of 80 V (phase-to-phase):</p> $\text{Setting} = \frac{\text{OperateValue}}{V_{nom}} = \frac{80\text{V}}{100\text{V}} = 0.80$ <p>Setting in the <i>Star</i> operating mode for an operate value of 46.2 V (phase-to-ground):</p> $\text{Setting} = \frac{\text{OperateValue}}{V_{nom}/\sqrt{3}} = \frac{46.2\text{V}}{100\text{V}/\sqrt{3}} = \frac{46.2\text{V} \cdot \sqrt{3}}{100\text{V}} = 0.80$ | | | |
| V<>: V> | PSx | 076 003 077 003 078 003 079 003 | Fig. 3-171 |
| Setting for operate value V>. | | | |
| V<>: V>> | PSx | 076 004 077 004 078 004 079 004 | Fig. 3-171 |
| Setting for operate value V>>. | | | |
| V<>: tV> | PSx | 076 005 077 005 078 005 079 005 | Fig. 3-171 |
| Setting for the operate delay of overvoltage stage V>. | | | |
| V<>: tV> 3-pole | PSx | 076 027 077 027 078 027 079 027 | Fig. 3-171 |
| Setting for the operate delay of overvoltage stage V> when all three trigger stages are activated. | | | |
| V<>: tV>> | PSx | 076 006 077 006 078 006 079 006 | Fig. 3-171 |
| Setting for the operate delay of overvoltage stage V>>. | | | |
| V<>: V< | PSx | 076 007 077 007 078 007 079 007 | Fig. 3-172 |
| Setting for operate value V<. | | | |
| V<>: V<< | PSx | 076 008 077 008 078 008 079 008 | Fig. 3-172 |
| Setting for operate value V<<. | | | |
| V<>: tV< | PSx | 076 009 077 009 078 009 079 009 | Fig. 3-172 |
| Setting for the operate delay of undervoltage stage V<. | | | |
| V<>: tV< 3-pole | PSx | 076 028 077 028 078 028 079 028 | Fig. 3-172 |
| Setting for the operate delay of undervoltage stage V< when all three trigger stages are activated. | | | |
| V<>: tV<< | PSx | 076 010 077 010 078 010 079 010 | Fig. 3-172 |
| Setting for the operate delay of undervoltage stage V<<. | | | |

7 Settings

(continued)

| | | | |
|--|-----|-----------------------------|------------|
| V<>: Vpos> | PSx | 076015 077015 078015 079015 | Fig. 3-174 |
| Setting for operate value Vpos>. | | | |
| V<>: Vpos>> | PSx | 076016 077016 078016 079016 | Fig. 3-174 |
| Setting for operate value Vpos>>. | | | |
| V<>: tVpos> | PSx | 076017 077017 078017 079017 | Fig. 3-174 |
| Setting for the operate delay of overvoltage stage Vpos>. | | | |
| V<>: tVpos>> | PSx | 076018 077018 078018 079018 | Fig. 3-174 |
| Setting for the operate delay of overvoltage stage Vpos>>. | | | |
| V<>: Vpos< | PSx | 076019 077019 078019 079019 | Fig. 3-174 |
| Setting for operate value Vpos<. | | | |
| V<>: Vpos<< | PSx | 076020 077020 078020 079020 | Fig. 3-174 |
| Setting for operate value Vpos<<. | | | |
| V<>: tVpos< | PSx | 076021 077021 078021 079021 | Fig. 3-174 |
| Setting for the operate delay of undervoltage stage Vpos<. | | | |
| V<>: tVpos<< | PSx | 076022 077022 078022 079022 | Fig. 3-174 |
| Setting for the operate delay of undervoltage stage Vpos<<. | | | |
| V<>: Vneg> | PSx | 076023 077023 078023 079023 | Fig. 3-175 |
| Setting for operate value Vneg>. | | | |
| V<>: Vneg>> | PSx | 076024 077024 078024 079024 | Fig. 3-175 |
| Setting for operate value Vneg>>. | | | |
| V<>: tVneg> | PSx | 076025 077025 078025 079025 | Fig. 3-175 |
| Setting for the operate delay of overvoltage stage Vneg>. | | | |
| V<>: tVneg>> | PSx | 076026 077026 078026 079026 | Fig. 3-175 |
| Setting for the operate delay of overvoltage stage Vneg>>. | | | |
| V<>: VNG> | PSx | 076011 077011 078011 079011 | Fig. 3-177 |
| Setting for operate value VNG>. | | | |
| V<>: VNG>> | PSx | 076012 077012 078012 079012 | Fig. 3-177 |
| Setting for operate value VNG>>. | | | |
| V<>: tVNG> | PSx | 076013 077013 078013 079013 | Fig. 3-177 |
| Setting for the operate delay of overvoltage stage VNG>. | | | |
| V<>: tVNG>> | PSx | 076014 077014 078014 079014 | Fig. 3-177 |
| Setting for the operate delay of overvoltage stage VNG>>. | | | |
| V<>: tTransient | PSx | 076029 077029 078029 079029 | Fig. 3-172 |
| Setting for the time limit of the signals generated by the undervoltage stages. | | | |
| V<>: Hyst. V<> meas. PSx | | 076048 077048 078048 079048 | Fig. 3-171 |
| Setting for the hysteresis of the trigger stages for monitoring measured voltages. | | | |
| V<>: Hyst. V<> deduc. PSx | | 076049 077049 078049 079049 | Fig. 3-174 |
| Setting for the hysteresis of the trigger stages for monitoring deduced voltages such as Vneg and VNG. | | | |

7 Settings

(continued)

Over-/ underfrequency
protection

| | | | |
|--|-----|---------------------------------|------------|
| f<>: Enable | PSx | 018 196 018 197 018 198 018 199 | Fig. 3-178 |
| This setting defines the parameter subset in which over-/underfrequency protection is enabled. | | | |
| f<>: Oper. mode f1 | PSx | 018 120 018 121 018 122 018 123 | Fig. 3-182 |
| f<>: Oper. mode f2 | PSx | 018 144 018 145 018 146 018 147 | |
| f<>: Oper. mode f3 | PSx | 018 168 018 169 018 170 018 171 | |
| f<>: Oper. mode f4 | PSx | 018 192 018 193 018 194 018 195 | |
| Setting the operating mode of the timer stages of over-/underfrequency protection. | | | |
| f<>: f1 | PSx | 018 100 018 101 018 102 018 103 | Fig. 3-182 |
| f<>: f2 | PSx | 018 124 018 125 018 126 018 127 | |
| f<>: f3 | PSx | 018 148 018 149 018 150 018 151 | |
| f<>: f4 | PSx | 018 172 018 173 018 174 018 175 | |
| Setting for the frequency threshold. The over-/underfrequency protection function will operate if one of the following two conditions applies: The threshold is higher than the set nominal frequency and the frequency exceeds this threshold. The threshold is lower than the set nominal frequency and the frequency falls below this threshold. Depending on the selected operating mode, a signal will be issued without further monitoring or, alternatively, further monitoring mechanisms will be triggered. | | | |
| f<>: tf1 | PSx | 018 104 018 105 018 106 018 107 | Fig. 3-182 |
| f<>: tf2 | PSx | 018 128 018 129 018 130 018 131 | |
| f<>: tf3 | PSx | 018 152 018 153 018 154 018 155 | |
| f<>: tf4 | PSx | 018 176 018 177 018 178 018 179 | |
| Setting for the operate delay of over-/underfrequency protection. | | | |
| f<>: df1/dt | PSx | 018 108 018 109 018 110 018 111 | Fig. 3-182 |
| f<>: df2/dt | PSx | 018 132 018 133 018 134 018 135 | |
| f<>: df3/dt | PSx | 018 156 018 157 018 158 018 159 | |
| f<>: df4/dt | PSx | 018 180 018 181 018 182 018 183 | |
| Setting for the frequency gradient to be monitored | | | |
| Note: This setting is ineffective unless operating mode "f with df/dt" has been selected. | | | |
| f<>: Delta f1 | PSx | 018 112 018 113 018 114 018 115 | Fig. 3-182 |
| f<>: Delta f2 | PSx | 018 136 018 137 018 138 018 139 | |
| f<>: Delta f3 | PSx | 018 160 018 161 018 162 018 163 | |
| f<>: Delta f4 | PSx | 018 184 018 185 018 186 018 187 | |
| Setting for delta f. | | | |
| Note: This setting is ineffective unless operating mode "f w. Delta f/Delta t" has been selected. | | | |
| f<>: Delta t1 | PSx | 018 116 018 117 018 118 018 119 | Fig. 3-182 |
| f<>: Delta t2 | PSx | 018 140 018 141 018 142 018 143 | |
| f<>: Delta t3 | PSx | 018 164 018 165 018 166 018 167 | |
| f<>: Delta t4 | PSx | 018 188 018 189 018 190 018 191 | |
| Setting for delta f. | | | |
| Note: This setting is ineffective unless operating mode "f w. Delta f/Delta t" has been selected. | | | |

7 Settings

(continued)

Power Directional Protection

| | | | |
|--|------------|---------------------------------|------------|
| P<>: Enabled | PSx | 014 252 014 253 014 254 014 255 | Fig. 3-183 |
| This setting defines the parameter subset in which power directional protection is enabled. | | | |
| P<>: P> | PSx | 017 120 017 200 017 201 017 202 | Fig. 3-185 |
| Setting for the operate value P> for the active power. | | | |
| P<>: Operate delay P> PSx | | 017 128 017 129 017 130 017 131 | Fig. 3-185 |
| Setting for the operate delay of stage P>. | | | |
| P<>: Release delay P> PSx | | 017 132 017 133 017 134 017 135 | Fig. 3-185 |
| Setting for the operate delay of stage P>. | | | |
| P<>: Direction P> | PSx | 017 136 017 137 017 138 017 139 | Fig. 3-186 |
| This setting for the measuring direction determines whether a P> trip signal will be issued for forward, backward or non-directional fault decisions. | | | |
| P<>: Diseng. ratio P> PSx | | 017 124 017 125 017 126 017 127 | Fig. 3-185 |
| Setting for the disengaging ratio of the operate value P> for the active power. | | | |
| P<>: P>> | PSx | 017 140 017 141 017 142 017 143 | Fig. 3-185 |
| Setting for the operate value P>> for the active power. | | | |
| P<>: Operate delay P>>PSx | | 017 148 017 149 017 150 017 151 | Fig. 3-185 |
| Setting for the operate delay of stage P>>. | | | |
| P<>: Release delay P>>PSx | | 017 152 017 153 017 154 017 155 | Fig. 3-185 |
| Setting for the operate delay of stage P>>. | | | |
| P<>: Direction P>> | PSx | 017 156 017 157 017 158 017 159 | Fig. 3-186 |
| This setting for the measuring direction determines whether a P>> trip signal will be issued for forward, backward or non-directional fault decisions. | | | |
| P<>: Diseng. ratio P>>PSx | | 017 144 017 145 017 146 017 147 | Fig. 3-185 |
| Setting for the disengaging ratio of the operate value P>> for the active power. | | | |
| P<>: Q> | PSx | 017 160 017 161 017 162 017 163 | Fig. 3-187 |
| Setting for the operate value Q> of the reactive power. | | | |
| P<>: Operate delay Q> PSx | | 017 168 017 169 017 170 017 171 | Fig. 3-187 |
| Setting for the operate delay of stage Q>. | | | |
| P<>: Release delay Q> PSx | | 017 172 017 173 017 174 017 175 | Fig. 3-187 |
| Setting for the release delay of stage Q>. | | | |
| P<>: Direction Q> | PSx | 017 176 017 177 017 178 017 179 | Fig. 3-188 |
| This setting for the measuring direction determines whether a Q> trip signal will be issued for forward, backward or non-directional fault decisions. | | | |
| P<>: Diseng. ratio Q> PSx | | 017 164 017 165 017 166 017 167 | Fig. 3-187 |
| Setting for the disengaging ratio of the operate value Q> of the reactive power. | | | |

7 Settings

(continued)

| | | |
|--|---------------------------------|------------|
| P<>: Q>> PSx | 017.180 017.181 017.182 017.183 | Fig. 3-187 |
| Setting for the operate value Q>> of the reactive power. | | |
| P<>: Operate delay Q>>PSx | 017.188 017.189 017.190 017.191 | Fig. 3-187 |
| Setting for the operate delay of stage Q>>. | | |
| P<>: Release delay Q>>PSx | 017.192 017.193 017.194 017.195 | Fig. 3-187 |
| Setting for the release delay of stage Q>>. | | |
| P<>: Direction Q>> PSx | 017.196 017.197 017.198 017.199 | Fig. 3-188 |
| This setting for the measuring direction determines whether a Q>> trip signal will be issued for forward, backward or non-directional fault decisions. | | |
| P<>: Diseng. ratio Q>>PSx | 017.184 017.185 017.186 017.187 | Fig. 3-187 |
| Setting for the disengaging ratio of the operate value Q>> of the reactive power. | | |

7 Settings

(continued)

7.2 Protection of Increased-Safety Machines

7.2.1 General

The P130C was subjected to risk analysis based on the DIN V 19 250 standard of May 1994 (on basic safety considerations for measuring and protection relays) as well as DIN V 19 251 of February 1995 (on measuring and protection relays, specifications and measures for their fail-safe functioning) and owing to a lack of more specific standards also based on DIN V VDE 0801 (on computers in safety systems).

Based on this risk analysis involving the examination of extensive measures for prevention and management of malfunction, the P130C has been classified in specifications class 3. According to NAMUR NE 31 (NAMUR: German committee on standards for measuring and control engineering), specifications class 3 corresponds to risk area 1. For this risk area, a protection device of single-channel design with alarm signal and/or normally-energized arrangement ('closed-circuit principle') will normally suffice. In special cases, a requirement for a higher specifications class can be met by a customized '1 out of 2' or '2 out of 3' circuit.

By connection and configuration of the output relay MAIN: Blocked/faulty, the increased-safety machine can be switched off immediately or, alternatively, an alarm signal can be given for delayed switch-off based on an assessment of the operational conditions by trained staff.

7.2.2 Restrictive Safety-Oriented Configuration

For the P130C to operate in a restrictive safety-oriented mode under all operational conditions, the output relays must be operated in a normally-energized arrangement ('closed-circuit principle'). In this arrangement, the relevant output relay is energized during normal operation and drops out in the event of an activation of the associated function or in the event of a malfunction.

On the configuration of functions, please see the Chapter on 'Local Control'.

Essential General Configuration

| Function | Address | Folder ¹ | Setting |
|----------------------------|---------|---------------------|--------------|
| MAIN: Device on-line | 003 030 | Par/Func/Glob/ | Yes = on (1) |
| MAIN: Trip cmd.block. USER | 021 012 | Par/Func/Glob/ | No (0) |
| OUTP: Outp.rel.block USER | 021 014 | Par/Func/Glob/ | No (0) |
| DTOC: Function group DTOC | 056 008 | Par/Conf/ | With (1) |
| MP: Function group MP | 056 022 | Par/Conf/ | With (1) |
| I2>: Function group I2> | 056 024 | Par/Conf/ | With (1) |
| DTOC: General enable USER | 022 075 | Par/Func/Gen/ | Yes (1) |
| MP: General enable USER | 017 059 | Par/Func/Gen/ | Yes (1) |
| I2>: General enable USER | 018 090 | Par/Func/Gen/ | Yes (1) |

¹ See the Chapter on 'Local Control' for notes on the folders.

7 Settings

(continued)

In order to implement a restrictive safety-oriented configuration for the protection of electrical increased-safety machines, the configuration should be equivalent to the example shown in the table below.

| Relay | Function | Address | Folder | Associated function |
|-------|---------------------------|---------|----------------|---------------------------|
| K 2 | OUTP: Fct. assignm. K 2 | 150 196 | Par/Conf/ | MAIN: Gen. trip command 1 |
| | OUTP: Operation mode K 2 | 150 197 | Par/Conf/ | NE updating |
| | MAIN: Gen. trip command 1 | 021 001 | Par/Func/Glob/ | MP: Trip signal |
| | | | | DTOC: Trip signal |
| | | | | I2>: tlneg> elapsed |

7 Settings

(continued)

During device startup and during P130C operation, cyclic self-monitoring tests are run. In the event of a positive test result, a specified monitoring signal will be issued and stored in a non-volatile memory – the monitoring signal memory (see Chapter 'Troubleshooting'). A listing of all possible entries in this monitoring signal memory is given in the address list (see Appendix). Monitoring signals prompted by a serious hardware or software fault in the unit are always entered in the monitoring signal memory. The entry of monitoring signals of lesser significance into the monitoring signal memory is optional. The user can select this option by setting an 'm out of n' parameter.

The blocking of the protection device is governed by similar principles, that is, signals prompted by a serious hardware or software fault in the unit always lead to a blocking of the unit. The assignment of signals of lesser significance to the signal MAIN: Blocked/faulty by an 'm out of n' parameter (MAIN: Fct. assignm. fault) is optional.

| | | | | |
|-----|--------------------------|---------|----------------|------------------------------|
| K 8 | OUTP: Fct. assignm. K 8 | 150 214 | Par/Conf/ | MAIN: Fct. assign. fault |
| | OUTP: Operation mode K 8 | 150 215 | Par/Conf/ | NE updating |
| | MAIN: Fct. assign. fault | 021 031 | Par/Func/Glob/ | SFMON: Error K 902 |
| | | | | SFMON: Defect. module slot 1 |
| | | | | SFMON: Defect. module slot 4 |
| | | | | SFMON: Defect. module slot 9 |

For safety-oriented operation, the 'Warning' can be configured onto an output relay as in the following example.

| Relay | Function | Address | Folder | Associated function |
|-------------|-----------------------------|---------|----------------|-----------------------------|
| E.g. K 1 | OUTP: Fct. assignm. K 1 | 150 193 | Par/Conf/ | SFMON: Warning (relay) |
| | SFMON: Fct. assign. warning | 021 030 | Par/Func/Glob/ | SFMON: Phase sequ. V faulty |
| | | | | SFMON: Undervoltage |

8 Information and Control Functions

8 Information and Control Functions

The P130C generates a large number of signals, processes binary input signals, and acquires measured data during fault-free operation of the protected object as well as fault-related data. A number of counters are maintained for statistical purposes. This information can be read out from the integrated local control panel. All this information can be found in the 'Operation' and 'Events' folders in the menu tree.

8.1 Operation

8.1.1 Cyclic Values

8.1.1.1 Measured Operating Data

"Logical" communication
interface 3

| | |
|--|--------|
| COMM3: No. tel. errors p.u. | 120040 |
| Display of the updated measured operating value for the proportion of corrupted messages within the last 1000 received messages. | |
| COMM3: No.t.err.,max,stored | 120041 |
| Display of the updated measured operating value for the proportion of corrupted messages within the last 1000 received messages. | |
| COMM3: Loop back result | 120057 |
| COMM3: Loop back receive | 120056 |
| While the hold time is running, the loop back test results can be checked by reading out these values. | |

8 Information and Control Functions

(continued)

Main function

| | |
|---|---|
| MAIN: Date | 003 090 Fig. 3-51 |
| Date display. | |
| Note: | The date can also be set here. |
| MAIN: Time of day | 003 091 Fig. 3-51 |
| Display of the time of day. | |
| Note: | The time can also be set here. |
| MAIN: Time switching | 003 095 Fig. 3-51 |
| Setting for standard time or daylight saving time. | |
| This setting is necessary in order to avoid misinterpretation of the times assigned to signals and event data that can be read out through the PC or communication interfaces. | |
| Note: | The time can be set here for standard time or daylight saving time. |
| In the case of clock synchronization via the clock synchronization telegram from a central control system or a central device, this setting will be overwritten each time a new clock synchronization telegram is received. With a free-running clock or synchronization by minute pulse through a binary input, the time of day setting and the time switching setting in the device must be plausible. The two settings do not have a mutual effect on one another. | |
| MAIN: Frequency f | 004 040 Fig. 3-33 |
| Display of system frequency. | |
| MAIN: Curr. IP,max prim. | 005 050 Fig. 3-26 |
| Display of the maximum phase current as a primary quantity. | |
| MAIN: IP,max prim.,delay | 005 036 Fig. 3-26 |
| Display of the delayed maximum phase current as a primary quantity. | |
| MAIN: IP,max prim.,stored | 005 034 Fig. 3-26 |
| Display of the delayed stored maximum phase current as a primary quantity. | |
| MAIN: Curr. IP,min prim. | 005 055 Fig. 3-26 |
| Display of the minimum phase current as a primary quantity. | |
| MAIN: Current A prim. | 005 040 Fig. 3-26 |
| Display of phase current A as a primary quantity. | |
| MAIN: Current B prim. | 006 040 Fig. 3-26 |
| Display of phase current B as a primary quantity. | |
| MAIN: Current C prim. | 007 040 Fig. 3-26 |
| Display of phase current C as a primary quantity. | |
| MAIN: Current Σ(IP) prim. | 005 010 Fig. 3-26 |
| Display of the calculated resultant current as a primary quantity. | |
| MAIN: Current IN prim. | 004 043 Fig. 3-27 |
| Display of the updated value for the residual current as a primary quantity. | |
| MAIN: Volt. VPG,max prim. | 008 042 Fig. 3-30 |
| Display of the maximum phase-to-ground voltage as a primary quantity. | |
| MAIN: Volt. VPG,min prim. | 009 042 Fig. 3-30 |
| Display of the minimum phase-to-ground voltage as a primary quantity. | |

8 Information and Control Functions

(continued)

| | |
|--|------------------|
| MAIN: Voltage A-G prim. | 005042 Fig. 3-30 |
| Display of the updated value for phase-to-ground voltage A-G as a primary quantity. | |
| MAIN: Voltage B-G prim. | 006042 Fig. 3-30 |
| Display of the updated value for phase-to-ground voltage B-G as a primary quantity. | |
| MAIN: Voltage C-G prim. | 007042 Fig. 3-30 |
| Display of the updated value for phase-to-ground voltage C-G as a primary quantity. | |
| MAIN: Volt. $\Sigma(VPG)/3$ prim. | 005012 Fig. 3-30 |
| Display of the calculated neutral-displacement voltage as a primary quantity. | |
| MAIN: Volt. VPP,max prim. | 008044 Fig. 3-30 |
| Display of the maximum phase-to-phase voltage as a primary quantity. | |
| MAIN: Voltage VPP,min prim | 009044 Fig. 3-30 |
| Display of the minimum phase-to-phase voltage as a primary quantity. | |
| MAIN: Voltage A-B prim. | 005044 Fig. 3-30 |
| Display of the updated value for phase-to-phase voltage A-B as a primary quantity. | |
| MAIN: Voltage B-C prim. | 006044 Fig. 3-30 |
| Display of the updated value for the phase-to-phase voltage B-C as a primary quantity. | |
| MAIN: Voltage C-A prim. | 007044 Fig. 3-30 |
| Display of the updated value for phase-to-phase voltage C-A as a primary quantity. | |
| MAIN: Active power P prim. | 004050 Fig. 3-31 |
| Display of the updated active power value as a primary quantity. | |
| MAIN: React. power Q prim. | 004052 Fig. 3-31 |
| Display of the updated reactive power value as a primary quantity. | |
| MAIN: Act.energy outp.prim | 005061 Fig. 3-34 |
| Display of the updated active energy output as a primary quantity. | |
| MAIN: Act.energy inp. prim | 005062 Fig. 3-34 |
| Display of the updated active energy input as a primary quantity. | |
| MAIN: React.en. outp. prim | 005063 Fig. 3-34 |
| Display of the updated reactive energy output as a primary quantity. | |
| MAIN: React. en. inp. prim | 005064 Fig. 3-34 |
| Display of the updated reactive energy input as a primary quantity. | |
| MAIN: Current IP,max p.u. | 005051 Fig. 3-26 |
| Display of the maximum phase current referred to I_{nom} . | |
| MAIN: IP,max p.u.,delay | 005037 Fig. 3-26 |
| Display of the delayed maximum phase current referred to I_{nom} . | |
| MAIN: IP,max p.u.,stored | 005035 Fig. 3-26 |
| Display of the delayed stored maximum phase current referred to I_{nom} . | |

8 Information and Control Functions

(continued)

| | | |
|--|--------|-----------|
| MAIN: Current $I_{P,min}$ p.u. | 005056 | Fig. 3-26 |
| Display of the minimum phase current referred to I_{nom} . | | |
| MAIN: Current A p.u. | 005041 | Fig. 3-26 |
| Display of phase current A referred to I_{nom} . | | |
| MAIN: Current B p.u. | 006041 | Fig. 3-26 |
| Display of phase current B referred to I_{nom} . | | |
| MAIN: Current C p.u. | 007041 | Fig. 3-26 |
| Display of phase current C referred to I_{nom} . | | |
| MAIN: Current $\Sigma(I_P)$ p.u. | 005011 | Fig. 3-26 |
| Display of the calculated resultant current referred to I_{nom} . | | |
| MAIN: Current ΣI unfilt. | 004074 | |
| Display of calculated unfiltered resultant current. | | |
| MAIN: Current I_N p.u. | 004044 | Fig. 3-27 |
| Display of the updated residual current value referred to I_{nom} . | | |
| MAIN: Voltage $V_{PG,max}$ p.u. | 008043 | Fig. 3-30 |
| Display of the maximum phase-to-ground voltage referred to V_{nom} . | | |
| MAIN: Voltage $V_{PG,min}$ p.u. | 009043 | Fig. 3-30 |
| Display of the minimum phase-to-ground voltage referred to V_{nom} . | | |
| MAIN: Voltage A-G p.u. | 005043 | Fig. 3-30 |
| Display of the updated value for phase-to-ground voltage A-G referred to V_{nom} . | | |
| MAIN: Voltage B-G p.u. | 006043 | Fig. 3-30 |
| Display of the updated value for phase-to-ground voltage B-G referred to V_{nom} . | | |
| MAIN: Voltage C-G p.u. | 007043 | Fig. 3-30 |
| Display of the updated value for phase-to-ground voltage C-G referred to V_{nom} . | | |
| MAIN: Volt. $\Sigma(V_{PG})/\sqrt{3}$ p.u. | 005013 | Fig. 3-30 |
| Display of the calculated neutral-displacement voltage referred to V_{nom} . | | |
| MAIN: Voltage $V_{PP,max}$ p.u. | 008045 | Fig. 3-30 |
| Display of the maximum phase-to-phase voltage referred to V_{nom} . | | |
| MAIN: Voltage $V_{PP,min}$ p.u. | 009045 | Fig. 3-30 |
| Display of the minimum phase-to-phase voltage referred to V_{nom} . | | |
| MAIN: Voltage A-B p.u. | 005045 | Fig. 3-30 |
| Display of the updated value for phase-to-phase voltage A-B referred to V_{nom} . | | |
| MAIN: Voltage B-C p.u. | 006045 | Fig. 3-30 |
| Display of the updated value for phase-to-phase voltage B-C referred to V_{nom} . | | |
| MAIN: Voltage C-A p.u. | 007045 | Fig. 3-30 |
| Display of the updated value for phase-to-phase voltage C-A referred to V_{nom} . | | |

8 Information and Control Functions

(continued)

Ground fault direction
determination using
steady-state values

| | |
|---|-------------------|
| MAIN: Active power P p.u. | 004051 Fig. 3-31 |
| Display of the updated value for active power referred to nominal apparent power S_{nom} . | |
| MAIN: Reac. power Q p.u. | 004053 Fig. 3-31 |
| Display of the updated value for reactive power referred to nominal apparent power S_{nom} . | |
| MAIN: Active power factor | 004054 Fig. 3-31 |
| Display of the updated active power factor. | |
| MAIN: Load angle phi A | 004055 Fig. 3-31 |
| Display of the updated load angle value in phase A. | |
| MAIN: Load angle phi B | 004056 Fig. 3-31 |
| Display of the updated load angle value in phase B. | |
| MAIN: Load angle phi C | 004057 Fig. 3-31 |
| Display of the updated load angle value in phase C. | |
| MAIN: Phase rel., IN vs ΣIP | 004073 Fig. 3-32 |
| The phase relations of measured and calculated residual current are compared. | |
| GFDSS: Current IN,act p.u. | 004045 Fig. 3-144 |
| Display of the updated value for the active component of residual current referred to $I_{N,nom}$. | |
| GFDSS: Curr. IN, reac p.u. | 004046 Fig. 3-144 |
| Display of the updated value for the reactive component of residual current referred to $I_{N,nom}$. | |
| GFDSS: Curr. IN filt. p.u. | 004047 Fig. 3-145 |
| Display of the updated value for the harmonic content of residual current referred to $I_{N,nom}$. This display is only active when the steady-state current evaluation mode of the ground fault direction determination function (GFDSS) is enabled. | |
| GFDSS: Admitt. Y(N) p.u. | 004191 Fig. 3-150 |
| Display of the updated admittance value referred to $Y_{N,nom}$. If GFDSS: Evaluation VNG is set to <i>Measured</i> : $Y_{N,nom} = I_{N,nom} / V_{NG,nom}$ If GFDSS: Evaluation VNG is set to <i>Calculated</i> : $Y_{N,nom} = I_{N,nom} / V_{nom}$ | |
| GFDSS: Conduct. G(N) p.u. | 004192 Fig. 3-150 |
| Display of the updated conductance value referred to $Y_{N,nom}$. If GFDSS: Evaluation VNG is set to <i>Measured</i> : $Y_{N,nom} = I_{N,nom} / V_{NG,nom}$ If GFDSS: Evaluation VNG is set to <i>Calculated</i> : $Y_{N,nom} = I_{N,nom} / V_{nom}$ | |
| GFDSS: Suscept. B(N) p.u. | 004193 Fig. 3-150 |
| Display of the updated susceptance value referred to $Y_{N,nom}$. GFDSS: Evaluation VNG is set to <i>Measured</i> : $Y_{N,nom} = I_{N,nom} / V_{NG,nom}$ If GFDSS: Evaluation VNG is set to <i>Calculated</i> : $Y_{N,nom} = I_{N,nom} / V_{nom}$ | |

8 Information and Control Functions

(continued)

Motor protection

| | |
|---|--------------------|
| MP: Therm.repl.buffer MP | 004 018 Fig. 3-159 |
| Display of the buffer content of the motor protection function. | |
| MP: St-ups still permitt | 004 012 Fig. 3-159 |
| Display of the current number of motor startups still permitted before RC blocking. | |

Thermal overload protection

| | |
|---|--------------------|
| THERM: Status THERM replica | 004 016 Fig. 3-165 |
| Display of the buffer content of the thermal overload protection function. | |
| THERM: Object temperature | 004 137 Fig. 3-165 |
| Display of the temperature of the protected object. | |
| THERM: Pre-trip time left | 004 139 Fig. 3-165 |
| Display of the time remaining before the thermal overload protection function will reach the tripping threshold. | |
| THERM: Therm. replica p.u. | 004 017 |
| Display of the buffer content of the thermal overload protection function referred to a buffer content of 100 %. | |
| THERM: Object temp. p.u. | 004 179 |
| Display of the temperature of the protected object referred to 100 °C. | |
| THERM: Temp. offset replica | 004 109 Fig. 3-165 |
| Display of the additional reserve if the coolant temperature is taken into account. This display is relevant if the coolant temperature has been set to a value below the maximum permissible coolant temperature or, in other words, if the thermal model has been shifted downwards. | |
| If, on the other hand, the coolant temperature and the maximum permissible coolant temperature have been set to the same value, then the coolant temperature is not taken into account and the characteristic is a function of the current only. The additional reserve amounts to zero in this case. | |

8 Information and Control Functions

(continued)

8.1.1.2 Physical State Signals

"Logical" communication
interface 3

| | |
|--|---------|
| COMM3: State receive 1 | 120 000 |
| COMM3: State receive 2 | 120 003 |
| COMM3: State receive 3 | 120 006 |
| COMM3: State receive 4 | 120 009 |
| COMM3: State receive 5 | 120 012 |
| COMM3: State receive 6 | 120 015 |
| COMM3: State receive 7 | 120 018 |
| COMM3: State receive 8 | 120 021 |
| Display of the relevant receive signal. | |
| COMM3: State send 1 | 121 000 |
| COMM3: State send 2 | 121 002 |
| COMM3: State send 3 | 121 004 |
| COMM3: State send 4 | 121 006 |
| COMM3: State send 5 | 121 008 |
| COMM3: State send 6 | 121 010 |
| COMM3: State send 7 | 121 012 |
| COMM3: State send 8 | 121 014 |
| Display of the updated value for the relevant send signal. | |

Function keys

| | |
|-----------------|-------------------|
| F_KEY: State F1 | 080 122 Fig. 3-20 |
| F_KEY: State F2 | 080 123 |
| F_KEY: State F3 | 080 124 |
| F_KEY: State F4 | 080 125 |

The state of the function keys is displayed as follows:

- ☐ *Without function* No functions are assigned to the function key.
- ☐ *"Off":* The function key is in the "Off" position.
- ☐ *"On":* The function key is in the "On" position.

Binary inputs

| | |
|----------------|---------|
| INP: State U 1 | 178 001 |
| INP: State U 2 | 178 005 |

The state of the binary signal inputs is displayed as follows:

- ☐ *Without function:* No functions are assigned to the binary signal input.
- ☐ *Low:* Not energized.
- ☐ *High:* Energized.

This display appears regardless of the setting for the binary signal input mode.

8 Information and Control Functions

(continued)

Binary and analog outputs

| | |
|-----------------|---------|
| OUTP: State K 1 | 157 001 |
| OUTP: State K 2 | 157 005 |
| OUTP: State K 3 | 157 009 |
| OUTP: State K 4 | 157 013 |
| OUTP: State K 5 | 157 017 |
| OUTP: State K 6 | 157 021 |
| OUTP: State K 7 | 157 025 |
| OUTP: State K 8 | 157 029 |

The state of the output relays is displayed as follows:

- ☐ *Without function:* No functions are assigned to the output relay.
- ☐ *Low:* The output relay is not energized.
- ☐ *High:* The output relay is energized.

This display appears regardless of the operating mode set for the output relay.

| | |
|-----------------|---------|
| LED: State H 2 | 085 000 |
| LED: State H 3 | 085 003 |
| LED: State H 4 | 085 006 |
| LED: State H 5 | 085 009 |
| LED: State H 6 | 085 012 |
| LED: State H 7 | 085 015 |
| LED: State H 8 | 085 018 |
| LED: State H 9 | 085 021 |
| LED: State H 10 | 085 024 |
| LED: State H 11 | 085 027 |
| LED: State H 12 | 085 030 |
| LED: State H 13 | 085 033 |
| LED: State H 14 | 085 036 |
| LED: State H 15 | 085 039 |
| LED: State H 16 | 085 042 |

The state of the LED indicators is displayed as follows:

- ☐ *Inactive:* The LED indicator is not energized.
- ☐ *Active:* The LED indicator is energized.

8 Information and Control Functions

(continued)

8.1.1.3 Logic state signals

Local control panel

| | |
|---------------------------|---------|
| LOC: Trig. menu jmp 1 EXT | 030 230 |
| LOC: Trig. menu jmp 2 EXT | 030 231 |
| LOC: Illumination on EXT | 037 101 |

"Logical" communication interface 1

| | |
|-----------------------------|-------------------------------|
| COMM1: Command block. EXT | 003 173 Fig. 3-7 |
| COMM1: Sig./meas. block EXT | 037 074 Fig. 3-8, 3-9,3-10 |
| COMM1: Command blocking | 003 174 Fig. 3-7 |
| COMM1: Sig./meas.val.block. | 037 075 Fig. 3-8, 3-9,3-10 |
| COMM1: IEC 870-5-103 | 003 219 Fig. 3-8 |
| COMM1: IEC 870-5-101 | 003 218 Fig. 3-9 |
| COMM1: IEC 870-5,ILS | 003 221 Fig. 3-10 |
| COMM1: MODBUS | 003 223 Fig. 3-11 |
| COMM1: DNP3 | 003 230 Fig. 3-12 |
| COMM1: COURIER | 103 041 |

"Logical" communication interface 3

| | |
|-----------------------------|-------------------|
| COMM3: Communications fault | 120 043 Fig. 3-18 |
| COMM3: Comm. link failure | 120 044 Fig. 3-18 |
| COMM3: Lim.exceed.,tel.err. | 120 045 |

IRIG-B interface

| | |
|------------------------|-------------------|
| IRIGB: Enabled | 023 201 Fig. 3-19 |
| IRIGB: Synchron. ready | 023 202 Fig. 3-19 |

Binary and analog outputs

| | |
|----------------------------|-------------------|
| OUTP: Block outp.rel. EXT | 040 014 Fig. 3-22 |
| OUTP: Reset latch. EXT | 040 015 Fig. 3-22 |
| OUTP: Outp. relays blocked | 021 015 Fig. 3-22 |
| OUTP: Latching reset | 040 088 Fig. 3-22 |

Main function

| | |
|----------------------------|-----------------------------------|
| MAIN: Enable protect. EXT | 003 027 Fig. 3-36 |
| MAIN: Disable protect. EXT | 003 026 Fig. 3-36 |
| MAIN: System IN enable EXT | 040 130 Fig. 3-37 |
| MAIN: Syst. IN disable EXT | 040 131 Fig. 3-37 |
| MAIN: Test mode EXT | 037 070 Fig. 3-54 |
| MAIN: Blocking 1 EXT | 040 060 Fig. 3-40 |
| MAIN: Blocking 2 EXT | 040 061 Fig. 3-40 |
| MAIN: Reset latch.trip EXT | 040 138 Fig. 3-48 |
| MAIN: Trip cmd. block. EXT | 036 045 Fig. 3-48 |
| MAIN: M.c.b. trip V EXT | 004 061 Fig. 3-77, 3-190 |
| MAIN: Switch dyn.param.EXT | 036 033 Fig. 3-38 |
| MAIN: CB closed sig. EXT | 036 051 Fig. 3-42, 3-125,3-192 |
| MAIN: Man.cl.cmd.enabl.EXT | 041 023 Fig. 3-42 |
| MAIN: Manual close EXT | 036 047 Fig. 3-116 |
| MAIN: Man. close cmd. EXT | 041 022 Fig. 3-42 |
| MAIN: Man. trip cmd. EXT | 037 018 Fig. 3-49 |
| MAIN: Reset indicat. EXT | 065 001 Fig. 3-52 |
| MAIN: Min-pulse clock EXT | 060 060 Fig. 3-51 |
| MAIN: Prot. ext. enabled | 003 028 Fig. 3-36 |

8 Information and Control Functions

(continued)

| | |
|----------------------------|-------------------|
| MAIN: Prot. ext. disabled | 038 046 Fig. 3-36 |
| MAIN: Gen. trip signal | 036 251 Fig. 3-48 |
| MAIN: Syst.IN ext/user en. | 040 132 Fig. 3-37 |
| MAIN: System IN enabled | 040 133 Fig. 3-37 |
| MAIN: System IN disabled | 040 134 Fig. 3-37 |
| MAIN: Device not ready | 004 060 Fig. 3-41 |
| MAIN: Test mode | 037 071 Fig. 3-54 |
| MAIN: Blocked/faulty | 004 065 Fig. 3-41 |
| MAIN: Trip cmd. blocked | 021 013 Fig. 3-48 |
| MAIN: Latch. trip c. reset | 040 139 Fig. 3-48 |
| MAIN: Manual trip signal | 034 017 Fig. 3-49 |
| MAIN: Man. close command | 037 068 Fig. 3-42 |
| MAIN: Gen. trip command | 035 071 Fig. 3-48 |
| MAIN: Gen. trip signal 1 | 036 005 Fig. 3-48 |
| MAIN: Gen. trip signal 2 | 036 023 Fig. 3-48 |
| MAIN: Gen. trip command 1 | 036 071 Fig. 3-48 |
| MAIN: Gen. trip command 2 | 036 022 Fig. 3-48 |
| MAIN: Close command | 037 009 Fig. 3-42 |
| MAIN: Dynam. param. active | 040 090 Fig. 3-38 |
| MAIN: General starting | 040 000 Fig. 3-46 |
| MAIN: tGS elapsed | 040 009 Fig. 3-46 |
| MAIN: Starting A | 040 005 Fig. 3-45 |
| MAIN: Starting B | 040 006 Fig. 3-45 |
| MAIN: Starting C | 040 007 Fig. 3-45 |
| MAIN: Starting GF | 040 008 Fig. 3-45 |
| MAIN: Starting Ineg | 040 105 Fig. 3-45 |
| MAIN: Rush restr. A trig. | 041 027 |
| MAIN: Rush restr. B trig. | 041 028 |
| MAIN: Rush restr. C trig. | 041 029 |
| MAIN: Timer stage P elaps. | 040 031 Fig. 3-47 |
| MAIN: Timer st. Ineg elaps | 040 050 |
| MAIN: Timer stage N elaps. | 040 032 Fig. 3-47 |
| MAIN: TripSig. tI>/tIrefP> | 040 042 Fig. 3-47 |
| MAIN: Tr.sig.tIneg>/Ir,neg | 040 051 |
| MAIN: TripSig tIN>/tIrefN> | 040 043 Fig. 3-47 |
| MAIN: Ground fault | 041 087 Fig. 3-44 |
| MAIN: Ground fault A | 041 054 Fig. 3-43 |
| MAIN: Ground fault B | 041 055 Fig. 3-43 |
| MAIN: Ground fault C | 041 056 Fig. 3-43 |
| MAIN: Gnd. fault forw./LS | 041 088 Fig. 3-44 |
| MAIN: Gnd. fault backw./BS | 041 089 Fig. 3-44 |

Parameter subset selection

| | |
|---------------------------|-------------------|
| PSS: Control via user EXT | 036 101 Fig. 3-55 |
| PSS: Activate PS 1 EXT | 065 002 Fig. 3-55 |
| PSS: Activate PS 2 EXT | 065 003 Fig. 3-55 |
| PSS: Activate PS 3 EXT | 065 004 Fig. 3-55 |
| PSS: Activate PS 4 EXT | 065 005 Fig. 3-55 |
| PSS: Control via user | 036 102 Fig. 3-55 |
| PSS: Ext.sel.param.subset | 003 061 Fig. 3-55 |

8 Information and Control Functions

(continued)

Self-monitoring

| | |
|-----------------------------|-------------------|
| PSS: PS 1 activated ext. | 036 094 Fig. 3-55 |
| PSS: PS 2 activated ext. | 036 095 Fig. 3-55 |
| PSS: PS 3 activated ext. | 036 096 Fig. 3-55 |
| PSS: PS 4 activated ext. | 036 097 Fig. 3-55 |
| PSS: Actual param. subset | 003 062 Fig. 3-55 |
| PSS: PS 1 active | 036 090 Fig. 3-55 |
| PSS: PS 2 active | 036 091 Fig. 3-55 |
| PSS: PS 3 active | 036 092 Fig. 3-55 |
| PSS: PS 4 active | 036 093 Fig. 3-55 |
| SFMON: Warning (LED) | 036 070 Fig. 3-56 |
| SFMON: Warning (relay) | 036 100 Fig. 3-56 |
| SFMON: Warm restart exec. | 041 202 |
| SFMON: Cold restart exec. | 041 201 |
| SFMON: Cold restart | 093 024 |
| SFMON: Cold rest./SW update | 093 025 |
| SFMON: Blocking/ HW failure | 090 019 |
| SFMON: Relay Kxx faulty | 041 200 |
| SFMON: Hardware clock fail. | 093 040 |
| SFMON: Battery failure | 090 010 |
| SFMON: Invalid SW d.loaded | 096 121 |
| SFMON: +15V supply faulty | 093 081 |
| SFMON: +24V supply faulty | 093 082 |
| SFMON: -15V supply faulty | 093 080 |
| SFMON: Power supply faulty | 093 083 |
| SFMON: Wrong module slot 1 | 096 100 |
| SFMON: Wrong module slot 2 | 096 101 |
| SFMON: Defect.module slot 1 | 097 000 |
| SFMON: Defect.module slot 2 | 097 001 |
| SFMON: Module A DPR faulty | 093 070 |
| SFMON: Module A RAM faulty | 093 071 |
| SFMON: Error K 1 | 097 038 |
| SFMON: Error K 2 | 097 039 |
| SFMON: Error K 3 | 097 040 |
| SFMON: Error K 4 | 097 041 |
| SFMON: Error K 5 | 097 042 |
| SFMON: Error K 6 | 097 043 |
| SFMON: Error K 7 | 097 044 |
| SFMON: Error K 8 | 097 045 |
| SFMON: Undef. operat. code | 093 010 |
| SFMON: Invalid arithm. op. | 093 011 |
| SFMON: Undefined interrupt | 093 012 |
| SFMON: Exception oper.syst. | 093 013 |
| SFMON: Data acquis. failure | 090 021 |
| SFMON: Checksum error param | 090 003 |
| SFMON: Clock sync. error | 093 041 |
| SFMON: Interm.volt.fail.RAM | 093 026 |
| SFMON: Overflow MT_RC | 090 012 Fig. 3-58 |
| SFMON: Semaph. MT_RC block. | 093 015 |
| SFMON: Inval. SW vers.COMM1 | 093 075 |
| SFMON: IRIGB faulty | 093 117 |
| SFMON: Time-out module L | 093 130 |

8 Information and Control Functions

(continued)

| | |
|-----------------------------|--------------------|
| SFMON: Inom not adjustable | 093 118 |
| SFMON: M.c.b. trip V | 098 000 Fig. 3-190 |
| SFMON: Phase sequ. V faulty | 098 001 Fig. 3-192 |
| SFMON: Undervoltage | 098 009 Fig. 3-192 |
| SFMON: Meas. circ. V faulty | 098 017 Fig. 3-190 |
| SFMON: Meas. circ. I faulty | 098 005 Fig. 3-191 |
| SFMON: Meas.circ.V,I faulty | 098 016 Fig. 3-190 |
| SFMON: Communic.fault COMM3 | 093 140 |
| SFMON: Comm.link fail.COMM3 | 093 142 |
| SFMON: Lim.exceed.,tel.err. | 093 141 |
| SFMON: Telecom. faulty | 098 006 Fig. 3-120 |
| SFMON: Setting error THERM | 098 035 Fig. 3-165 |
| SFMON: Setting error f<> | 098 028 Fig. 3-182 |
| SFMON: Output 30 | 098 053 |
| SFMON: Output 30 (t) | 098 054 |
| SFMON: Output 31 | 098 055 |
| SFMON: Output 31 (t) | 098 056 |
| SFMON: Output 32 | 098 057 |
| SFMON: Output 32 (t) | 098 058 |

Overload recording

| | |
|-----------------------------|-------------------|
| OL_RC: Record. in progress | 035 003 Fig. 3-62 |
| OL_RC: Overl. mem. overflow | 035 007 Fig. 3-63 |

Ground fault recording

| | |
|----------------------------|-------------------|
| GF_RC: Record. in progress | 035 005 Fig. 3-71 |
| GF_RC: GF memory overflow | 035 006 Fig. 3-72 |

Fault data acquisition

| | |
|--------------------|-------------------|
| FT_DA: Trigger EXT | 036 096 Fig. 3-74 |
|--------------------|-------------------|

Fault recording

| | |
|-----------------------------|-------------------|
| FT_RC: Trigger EXT | 036 089 Fig. 3-80 |
| FT_RC: Trigger | 037 076 Fig. 3-80 |
| FT_RC: I> triggered | 040 063 Fig. 3-80 |
| FT_RC: Record. in progress | 035 000 Fig. 3-80 |
| FT_RC: System disturb. runn | 035 004 Fig. 3-80 |
| FT_RC: Fault mem. overflow | 035 001 Fig. 3-81 |
| FT_RC: Faulty time tag | 035 002 |

Definite-time overcurrent protection

| | |
|---------------------------|---------------------------------|
| DTOC: Blocking tI> EXT | 041 050 Fig. 3-84 |
| DTOC: Blocking tI>> EXT | 041 061 Fig. 3-84 |
| DTOC: Blocking tI>>> EXT | 041 062 Fig. 3-84 |
| DTOC: Block. tIneg> EXT | 036 141 |
| DTOC: Block. tIneg>> EXT | 036 142 |
| DTOC: Block. tIneg>>> EXT | 036 143 |
| DTOC: Blocking tIN> EXT | 041 063 Fig. 3-89 |
| DTOC: Blocking tIN>> EXT | 041 064 Fig. 3-89 |
| DTOC: Blocking tIN>>> EXT | 041 065 Fig. 3-89 |
| DTOC: Enabled | 040 120 Fig. 3-83 |
| DTOC: Starting I> | 040 036 Fig. 3-84 |
| DTOC: Starting I>> | 040 029 Fig. 3-84 |
| DTOC: Starting I>>> | 039 075 Fig. 3-84 |
| DTOC: Starting Ineg> | 036 145 Fig. 3-86, 3-45,3-46 |

8 Information and Control Functions

(continued)

| | |
|----------------------------|---------------------------------|
| DTOC: Starting Ineg>> | 036 146 Fig. 3-86, 3-45,3-46 |
| DTOC: Starting Ineg>>> | 036 147 Fig. 3-86, 3-45,3-46 |
| DTOC: Starting IN> | 040 077 Fig. 3-89 |
| DTOC: Starting IN>> | 040 041 Fig. 3-89 |
| DTOC: Starting IN>>> | 039 078 Fig. 3-89 |
| DTOC: tl> elapsed | 040 010 Fig. 3-84 |
| DTOC: tl>> elapsed | 040 033 Fig. 3-84 |
| DTOC: tl>>> elapsed | 040 012 Fig. 3-84 |
| DTOC: Trip signal tl> | 041 020 Fig. 3-85 |
| DTOC: Trip signal tl>> | 040 011 Fig. 3-85 |
| DTOC: Trip signal tl>>> | 040 076 Fig. 3-85 |
| DTOC: tlneg> elapsed | 036 148 Fig. 3-86, 3-47 |
| DTOC: tlneg>> elapsed | 036 149 Fig. 3-86, 3-47 |
| DTOC: tlneg>>> elapsed | 036 150 Fig. 3-86, 3-47 |
| DTOC: Trip signal tlneg> | 036 151 Fig. 3-86, 3-87 |
| DTOC: Trip signal tlneg>> | 036 152 Fig. 3-86, 3-87 |
| DTOC: Trip signal tlneg>>> | 036 153 Fig. 3-86, 3-87 |
| DTOC: tIN> elapsed | 040 013 Fig. 3-89 |
| DTOC: tIN>> elapsed | 040 121 Fig. 3-89 |
| DTOC: tIN>>> elapsed | 039 079 Fig. 3-89 |
| DTOC: Trip signal tIN> | 041 021 Fig. 3-90 |
| DTOC: Trip signal tIN>> | 040 028 Fig. 3-90 |
| DTOC: Trip signal tIN>>> | 040 079 Fig. 3-90 |
| DTOC: H.-time tIN>,i. runn | 040 086 Fig. 3-91 |
| DTOC: tIN>,interm. elapsed | 040 099 Fig. 3-91 |
| DTOC: Trip sig. tIN>,intm. | 039 073 Fig. 3-91 |

*Inverse-time overcurrent
protection*

| | |
|----------------------------|--------------------|
| IDMT: Block. tlref,P> EXT | 040 101 Fig. 3-99 |
| IDMT: Block. tlref,neg>EXT | 040 102 |
| IDMT: Block. tlref,N> EXT | 040 103 Fig. 3-103 |
| IDMT: Enabled | 040 100 Fig. 3-94 |
| IDMT: Starting Iref,P> | 040 080 Fig. 3-99 |
| IDMT: tlref,P> elapsed | 040 082 Fig. 3-99 |
| IDMT: Trip signal tlref,P> | 040 084 Fig. 3-100 |
| IDMT: Hold time P running | 040 053 Fig. 3-99 |
| IDMT: Memory P clear | 040 110 Fig. 3-99 |
| IDMT: Starting Iref,neg> | 040 107 |
| IDMT: tlref,neg> elapsed | 040 109 |
| IDMT: Trip sig. tlref,neg> | 040 108 |
| IDMT: Hold time neg runn. | 040 113 |
| IDMT: Memory neg clear | 040 111 |
| IDMT: Starting Iref,N> | 040 081 Fig. 3-103 |
| IDMT: tlref,N> elapsed | 040 083 Fig. 3-103 |
| IDMT: Trip signal tlref,N> | 040 085 Fig. 3-104 |
| IDMT: Hold time N running | 040 054 Fig. 3-103 |
| IDMT: Memory N clear | 040 112 Fig. 3-103 |

8 Information and Control Functions

(continued)

Short-circuit direction determination

| | | |
|----------------------------|--------|------------|
| SCDD: Enabled | 040098 | Fig. 3-106 |
| SCDD: Blocked | 040062 | Fig. 3-108 |
| SCDD: Fault P forward | 036018 | Fig. 3-109 |
| SCDD: Fault P backward | 036019 | Fig. 3-109 |
| SCDD: Ground fault forward | 040037 | Fig. 3-113 |
| SCDD: Ground fault backw. | 040038 | Fig. 3-113 |
| SCDD: Fault P or G forwd. | 040039 | Fig. 3-115 |
| SCDD: Fault P or G backw. | 040040 | Fig. 3-115 |

Switch on to fault protection

| | | |
|----------------------------|--------|------------|
| SOTF: Par. ARC running EXT | 039063 | Fig. 3-116 |
| SOTF: Enabled | 040069 | Fig. 3-116 |
| SOTF: tManual-close runn. | 036063 | Fig. 3-116 |
| SOTF: Trip signal | 036064 | Fig. 3-116 |

Protective signaling

| | | |
|----------------------------|--------|-------------------|
| PSIG: Enable EXT | 037025 | Fig. 3-117 |
| PSIG: Disable EXT | 037026 | Fig. 3-117 |
| PSIG: Test telecom. EXT | 036038 | Fig. 3-119 |
| PSIG: Blocking EXT | 036049 | Fig. 3-117 |
| PSIG: Receive EXT | 036048 | Fig. 3-119, 3-120 |
| PSIG: Ext./user enabled | 037023 | Fig. 3-117 |
| PSIG: Enabled | 015008 | Fig. 3-117 |
| PSIG: Ready | 037027 | Fig. 3-117 |
| PSIG: Not ready | 037028 | Fig. 3-117 |
| PSIG: Test telecom. chann. | 034016 | Fig. 3-119 |
| PSIG: Telecom. faulty | 036060 | Fig. 3-120 |
| PSIG: Send (signal) | 036035 | Fig. 3-119 |
| PSIG: Send (transm.relay) | 037024 | Fig. 3-119 |
| PSIG: Receive (signal) | 037029 | Fig. 3-119 |
| PSIG: Trip signal | 038007 | Fig. 3-119 |

Auto-reclosing control

| | | |
|---------------------------|--------|------------|
| ARC: Enable EXT | 037010 | Fig. 3-123 |
| ARC: Disable EXT | 037011 | Fig. 3-123 |
| ARC: Test HSR A-B-C EXT | 037017 | Fig. 3-136 |
| ARC: Blocking EXT | 036050 | Fig. 3-124 |
| ARC: CB drive ready EXT | 004066 | Fig. 3-125 |
| ARC: Ext./user enabled | 037013 | Fig. 3-123 |
| ARC: Enabled | 015064 | Fig. 3-123 |
| ARC: Test HSR A-B-C | 034023 | Fig. 3-136 |
| ARC: Blocked | 004069 | Fig. 3-124 |
| ARC: Blocking trip | 042000 | Fig. 3-134 |
| ARC: Ready | 004068 | Fig. 3-125 |
| ARC: Not ready | 037008 | Fig. 3-125 |
| ARC: Reject test HSR | 036055 | Fig. 3-136 |
| ARC: Block. time running | 037004 | Fig. 3-124 |
| ARC: Cycle running | 037000 | Fig. 3-134 |
| ARC: Oper. time running | 037005 | Fig. 3-134 |
| ARC: Start by LOGIC | 037078 | Fig. 3-133 |
| ARC: Dead time HSR runn. | 037002 | Fig. 3-134 |
| ARC: Dead time TDR runn. | 037003 | Fig. 3-134 |
| ARC: Reclaim time running | 036042 | Fig. 3-134 |
| ARC: Trip signal | 039099 | Fig. 3-134 |

8 Information and Control Functions

(continued)

Ground fault direction
determination using
steady-state values

| | |
|---------------------------|--------------------|
| ARC: (Re)close signal HSR | 037.007 Fig. 3-134 |
| ARC: (Re)close signal TDR | 037.006 Fig. 3-134 |
| ARC: Reclosure successful | 036.062 Fig. 3-134 |
| ARC: Sig.interr. CB trip | 036.040 Fig. 3-134 |

| | |
|-----------------------------|------------------------------|
| GFDSS: GF (curr.) eval. EXT | 038.020 Fig. 3-139 |
| GFDSS: Enabled | 042.096 Fig. 3-139 |
| GFDSS: GF (pow.) ready | 038.026 Fig. 3-139 |
| GFDSS: GF (pow.) not ready | 038.027 Fig. 3-139 |
| GFDSS: GF (curr.) evaluat. | 039.071 Fig. 3-139 |
| GFDSS: GF (curr.) ready | 038.028 Fig. 3-139 |
| GFDSS: GF (curr.) not ready | 038.029 Fig. 3-139 |
| GFDSS: Admittance ready | 038.167 Fig. 3-139 |
| GFDSS: Admittance not ready | 038.168 Fig. 3-139 |
| GFDSS: Grd. fault pow./adm. | 009.037 Fig. 3-141, 3-147 |
| GFDSS: Direct. forward/LS | 009.035 Fig. 3-144, 3-150 |
| GFDSS: Direct. backward/BS | 009.036 Fig. 3-144, 3-150 |
| GFDSS: Starting forward/LS | 009.040 Fig. 3-144, 3-150 |
| GFDSS: Starting backw. /BS | 009.041 Fig. 3-144, 3-150 |
| GFDSS: Trip signal forw./LS | 009.031 Fig. 3-144, 3-150 |
| GFDSS: Ground fault (curr.) | 009.038 Fig. 3-145 |
| GFDSS: Starting Y(N)> | 009.074 Fig. 3-151 |
| GFDSS: Trip Y(N)> | 009.075 Fig. 3-151 |
| GFDSS: Trip signal Y(N)> | 009.072 Fig. 3-151 |

Motor protection

| | |
|--------------------------|--------------------|
| MP: Therm.repl.block EXT | 040.044 Fig. 3-159 |
| MP: Reset therm.repl.EXT | 041.082 Fig. 3-161 |
| MP: Speed monitor n> EXT | 040.045 Fig. 3-159 |
| MP: Enabled | 040.115 Fig. 3-153 |
| MP: Reset therm. replica | 041.083 Fig. 3-161 |
| MP: Reclosure blocked | 040.049 Fig. 3-159 |
| MP: Starting k*Iref> | 041.057 Fig. 3-154 |
| MP: Startup | 040.119 Fig. 3-159 |
| MP: Trip by failed st-up | 041.081 Fig. 3-159 |
| MP: Trip signal | 040.046 Fig. 3-159 |
| MP: tk elapsed | 040.047 Fig. 3-162 |

8 Information and Control Functions

(continued)

Thermal overload protection

| | |
|-----------------------------|-------------------|
| THERM: Therm.repl.block EXT | 041074 Fig. 3-165 |
| THERM: Reset replica EXT | 038061 Fig. 3-166 |
| THERM: Enabled | 040068 Fig. 3-163 |
| THERM: Reset replica | 039061 Fig. 3-166 |
| THERM: Starting k*Iref> | 041108 Fig. 3-165 |
| THERM: Warning | 039025 Fig. 3-165 |
| THERM: Trip signal | 039020 Fig. 3-165 |
| THERM: Buffer empty | 039112 Fig. 3-165 |
| THERM: Within pre-trip time | 041109 Fig. 3-165 |
| THERM: Setting error,block, | 039110 Fig. 3-165 |

Unbalance protection

| | |
|---------------------------|-------------------|
| I2>: Blocking EXT | 035100 Fig. 3-168 |
| I2>: Blocking tIneg> EXT | 041076 Fig. 3-168 |
| I2>: Blocking tIneg>> EXT | 041077 Fig. 3-168 |
| I2>: Enabled | 040073 Fig. 3-167 |
| I2>: Starting tIneg> | 035024 Fig. 3-168 |
| I2>: Starting tIneg>> | 035025 Fig. 3-168 |
| I2>: tIneg> elapsed | 035033 Fig. 3-168 |
| I2>: tIneg>> elapsed | 035034 Fig. 3-168 |

Time-voltage protection

| | |
|-----------------------------|-------------------|
| V<>: Blocking tV> EXT | 041068 Fig. 3-171 |
| V<>: Blocking tV>> EXT | 041069 Fig. 3-171 |
| V<>: Blocking tV< EXT | 041070 Fig. 3-172 |
| V<>: Blocking tV<< EXT | 041071 Fig. 3-172 |
| V<>: Blocking tVpos> EXT | 041090 Fig. 3-174 |
| V<>: Blocking tVpos>> EXT | 041091 Fig. 3-174 |
| V<>: Blocking tVpos< EXT | 041092 Fig. 3-174 |
| V<>: Blocking tVpos<< EXT | 041093 Fig. 3-174 |
| V<>: Blocking tVneg> EXT | 041094 Fig. 3-175 |
| V<>: Blocking tVneg>> EXT | 041095 Fig. 3-175 |
| V<>: Blocking tVNG> EXT | 041072 Fig. 3-177 |
| V<>: Blocking tVNG>> EXT | 041073 Fig. 3-177 |
| V<>: Enabled | 040066 Fig. 3-169 |
| V<>: Ready | 042003 Fig. 3-169 |
| V<>: Not ready | 042004 Fig. 3-169 |
| V<>: Starting V>/>> A(-B) | 041031 Fig. 3-171 |
| V<>: Starting V>/>> B(-C) | 041032 Fig. 3-171 |
| V<>: Starting V>/>> C(-A) | 041033 Fig. 3-171 |
| V<>: Starting V> | 041030 Fig. 3-171 |
| V<>: Starting V> 3-pole | 041097 Fig. 3-171 |
| V<>: Starting V>> | 041096 Fig. 3-171 |
| V<>: tV> elapsed | 041034 Fig. 3-171 |
| V<>: tV> 3-pole elapsed | 041098 Fig. 3-171 |
| V<>: tV>> elapsed | 041035 Fig. 3-171 |
| V<>: Starting V</<< A(-B) | 041038 Fig. 3-172 |
| V<>: Starting V</<< B(-C) | 041039 Fig. 3-172 |
| V<>: Starting V</<< C(-A) | 041040 Fig. 3-172 |
| V<>: Starting V< | 041037 Fig. 3-172 |
| V<>: Starting V< 3-pole | 042005 Fig. 3-172 |
| V<>: Starting V<< | 041099 Fig. 3-172 |
| V<>: tV< elapsed | 041041 Fig. 3-172 |
| V<>: tV< elapsed. transient | 042023 Fig. 3-172 |

8 Information and Control Functions

(continued)

| | |
|---------------------------|-------------------|
| V<>: Fault V< | 041110 Fig. 3-172 |
| V<>: tV< 3-pole elapsed | 042006 Fig. 3-172 |
| V<>: tV< 3p elaps. trans. | 042024 Fig. 3-172 |
| V<>: Fault V< 3-pole | 041111 Fig. 3-172 |
| V<>: tV<< elapsed | 041042 Fig. 3-172 |
| V<>: tV<< elapsed trans. | 042025 Fig. 3-172 |
| V<>: tV</<< elaps. trans. | 042007 Fig. 3-172 |
| V<>: Fault V<< | 041112 Fig. 3-172 |
| V<>: Starting Vpos> | 042010 Fig. 3-174 |
| V<>: Starting Vpos>> | 042011 Fig. 3-174 |
| V<>: tVpos> elapsed | 042012 Fig. 3-174 |
| V<>: tVpos>> elapsed | 042013 Fig. 3-174 |
| V<>: Starting Vpos< | 042014 Fig. 3-174 |
| V<>: Starting Vpos<< | 042015 Fig. 3-174 |
| V<>: tVpos< elapsed | 042016 Fig. 3-174 |
| V<>: tVpos< elaps. trans. | 042026 Fig. 3-174 |
| V<>: Fault Vpos< | 041113 Fig. 3-174 |
| V<>: tVpos<< elapsed | 042017 Fig. 3-174 |
| V<>: tVpos<< elaps.trans. | 042027 Fig. 3-174 |
| V<>: Fault Vpos<< | 041114 Fig. 3-174 |
| V<>: tVpos</<< elap.trans | 042018 Fig. 3-174 |
| V<>: Starting Vneg> | 042019 Fig. 3-175 |
| V<>: Starting Vneg>> | 042020 Fig. 3-175 |
| V<>: tVneg> elapsed | 042021 Fig. 3-175 |
| V<>: tVneg>> elapsed | 042022 Fig. 3-175 |
| V<>: Starting VNG> | 041044 Fig. 3-177 |
| V<>: Starting VNG>> | 042008 Fig. 3-177 |
| V<>: tVNG> elapsed | 041045 Fig. 3-177 |
| V<>: tVNG>> elapsed | 041046 Fig. 3-177 |

Over-/ underfrequency
protection

| | |
|-------------------------|-------------------|
| f<>: Blocking f1 EXT | 042103 Fig. 3-182 |
| f<>: Blocking f2 EXT | 042104 |
| f<>: Blocking f3 EXT | 042105 |
| f<>: Blocking f4 EXT | 042106 |
| f<>: Enabled | 042100 Fig. 3-178 |
| f<>: Ready | 042101 Fig. 3-178 |
| f<>: Not ready | 042140 Fig. 3-178 |
| f<>: Blocked by V< | 042102 Fig. 3-180 |
| f<>: Starting f1 | 042107 Fig. 3-182 |
| f<>: Starting f1/df1 | 042108 Fig. 3-182 |
| f<>: Delta f1 triggered | 042109 Fig. 3-182 |
| f<>: Delta t1 elapsed | 042110 Fig. 3-182 |
| f<>: Trip signal f1 | 042111 Fig. 3-182 |
| f<>: Starting f2 | 042115 |
| f<>: Starting f2/df2 | 042116 |
| f<>: Delta f2 triggered | 042117 |
| f<>: Delta t2 elapsed | 042118 |
| f<>: Trip signal f2 | 042119 |
| f<>: Starting f3 | 042123 |
| f<>: Starting f3/df3 | 042124 |
| f<>: Delta f3 triggered | 042125 |

8 Information and Control Functions

(continued)

| | |
|-------------------------|---------|
| f<>: Delta t3 elapsed | 042.126 |
| f<>: Trip signal f3 | 042.127 |
| f<>: Starting f4 | 042.131 |
| f<>: Starting f4/df4 | 042.132 |
| f<>: Delta f4 triggered | 042.133 |
| f<>: Delta t4 elapsed | 042.134 |
| f<>: Trip signal f4 | 042.135 |

Power directional protection

| | |
|-------------------------|--------------------|
| P<>: Blocking P> EXT | 035.082 Fig. 3-185 |
| P<>: Blocking P>> EXT | 035.083 Fig. 3-185 |
| P<>: Blocking Q> EXT | 035.084 Fig. 3-187 |
| P<>: Blocking Q>> EXT | 035.085 Fig. 3-187 |
| P<>: Enabled | 036.250 Fig. 3-183 |
| P<>: Starting P> | 035.086 Fig. 3-185 |
| P<>: Starting P>> | 035.089 Fig. 3-185 |
| P<>: Signal P> delayed | 035.087 Fig. 3-185 |
| P<>: Signal P>> delayed | 035.090 Fig. 3-185 |
| P<>: Trip signal P> | 035.088 Fig. 3-186 |
| P<>: Trip signal P>> | 035.091 Fig. 3-186 |
| P<>: Starting Q> | 035.092 Fig. 3-187 |
| P<>: Starting Q>> | 035.095 Fig. 3-187 |
| P<>: Signal Q> delayed | 035.093 Fig. 3-187 |
| P<>: Signal Q>> delayed | 035.096 Fig. 3-187 |
| P<>: Trip signal Q> | 035.094 Fig. 3-188 |
| P<>: Trip signal Q>> | 035.097 Fig. 3-188 |

Circuit breaker failure protection

| | |
|-------------------------|-----------------------------|
| CBF: Starting trig. EXT | 038.016 Fig. 3-189 |
| CBF: Parallel trip EXT | 037.019 Fig. 3-42, 3-189 |
| CBF: Enabled | 040.055 Fig. 3-189 |
| CBF: Trip signal | 040.026 Fig. 3-189 |
| CBF: tCBF running | 036.066 Fig. 3-189 |
| CBF: CB failure | 036.017 Fig. 3-189 |

Measuring-circuit monitoring

| | |
|-----------------------------|--------------------|
| MCMON: Enabled | 040.094 Fig. 3-191 |
| MCMON: Meas. circ. I faulty | 040.087 Fig. 3-191 |
| MCMON: Undervoltage | 038.038 Fig. 3-192 |
| MCMON: Phase sequ. V faulty | 038.049 Fig. 3-192 |
| MCMON: Meas. circ. V faulty | 038.023 Fig. 3-190 |
| MCMON: Meas.circ.V,I faulty | 037.020 Fig. 3-190 |
| MCMON: Meas. voltage o.k. | 038.048 Fig. 3-192 |

8 Information and Control Functions

(continued)

Limit value monitoring

| | |
|-----------------------|--------------------|
| LIMIT: Enabled | 040 074 Fig. 3-193 |
| LIMIT: ti> elapsed | 040 220 Fig. 3-193 |
| LIMIT: ti>> elapsed | 040 221 Fig. 3-193 |
| LIMIT: ti< elapsed | 040 222 Fig. 3-193 |
| LIMIT: ti<< elapsed | 040 223 Fig. 3-193 |
| LIMIT: tVPG> elapsed | 040 224 |
| LIMIT: tVPG>> elapsed | 040 225 |
| LIMIT: tVPG< elapsed | 040 226 |
| LIMIT: tVPG<< elapsed | 040 227 |
| LIMIT: tVPP> elapsed | 040 228 |
| LIMIT: tVPP>> elapsed | 040 229 |
| LIMIT: tVPP< elapsed | 040 230 |
| LIMIT: tVPP<< elapsed | 040 231 |
| LIMIT: tVNG> elapsed | 040 168 Fig. 3-195 |
| LIMIT: tVNG>> elapsed | 040 169 Fig. 3-195 |

8 Information and Control Functions

(continued)

Logic

| | |
|-------------------------|--------------------|
| LOGIC: Input 1 EXT | 034 000 Fig. 3-197 |
| LOGIC: Input 2 EXT | 034 001 |
| LOGIC: Input 3 EXT | 034 002 |
| LOGIC: Input 4 EXT | 034 003 |
| LOGIC: Input 5 EXT | 034 004 |
| LOGIC: Input 6 EXT | 034 005 |
| LOGIC: Input 7 EXT | 034 006 |
| LOGIC: Input 8 EXT | 034 007 |
| LOGIC: Input 9 EXT | 034 008 |
| LOGIC: Input 10 EXT | 034 009 |
| LOGIC: Input 11 EXT | 034 010 |
| LOGIC: Input 12 EXT | 034 011 |
| LOGIC: Input 13 EXT | 034 012 |
| LOGIC: Input 14 EXT | 034 013 |
| LOGIC: Input 15 EXT | 034 014 |
| LOGIC: Input 16 EXT | 034 015 Fig. 3-197 |
| LOGIC: Set 1 EXT | 034 051 Fig. 3-196 |
| LOGIC: Set 2 EXT | 034 052 |
| LOGIC: Set 3 EXT | 034 053 |
| LOGIC: Set 4 EXT | 034 054 |
| LOGIC: Set 5 EXT | 034 055 |
| LOGIC: Set 6 EXT | 034 056 |
| LOGIC: Set 7 EXT | 034 057 |
| LOGIC: Set 8 EXT | 034 058 |
| LOGIC: Reset 1 EXT | 034 059 Fig. 3-196 |
| LOGIC: Reset 2 EXT | 034 060 |
| LOGIC: Reset 3 EXT | 034 061 |
| LOGIC: Reset 4 EXT | 034 062 |
| LOGIC: Reset 5 EXT | 034 063 |
| LOGIC: Reset 6 EXT | 034 064 |
| LOGIC: Reset 7 EXT | 034 065 |
| LOGIC: Reset 8 EXT | 034 066 |
| LOGIC: 1 has been set | 034 067 Fig. 3-196 |
| LOGIC: 2 has been set | 034 068 |
| LOGIC: 3 has been set | 034 069 |
| LOGIC: 4 has been set | 034 070 |
| LOGIC: 5 has been set | 034 071 |
| LOGIC: 6 has been set | 034 072 |
| LOGIC: 7 has been set | 034 073 |
| LOGIC: 8 has been set | 034 074 |
| LOGIC: 1 set externally | 034 075 Fig. 3-196 |
| LOGIC: 2 set externally | 034 076 |
| LOGIC: 3 set externally | 034 077 |
| LOGIC: 4 set externally | 034 078 |
| LOGIC: 5 set externally | 034 079 |
| LOGIC: 6 set externally | 034 080 |
| LOGIC: 7 set externally | 034 081 |
| LOGIC: 8 set externally | 034 082 |
| LOGIC: Enabled | 034 046 Fig. 3-197 |
| LOGIC: Output 1 | 042 032 Fig. 3-197 |
| LOGIC: Output 1 (t) | 042 033 Fig. 3-197 |
| LOGIC: Output 2 | 042 034 |

8 Information and Control Functions

(continued)

| | |
|----------------------|--------------------|
| LOGIC: Output 2 (t) | 042 035 Fig. 3-133 |
| LOGIC: Output 3 | 042 036 |
| LOGIC: Output 3 (t) | 042 037 |
| LOGIC: Output 4 | 042 038 |
| LOGIC: Output 4 (t) | 042 039 |
| LOGIC: Output 5 | 042 040 |
| LOGIC: Output 5 (t) | 042 041 |
| LOGIC: Output 6 | 042 042 |
| LOGIC: Output 6 (t) | 042 043 |
| LOGIC: Output 7 | 042 044 |
| LOGIC: Output 7 (t) | 042 045 |
| LOGIC: Output 8 | 042 046 |
| LOGIC: Output 8 (t) | 042 047 |
| LOGIC: Output 9 | 042 048 |
| LOGIC: Output 9 (t) | 042 049 |
| LOGIC: Output 10 | 042 050 |
| LOGIC: Output 10 (t) | 042 051 |
| LOGIC: Output 11 | 042 052 |
| LOGIC: Output 11 (t) | 042 053 |
| LOGIC: Output 12 | 042 054 |
| LOGIC: Output 12 (t) | 042 055 |
| LOGIC: Output 13 | 042 056 |
| LOGIC: Output 13 (t) | 042 057 |
| LOGIC: Output 14 | 042 058 |
| LOGIC: Output 14 (t) | 042 059 |
| LOGIC: Output 15 | 042 060 |
| LOGIC: Output 15 (t) | 042 061 |
| LOGIC: Output 16 | 042 062 |
| LOGIC: Output 16 (t) | 042 063 |
| LOGIC: Output 17 | 042 064 |
| LOGIC: Output 17 (t) | 042 065 |
| LOGIC: Output 18 | 042 066 |
| LOGIC: Output 18 (t) | 042 067 |
| LOGIC: Output 19 | 042 068 |
| LOGIC: Output 19 (t) | 042 069 |
| LOGIC: Output 20 | 042 070 |
| LOGIC: Output 20 (t) | 042 071 |
| LOGIC: Output 21 | 042 072 |
| LOGIC: Output 21 (t) | 042 073 |
| LOGIC: Output 22 | 042 074 |
| LOGIC: Output 22 (t) | 042 075 |
| LOGIC: Output 23 | 042 076 |
| LOGIC: Output 23 (t) | 042 077 |
| LOGIC: Output 24 | 042 078 |
| LOGIC: Output 24 (t) | 042 079 |
| LOGIC: Output 25 | 042 080 |
| LOGIC: Output 25 (t) | 042 081 |
| LOGIC: Output 26 | 042 082 |
| LOGIC: Output 26 (t) | 042 083 |
| LOGIC: Output 27 | 042 084 |
| LOGIC: Output 27 (t) | 042 085 |
| LOGIC: Output 28 | 042 086 |

8 Information and Control Functions

(continued)

| | |
|----------------------|--------|
| LOGIC: Output 28 (t) | 042087 |
| LOGIC: Output 29 | 042088 |
| LOGIC: Output 29 (t) | 042089 |
| LOGIC: Output 30 | 042090 |
| LOGIC: Output 30 (t) | 042091 |
| LOGIC: Output 31 | 042092 |
| LOGIC: Output 31 (t) | 042093 |
| LOGIC: Output 32 | 042094 |
| LOGIC: Output 32 (t) | 042095 |

8 Information and Control Functions

(continued)

8.1.2 Control and Testing

| | | |
|-------------------------------------|---|--|
| Device | DVICE: Service info 031 080 | 031 080 |
| Local control panel | LOC: Param. change enabl. Setting the enable for changing values from the local control panel. | 003 010 |
| "Logical" communication interface 1 | COMM1: Sel.spontan.sig.test Signal selection for testing purposes. COMM1: Test spont.sig.start Trigger for the transmission of the selected signal (as signal 'start'). COMM1: Test spont.sig. end Trigger for the transmission of the selected signal (as signal 'end'). | 003 180 003 184 003 186 |
| "Logical" communication interface 2 | COMM2: Sel.spontan.sig.test Signal selection for testing purposes. COMM2: Test spont.sig.start Trigger for the transmission of the selected signal (as signal 'start'). COMM2: Test spont.sig. end Trigger for the transmission of the selected signal (as signal 'end'). | 103 180 103 184 103 186 |
| "Logical" communication interface 3 | COMM3: Reset No. tel.errors COMM3: Send signal for test COMM3: Log. state for test COMM3: Send signal, test COMM3: Loop back send COMM3: Loop back test COMM3: Hold time for test | 120 037 120 050 120 051 120 053 120 055 120 054 120 052 |
| Binary and analog outputs | OUTP: Reset latch. USER Reset of latched output relays from the local control panel. OUTP: Relay assign. f.test Selection of the relay to be tested. OUTP: Relay test The relay selected for testing is triggered for the set time (OUTP: Hold-time for test). This control action is password-protected (see section entitled 'Password-Protected Control Operations' in Chapter 6). OUTP: Hold-time for test Setting for the time period for which the selected output relay is triggered for functional testing. | 021 009 Fig. 3-22 003 042 Fig. 3-23 003 043 Fig. 3-23 003 044 Fig. 3-23 |

8 Information and Control Functions

(continued)

Main function

| | |
|--|-------------------|
| MAIN: Enable syst. IN USER | 003.142 Fig. 3-37 |
| Enabling the residual current stages of the DTOC/IDMT protection. | |
| MAIN: Disable syst.IN USER | 003.141 Fig. 3-37 |
| Disabling the residual current stages of the DTOC/IDMT protection. | |
| MAIN: General reset | 003.002 Fig. 3-52 |
| Reset of the following memories: | |
| <input type="checkbox"/> All counters | |
| <input type="checkbox"/> LED indicators | |
| <input type="checkbox"/> Operating data memory | |
| <input type="checkbox"/> All event memories | |
| <input type="checkbox"/> Event counters | |
| <input type="checkbox"/> Fault data | |
| <input type="checkbox"/> Measured overload data | |
| <input type="checkbox"/> Recorded fault values | |
| This control action is password-protected (see section entitled 'Password-Protected Control Operations' in Chapter 6). | |
| MAIN: Reset indicat. USER | 021.010 Fig. 3-52 |
| Reset of the following displays: | |
| <input type="checkbox"/> LED indicators | |
| <input type="checkbox"/> Fault data | |
| MAIN: Rset.latch.trip USER | 021.005 Fig. 3-48 |
| Reset of latched trip commands from the local control panel. | |
| MAIN: Reset c. cl./trip c. | 003.007 Fig. 3-50 |
| The counters for counting the close and trip commands are reset. | |
| MAIN: Reset IP,max,stored | 003.033 Fig. 3-26 |
| The display for the stored maximum phase current is reset. | |
| MAIN: Reset meas.v. energy | 003.032 Fig. 3-34 |
| The display for active and reactive energy output and input is reset. | |
| MAIN: Man. trip cmd. USER | 003.040 Fig. 3-49 |
| A trip command is issued from the local control panel for 100 ms. This setting is password-protected (see section entitled 'Password-Protected Control Operations' in Chapter 6). | |
| Note: | |
| The command is only executed if the manual trip command has been configured as trip command 1 or 2. | |
| MAIN: Man. close cmd. USER | 018.033 Fig. 3-42 |
| A close command is issued from the local control panel for the set reclose command time. This setting is password-protected (see section entitled 'Password-Protected Control Operations' in Chapter 6). | |

8 Information and Control Functions

(continued)

| | |
|-----------------------------|--|
| | <div>003039</div> <div>MAIN: Warm restart</div> <div>A warm restart is carried out. The device functions as it does when the power supply is turned on.</div> |
| | <div>000085</div> <div>MAIN: Cold restart</div> <div>A cold restart is executed. This setting is password-protected (see section entitled 'Password-Protected Control Operations' in Chapter 6). A cold restart means that all settings and recordings are cleared. The values with which the device operates after a cold restart are the underlined default settings given in the 'Range of Values' column in the Address List. They are selected so as to block the device after a cold restart.</div> |
| Operating data recording | <div>100001 Fig. 3-57</div> <div>OP_RC: Reset recording</div> <div>The operating data memory and the counter for operation signals are reset.</div> |
| Monitoring signal recording | <div>003008 Fig. 3-58</div> <div>MT_RC: Reset recording</div> <div>Reset of the monitoring signal memory.</div> |
| Overload recording | <div>100003 Fig. 3-63</div> <div>OL_RC: Reset recording</div> <div>Reset of the overload memory.</div> |
| Ground fault recording | <div>100000 Fig. 3-72</div> <div>GF_RC: Reset recording</div> <div>Reset of the ground fault memory.</div> |
| Fault recording | <div>003041 Fig. 3-80</div> <div>FT_RC: Trigger USER</div> <div>Fault recording is enabled from the local control panel for 500 ms.</div> <div>003006 Fig. 3-81</div> <div>FT_RC: Reset recording</div> <div>Reset of the following memories:</div> <div><input type="checkbox"/> LED indicators</div> <div><input type="checkbox"/> Fault memory</div> <div><input type="checkbox"/> Fault counter</div> <div><input type="checkbox"/> Fault data</div> <div><input type="checkbox"/> Recorded fault values</div> |
| Protective signaling | <div>003132 Fig. 3-117</div> <div>PSIG: Enable USER</div> <div>Protective signaling is enabled from the local control panel.</div> <div>003131 Fig. 3-117</div> <div>PSIG: Disable USER</div> <div>Protective signaling is disabled from the local control panel.</div> <div>015009 Fig. 3-119</div> <div>PSIG: Test telecom. USER</div> <div>A send signal is issued for 500 ms.</div> |

8 Information and Control Functions
(continued)

Auto-reclosing control

Table with 3 columns: Function Name, Reference, and Description. Rows include ARC: Enable USER, ARC: Disable USER, ARC: Test HSR A-B-C USER, and ARC: Reset counters.

Ground fault direction determination using steady-state values

Table with 3 columns: Function Name, Reference, and Description. Row includes GFDSS: Reset counters.

Motor protection

Table with 3 columns: Function Name, Reference, and Description. Row includes MP: Rset therm.repl.USER.

Thermal overload protection

Table with 3 columns: Function Name, Reference, and Description. Row includes THERM: Rset.therm.repl.USER.

Logic

Table with 3 columns: Function Name, Reference, and Description. Rows include LOGIC: Trigger 1 through LOGIC: Trigger 8, and a general description of logic intervention.

8 Information and Control Functions

(continued)

8.1.3 Operating Data Recording

Operating data recording

OP_RC: Operat. data record.
Point of entry into the operating data log.

003024 Fig. 3-57

Monitoring signal recording

MT_RC: Mon. Signal record.
Point of entry into the monitoring signal log.

003001 Fig. 3-58

8 Information and Control Functions

(continued)

8.2 Events

8.2.1 Event counters

"Logical" communication
interface 3

| | |
|----------------------------|---------|
| COMM3: No. telegram errors | 120 042 |
|----------------------------|---------|

Main function

| | |
|--|-------------------|
| MAIN: No. general start. Number of general starting signals. | 004 000 Fig. 3-46 |
| MAIN: No. gen.trip cmds. 1 Number of general trip commands 1. | 004 006 Fig. 3-50 |
| MAIN: No. gen.trip cmds. 2 Number of general trip commands 2. | 009 050 Fig. 3-50 |
| MAIN: No. close commands Number of close commands. | 009 055 Fig. 3-42 |
| MAIN: No. overfl.act.en.out | 009 090 Fig. 3-34 |
| MAIN: No. overfl.act.en.inp | 009 091 Fig. 3-34 |
| MAIN: No. ov/fl.reac.en.out | 009 092 Fig. 3-34 |
| MAIN: No. ov/fl.reac.en.inp | 009 093 Fig. 3-34 |

Operating data recording

| | |
|--|-------------------|
| OP_RC: No. oper. data sig. Number of signals stored in the operating data memory. | 100 002 Fig. 3-57 |
|--|-------------------|

Monitoring signal recording

| | |
|--|-------------------|
| MT_RC: No. monit. signals Number of signals stored in the monitoring signal memory. | 004 019 Fig. 3-58 |
|--|-------------------|

Overload recording

| | |
|---|-------------------|
| OL_RC: No. overload Number of overload events. | 004 101 Fig. 3-62 |
|---|-------------------|

Ground fault recording

| | |
|--|-------------------|
| GF_RC: No. ground faults Number of ground faults. | 004 100 Fig. 3-71 |
|--|-------------------|

Fault recording

| | |
|--|-------------------|
| FT_RC: No. of faults Number of faults. | 004 020 Fig. 3-80 |
| FT_RC: No. system disturb. Number of system disturbances. | 004 010 Fig. 3-80 |

Auto-reclosing control

| | |
|---|--------------------|
| ARC: Number HSR A-B-C Number of high-speed reclosures. | 004 007 Fig. 3-138 |
| ARC: Number TDR Number of time-delay reclosures. | 004 008 Fig. 3-138 |

8 Information and Control Functions

(continued)

*Ground fault direction
determination using
steady-state values*

| | |
|---|-------------------|
| GFDSS: No. GF power/admitt. | 009002 Fig. 3-152 |
| Number of ground faults detected by steady-state power evaluation. | |
| GFDSS: No. GF (curr. meas) | 009003 Fig. 3-146 |
| Number of ground faults detected by steady-state current evaluation. | |
| GFDSS: No. GF admitt. Y(N) | 009000 Fig. 3-152 |
| Number of ground faults (non-directional) detected by the admittance evaluation method. | |
| GFDSS: No. GF forward/LS | 009000 Fig. 3-152 |
| Number of ground faults in the forward direction. | |
| GFDSS: No. GF backward/BS | 009001 Fig. 3-152 |
| Number of ground faults in the backward direction. | |
| MP: No. of start-ups | 004011 Fig. 3-160 |
| Number of motor startups since the last reset. | |

8 Information and Control Functions

(continued)

8.2.2 Measured event data

Overload data acquisition

| | |
|---|-------------------|
| OL_DA: Overload duration | 004.102 Fig. 3-59 |
| Duration of the overload event. | |
| OL_DA: T.taken f.startup,MP | 005.096 Fig. 3-60 |
| Display of the motor startup time. | |
| OL_DA: Start-up current, MP | 005.098 Fig. 3-60 |
| Display of the motor startup current. | |
| OL_DA: Heat.dur.start-up,MP | 005.097 Fig. 3-60 |
| Display of startup heating in motor protection. | |
| OL_DA: Status THERM replica | 004.147 Fig. 3-61 |
| Display of the buffer content of the thermal overload protection function. | |
| OL_DA: Load current THERM | 004.058 Fig. 3-61 |
| Display of the load current used by the thermal overload protection function to calculate the tripping time. | |
| OL_DA: Object temp. THERM | 004.035 Fig. 3-61 |
| Anzeige der Temperatur des Schutzobjektes. | |
| OL_DA: Pre-trip t.leftTHERM | 004.148 Fig. 3-61 |
| Display of the time remaining before the thermal overload protection function will reach the tripping threshold. | |
| OL_DA: Offset THERM replica | 004.164 Fig. 3-61 |
| Display of the additional reserve if the coolant temperature is taken into account. This display is relevant if the coolant temperature has been set to a value below the maximum permissible coolant temperature or, in other words, if the thermal model has been shifted downwards. | |
| If, on the other hand, the coolant temperature and the maximum permissible coolant temperature have been set to the same value, then the coolant temperature is not taken into account and the characteristic is a function of the current only. The additional reserve amounts to zero in this case. | |

8 Information and Control Functions

(continued)

Ground fault data acquisition

| | |
|---|--------------------------------|
| GF_DA: Ground flt. duration | 009100 Fig. 3-64 |
| Display of the ground fault duration of the most recent ground fault. | |
| GF_DA: GF duration pow.meas | 009024 Fig. 3-65 |
| Display of the ground fault duration of the most recent ground fault as determined by the steady-state power evaluation feature of the ground fault direction determination function. | |
| GF_DA: Voltage VNG p.u. | 009020 Fig. 3-66, 3-70 |
| Display of the neutral-displacement voltage of the most recent ground fault referred to V_{nom} . | |
| Note: This display is only active if the steady-state power evaluation mode of the ground fault direction determination function is enabled. | |
| GF_DA: Current IN p.u. | 009021 Fig. 3-66, 3-68,3-70 |
| Display of the residual current of the most recent ground fault referred to I_{nom} . | |
| Note: This display is only active when the ground fault direction determination function using steady state values (GFDSS) is enabled. | |
| GF_DA: Curr. IN,act p.u. | 009022 Fig. 3-66 |
| Display of the active component of the residual current of the most recent ground fault referred to I_{nom} . | |
| Note: This display is only active if the steady-state power evaluation mode of the ground fault direction determination function is enabled. | |
| GF_DA: Curr.IN,react p.u. | 009023 Fig. 3-66 |
| Display of the reactive component of the residual current of the most recent ground fault referred to I_{nom} . | |
| Note: This display is only active if the steady-state power evaluation mode of the ground fault direction determination function is enabled. | |
| GF_DA: GF durat. curr.meas. | 009026 Fig. 3-67 |
| Display of the ground fault duration of the most recent ground fault as determined by the steady-state current evaluation feature of the ground fault direction determination function. | |
| GF_DA: Curr. IN filt. p.u. | 009025 Fig. 3-68 |
| Display of the residual current component having the set filter frequency for the most recent ground fault (referred to I_{nom}). | |
| GF_DA: GF duration admitt. | 009068 Fig. 3-69 |
| Display of the ground fault duration of the most recent ground fault as determined by the admittance evaluation mode of the ground fault direction determination function. | |

8 Information and Control Functions

(continued)

GF_DA: Admittance Y(N) p.u.

009066 Fig. 3-70

Display of the admittance value referred to $Y_{N,nom}$.

If GFDSS: Evaluation VNG is set to *Measured*:

$$Y_{N,nom} = I_{N,nom} / V_{NG,nom}$$

If GFDSS: Evaluation VNG is set to *Calculated*:

$$Y_{N,nom} = I_{N,nom} / V_{nom}$$

GF_DA: Conduct. G(N) p.u.

009066 Fig. 3-70

Display of the conductance value referred to $Y_{N,nom}$.

If GFDSS: Evaluation VNG is set to *Measured*:

$$Y_{N,nom} = I_{N,nom} / V_{NG,nom}$$

If GFDSS: Evaluation VNG is set to *Calculated*:

$$Y_{N,nom} = I_{N,nom} / V_{nom}$$

GF_DA: Suscept. B(N) p.u.

009067 Fig. 3-70

Display of the susceptance value referred to $Y_{N,nom}$.

If GFDSS: Evaluation VNG is set to *Measured*:

$$Y_{N,nom} = I_{N,nom} / V_{NG,nom}$$

If GFDSS: Evaluation VNG is set to *Calculated*:

$$Y_{N,nom} = I_{N,nom} / V_{nom}$$

8 Information and Control Functions

(continued)

Fault data acquisition

| | |
|---|------------------|
| FT_DA: Fault duration | 008010 Fig. 3-73 |
| Display of the fault duration. | |
| FT_DA: Running time | 004021 Fig. 3-73 |
| Display of the running time. | |
| FT_DA: Fault current P p.u. | 004025 Fig. 3-77 |
| Display of the fault current referred to I_{nom} . | |
| FT_DA: Flt.volt. PG/PP p.u. | 004026 Fig. 3-77 |
| Display of the fault voltage referred to V_{nom} . | |
| FT_DA: Fault loop angle P | 004024 Fig. 3-77 |
| Display of the fault angle. | |
| FT_DA: Fault curr. N p.u. | 004049 Fig. 3-77 |
| Display of the ground fault current referred to $I_{N,nom}$. | |
| FT_DA: Fault loop angle N | 004048 Fig. 3-77 |
| Display of the ground fault angle. | |
| FT_DA: Meas. loop selected | 004079 Fig. 3-77 |
| Display of the measuring loop selected for determination of fault data. | |
| FT_DA: Fault react., prim. | 004029 Fig. 3-77 |
| Display of the fault reactance as a primary quantity. | |
| FT_DA: Fault reactance, sec. | 004028 Fig. 3-77 |
| Display of the fault reactance as a secondary quantity. | |
| FT_DA: Fault impedance, sec | 004023 Fig. 3-77 |
| Display of the fault impedance as a secondary quantity. | |
| FT_DA: Fault locat. percent | 004027 Fig. 3-78 |
| Display of the fault location of the last fault (in %) referred to the setting FT_DA: Line reactance PSx. | |
| FT_DA: Fault location | 004022 Fig. 3-78 |
| Display of the fault location of the last fault in km. | |
| FT_DA: Load imped.post-flt. | 004037 Fig. 3-79 |
| Display of the load impedance (in Ω) after the general starting condition of distance protection has ended. The display only appears if the fault has been detected by the fault data acquisition function of the P130C. | |
| FT_DA: Load angle post-flt. | 004038 Fig. 3-79 |
| Display of the load angle (in degrees) after the general starting condition of time-overcurrent protection has ended. The display only appears if the fault has been detected by the fault data acquisition function of the P130C. | |
| FT_DA: Resid.curr. post-flt | 004039 Fig. 3-79 |
| Display of the residual current of the last fault referred to I_{nom} . The display only appears if the fault has been detected by the fault data acquisition function of the P130C. | |

8 Information and Control Functions

(continued)

8.2.3 Event recording

Overload recording

| | |
|---------------------------------------|------------------|
| OL_RC: Overload recording 1 | 033020 Fig. 3-63 |
| OL_RC: Overload recording 2 | 033021 Fig. 3-63 |
| OL_RC: Overload recording 3 | 033022 Fig. 3-63 |
| OL_RC: Overload recording 4 | 033023 Fig. 3-63 |
| OL_RC: Overload recording 5 | 033024 Fig. 3-63 |
| OL_RC: Overload recording 6 | 033025 Fig. 3-63 |
| OL_RC: Overload recording 7 | 033026 Fig. 3-63 |
| OL_RC: Overload recording 8 | 033027 Fig. 3-63 |
| Point of entry into the overload log. | |

Ground fault recording

| | |
|---|------------------|
| GF_RC: Ground flt.record. 1 | 033010 Fig. 3-72 |
| GF_RC: Ground flt.record. 2 | 033011 Fig. 3-72 |
| GF_RC: Ground flt.record. 3 | 033012 Fig. 3-72 |
| GF_RC: Ground flt.record. 4 | 033013 Fig. 3-72 |
| GF_RC: Ground flt.record. 5 | 033014 Fig. 3-72 |
| GF_RC: Ground flt.record. 6 | 033015 Fig. 3-72 |
| GF_RC: Ground flt.record. 7 | 033016 Fig. 3-72 |
| GF_RC: Ground flt.record. 8 | 033017 Fig. 3-72 |
| Point of entry into the ground fault log. | |

Fault recording

| | |
|------------------------------------|------------------|
| FT_RC: Fault recording 1 | 003000 Fig. 3-81 |
| FT_RC: Fault recording 2 | 033001 Fig. 3-81 |
| FT_RC: Fault recording 3 | 033002 Fig. 3-81 |
| FT_RC: Fault recording 4 | 033003 Fig. 3-81 |
| FT_RC: Fault recording 5 | 033004 Fig. 3-81 |
| FT_RC: Fault recording 6 | 033005 Fig. 3-81 |
| FT_RC: Fault recording 7 | 033006 Fig. 3-81 |
| FT_RC: Fault recording 8 | 033007 Fig. 3-81 |
| Point of entry into the fault log. | |

9 Commissioning

9 Commissioning

9.1 Safety Instructions



The device must be reliably grounded before auxiliary voltage is turned on.

The surface-mounted case is grounded using the appropriate bolt and nut as the ground connection. The flush-mounted case must be grounded in the area of the rear sidepieces at the location provided. The cross-sectional area of this ground conductor must also conform to applicable national standards. A minimum conductor cross section of 2.5 mm^2 is required.

In addition, a protective ground connection at the terminal contact on the power supply module (identified by the letters "PE" on the terminal connection diagram) is also required for proper operation of the unit. The cross-sectional area of this ground conductor must also conform to applicable national standards. A minimum cross section of 1.5 mm^2 is required.



Before working on the device itself or in the space where the device is connected, always disconnect the device from the supply.



The secondary circuit of operating current transformers must not be opened. If the secondary circuit of an operating current transformer is opened, there is the danger that the resulting voltages will endanger people and damage the insulation.

For devices with pin-terminal connection, the threaded terminal block for current transformer connection is not a shorting block. Therefore always short-circuit the current transformers before loosening the threaded terminals.



The power supply must be turned off for at least 5 s before power supply module V is removed. Otherwise there is the danger of an electric shock.



When the P130C is used for the protection of increased-safety machines, it must be located outside of any areas that are subject to explosion hazards.

9 Commissioning

(continued)



The fiber-optic interface may only be connected or disconnected when the supply voltage for the unit is shut off.



The PC interface is not designed for permanent connection. Consequently the socket does not have the extra insulation from circuits connected to the system that is required per VDE-0106 Part 101.

Therefore when connecting the connecting cable make sure that you do not touch the socket contacts.



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see chapter entitled 'Technical Data').

9 Commissioning

(continued)

9.2 Commissioning Tests

Preparation

After the P130C has been installed and connected as described in Chapter 5, the commissioning procedure can begin.

Before turning on the power supply voltage, the following items must be checked again:

- ☐ Is the device connected to the protective ground at the specified location?
- ☐ Does the nominal voltage of the battery agree with the nominal auxiliary voltage of the device?
- ☐ Are the current and voltage transformer connections, grounding, and phase sequences correct?

After the wiring work is completed, check the system to make sure it is properly isolated. The conditions given in VDE 0100 must be satisfied.

Once all checks have been made, the power supply voltage may be turned on. After voltage has been applied, the device starts up. During startup, various startup tests are carried out (see section entitled 'Self-Monitoring' in Chapter 3). The LED indicator labeled 'HEALTHY' (H1) and the LED indicator labeled 'OUT OF SERVICE' (H2) will light up. (The LED indicator H2 is coupled to the signal MAIN: Blocked/faulty.) After approximately 15 s, the P130C is ready for operation. This is indicated by the display 'P130C' in the first line of the LCD.

Once the change-enabling command has been issued (see the Section Change-Enabling Function in Chapter 6), all settings can be entered. The procedure for entering settings from the integrated local control panel is described in Chapter 6.

9 Commissioning

(continued)

If either the PC interface or the communication interface will be used for setting the P130C and reading out event records, then the following settings must first be made from the integrated local control panel.

- 'Par/DvID/' folder:
 - DVICE: Device password 1
 - DVICE: Device password 2
- 'Par/Conf/' folder:
 - PC: Name of manufacturer
 - PC: Bay address
 - PC: Device address
 - PC: Baud rate
 - PC: Parity bit
 - COMM1: Function group COMM1
 - COMM1: General enable USER
 - COMM1: Name of manufacturer
 - COMM1: Line idle state
 - COMM1: Baud rate
 - COMM1: Parity bit
 - COMM1: Communicat. protocol
 - COMM1: Octet comm. address
 - COMM1: Octet address ASDU
 - COMM2: Function group COMM2
 - COMM2: General enable USER
 - COMM2: Name of manufacturer
 - COMM2: Line idle state
 - COMM2: Baud rate
 - COMM2: Parity bit
 - COMM2: Octet comm. address
 - COMM2: Octet comm. ASDU
 - COMM3: Function group COMM3
 - COMM3: General enable USER
 - COMM3: Baud rate

9 Commissioning

(continued)

- 'Par/Func/Glob/' folder:
 - PC: Command blocking
 - PC: Sig./meas.val.block
 - COMM1: Command block. USER
 - COMM1: Sig./meas.block.USER
 - COMM2: Command block. USER
 - COMM2: Sig./meas.block.USER

Instructions on these settings are given in Chapters 7 and 8.

Note: The settings given above apply to the IEC 60870-5-103 communication protocol. If another protocol is being used for the communication interface, additional settings may be necessary. See Chapter 7 for further details.

After the settings have been made, the following checks should be carried out again before blocking is canceled:

- Does the function assignment of the binary signal inputs agree with the terminal connection diagram?
- Has the correct operating mode been selected for the binary signal inputs?
- Does the function assignment of the output relays agree with the terminal connection diagram?
- Has the correct operating mode been selected for the output relays?
- Have all settings been made correctly?

Now the block can be cleared as follows ('Par/Func/Glob/' folder):

- MAIN: Device on-line "Yes (on)"

9 Commissioning

(continued)

Tests

By using the signals and displays generated by the P130C, it is possible to determine whether the P130C is correctly set and properly interconnected with the station. Signals are signaled by output relays and LED indicators and entered into the event memory. In addition, the signals can be checked by selecting the appropriate signal in the menu tree.

If the user does not wish to operate the circuit breaker during the protection functions test, the trip commands can be blocked through MAIN: Trip cmd. block. USER ('Par/Func/Glob/' folder) or an appropriately configured binary signal input. If circuit breaker testing is desired, it is possible to issue a trip command for 100 ms through MAIN: Man. trip cmd. USER ('Oper/CtrlTest' folder) or an appropriately configured binary signal input. Selection of the trip command from the integrated local control panel is password-protected (see Section Password-Protected Control Actions in Chapter 6).

Note: The manual trip command is only executed if it has been configured for trip command 1 or 2.

If the P130C is connected to substation control level, it is advisable to activate the test mode via MAIN: Test mode USER ('Par/Func/Glob/' folder) or an appropriately configured binary signal input. The telegrams are then identified accordingly (cause of transmission: test mode).

9 Commissioning

(continued)

Checking the binary signal inputs

By selecting the corresponding state signal ('Oper/Cycl/Phys' folder), it is possible to determine whether the input signal that is present is recognized correctly by the P130C. The values displayed have the following meanings:

- ☐ *Low*: Not energized.
- ☐ *High*: Energized.
- ☐ *Without function*: No functions are assigned to the binary signal input.

This display appears regardless of the binary signal input mode selected.

Checking the output relays

It is possible to trigger the output relays for a settable time period for test purposes (time setting at OUP: Hold-time for test in 'Oper/CtrlTest' folder). First select the output relay to be tested (OUP: Relay assign. f.test, 'Oper/CtrlTest' folder). Test triggering then occurs via OUP: Relay test (Oper/CtrlTest' folder). It is password-protected (see the section entitled 'Password-Protected Control Operations' in Chapter 6).



Before starting the test, open any triggering circuits for external devices so that no inadvertent switching operations will take place.

Checking the current-measuring inputs

By applying appropriate analog signals as 'measuring variables' to the measuring inputs, the user can check via the operating data displays (see Chapter 'Information and Control Functions') whether the protection and control unit detects the analog signals with the specified accuracy (folder 'Oper/Cycl/Data').

- ☐ MAIN: Current A p.u.: Display of the updated phase current A referred to the nominal device current I_{nom}
- ☐ MAIN: Current B p.u.: Display of the updated phase current B referred to the nominal device current I_{nom}
- ☐ MAIN: Current C p.u.: Display of the updated phase current C referred to the nominal device current I_{nom}
- ☐ MAIN: Current IN p.u.: Display of the updated phase current IN referred to the nominal device current I_{nom}



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

9 Commissioning

(continued)

Checking the protection function

Four parameter subsets are stored in the P130C, one of which is activated. Before checking the protective function, the user should determine which parameter subset is activated. The activated parameter subset is displayed at PSS: Actual param. subset ('Oper/Cycl/Log/' folder).

When testing the time-overcurrent protection with a testing device, the measuring-circuit monitoring function should be deactivated (MCMON: General enable USER, folder 'Par/Func/Gen/') since it would otherwise always operate and thus, depending on the setting, issue fault signals.

Checking the connection of the phase current and voltage transformers with load current for correct phase

The user can check to make sure connection to the system's current and voltage transformers involves the correct phase by consulting the operating data displays for load angle (MAIN: Load angle phi A, MAIN: Load angle phi B, MAIN: Load angle phi C in the 'Oper/Cycl/Meas/' folder). To this end, it is necessary for the connection to be *standard* in accordance with the standard schematic diagram shown in Chapter 'Installation and Connection' and for the setting of MAIN: Conn. meas. circ. IP to be '*standard*'. In the case of a purely resistive load, the load angles of all three phases must be 0° in line direction. The load angles are only determined if at least 5% of the nominal device current is flowing.

9 Commissioning

(continued)

Checking the connection of the residual current transformer with load current for correct phase

Whether connection of the P130C's residual current transformer involves the correct phase can be checked using the operating data displays (MAIN: Angle ϕ_{IN} , folder 'Oper/Cycl/Data/'). The required measuring variables V_{NG} and I_N must be generated. If the connection is standard in accordance with the standard schematic diagram shown in Chapter 'Installation and Connection' and the setting of MAIN: Conn. meas. circ. IN (folder 'Par/Func/Glob/') is 'standard' then a phase-to-ground voltage needs to be disconnected and the phase currents of the other two phases need to be shorted at the same time (see Figure 9-1).

The set rotary field needs to match the actual rotary field. In the case of a purely resistive load, the angle ϕ_N must have the following values (depending on the direction of energy flow in either line or busbar direction):

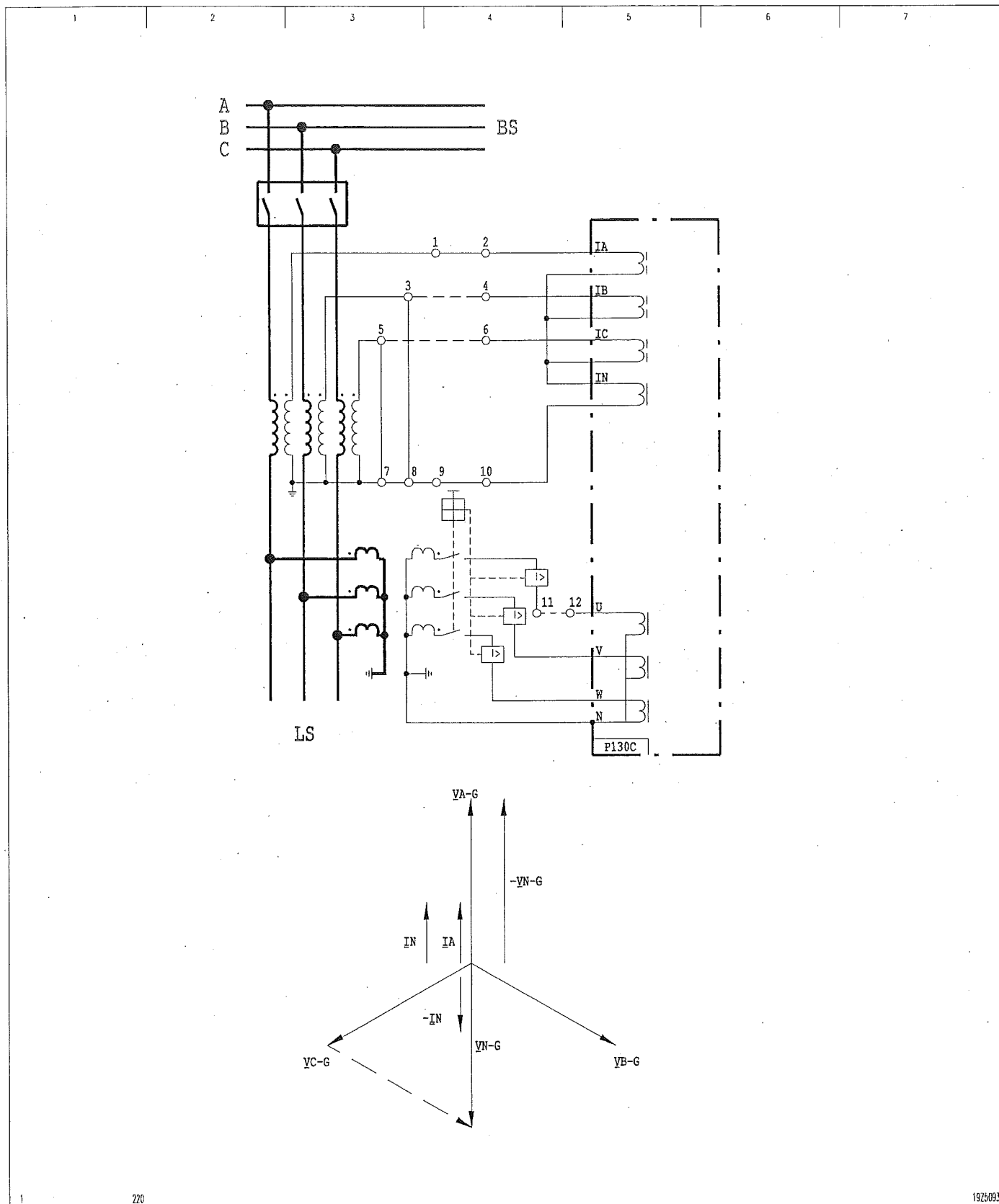
| Display | Energy in line direction | Energy in busbar direction |
|---|--------------------------|----------------------------|
| MAIN: Angle ϕ_{IN} (folder 'Oper/Cycl/Data/') | Approx. 0° | Approx. 180° |

Simplified testing of the connection of the residual current transformer with load current for correct phase

If the residual current does not originate from a dedicated main current transformer such as a window-type transformer, a simplified test can be carried out. In this procedure, after a positive test as to whether connection of the phase current and voltage transformers involves the correct phase and after shorting any one of the phase currents, the phase of the measured residual current is compared to the phase of the sum of phase currents. In the case of a phase match (or a positive direction check), the measured operating value MAIN: Phase rel., IN vs ΣIP (folder 'Oper/Cycl/Data/') is displayed as '1'. The phase relation check is carried out only if the calculated residual current is in excess of $0.1 \cdot I_{nom}$.

9 Commissioning

(continued)



9 Commissioning

(continued)

Checking the definite-time overcurrent protection function

Testing of the definite-time overcurrent protection function can only be carried out if the following conditions are met:

- ☐ DTOC protection is enabled. This may be interrogated at the logic state signal `DTOC: Enabled` ('Oper/Cycl/Log' folder).
- ☐ The function `MAIN: Block tim.st. IN,neg` is set to *No* (folder `Par/Func/Gen`).
- ☐ The function `MAIN: Gen. starting mode` is set to '*Starting IN, Ineg*' (folder `Par/Func/Gen`).
- ☐ The short-circuit direction determination function is disabled. `SCDD: General enable USER` (folder 'Par/Func/Gen') is set to '*No*'.

By applying appropriate measuring variables, the overcurrent stages and the associated timer stages can be tested.



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

Checking the inverse-time overcurrent protection function

Testing of the inverse-time overcurrent protection function can only be carried out if the following conditions are met:

- ☐ IDMT protection is enabled. This may be interrogated at the logic state signal `IDMT: Enabled` (folder 'Oper/Cycl/Log').
- ☐ The function `MAIN: Block tim.st. IN,neg` is set to *No* (folder `Par/Func/Gen`).
- ☐ The function `MAIN: Gen. starting mode` is set to '*Starting IN, Ineg*' (folder `Par/Func/Gen`).
- ☐ The short-circuit direction determination function is disabled. `SCDD: General enable USER` (folder 'Par/Func/Gen') is set to '*No*'.

By applying appropriate measuring variables, the overcurrent stages and the associated time delays can be tested.



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

9 Commissioning

(continued)

The trip times for the inverse-time overcurrent protection function as a function of the set tripping characteristics are shown in the following table:

| No. | Tripping Characteristic | Formula for the Tripping Characteristic | Constants | | | Formula for the Release Characteristic |
|-----|-------------------------|---|------------------------------|--------|---------|--|
| | | | a | b | c | |
| | | | $k = 0.01 \text{ to } 10.00$ | | | R |
| 0 | Definite Time | $t = k$ | | | | |
| | Per IEC 255-3 | $t = k \cdot \frac{a}{\left(\frac{I}{I_{ref}}\right)^b - 1}$ | | | | |
| 1 | Standard Inverse | | 0.14 | 0.02 | | |
| 2 | Very Inverse | | 13.50 | 1.00 | | |
| 3 | Extremely Inverse | | 80.00 | 2.00 | | |
| 4 | Long Time Inverse | | 120.00 | 1.00 | | |
| | Per IEEE C37.112 | $t = k \cdot \left(\frac{a}{\left(\frac{I}{I_{ref}}\right)^b - 1} + c \right)$ | | | | $t_r = k \cdot \frac{R}{\left(\frac{I}{I_{ref}}\right)^2 - 1}$ |
| 5 | Moderately Inverse | | 0.0515 | 0.0200 | 0.1140 | 4.85 |
| 6 | Very Inverse | | 19.6100 | 2.0000 | 0.4910 | 21.60 |
| 7 | Extremely Inverse | | 28.2000 | 2.0000 | 0.1217 | 29.10 |
| | Per ANSI | $t = k \cdot \left(\frac{a}{\left(\frac{I}{I_{ref}}\right)^b - 1} + c \right)$ | | | | $t_r = k \cdot \frac{R}{\left(\frac{I}{I_{ref}}\right)^2 - 1}$ |
| 8 | Normally Inverse | | 8.9341 | 2.0938 | 0.17966 | 9.00 |
| 9 | Short Time Inverse | | 0.2663 | 1.2969 | 0.03393 | 0.50 |
| 10 | Long Time Inverse | | 5.6143 | 1.0000 | 2.18592 | 15.75 |
| 11 | RI-Type Inverse | $t = k \cdot \frac{1}{0.339 - \frac{0.236}{\left(\frac{I}{I_{ref}}\right)}}$ | | | | |
| 12 | RXIDG-Type Inverse | $t = k \cdot \left(5.8 - 1.35 \cdot \ln \frac{I}{I_{ref}} \right)$ | | | | |

9 Commissioning

(continued)

Directional testing of the phase current stages of the short-circuit direction determination function

The current and voltage transformers of the system need to be simulated with a suitable testing device. In order to check the phase current stages of the short-circuit direction determination function, the following conditions must be met:

- ☐ The short-circuit direction determination function is enabled (see Chapter 3).
- ☐ All three phase currents are greater than $0.1 I_{nom}$.
- ☐ At least two phase-to-phase voltages are greater than 200 mV.
- ☐ The directions of the short-circuit direction determination function are set to *forward*.

If the connection is standard in accordance with the standard schematic diagram shown in Chapter 'Installation and Connection' and the setting of MAIN: Conn. meas. circ. IP is *Standard* then the measurement of the short-circuit direction determination function will be in line direction. The set rotary field needs to match the actual rotary field. It is now possible to simulate the various fault types with the appropriate starting via the DTOC or IDMT protection function by applying various shorting jumpers (such as A-G). The trip signals of the phase current stages are now directional. The trip signals of the phase current stages are now directional.

Direction testing of the residual current stages of the short-circuit direction determination function

In order to check the residual current stages of the short-circuit direction determination function, the following conditions must be met:

- ☐ The short-circuit direction determination function is enabled (see Chapter 3).
- ☐ The residual current is in excess of $0.01 \cdot I_{nom}$.
- ☐ The neutral displacement voltage is greater than the set triggering value of the function SCDD: VNG>.

If the connection is standard in accordance with the standard schematic diagram shown in Chapter 'Installation and Connection' and the setting of MAIN: Conn. meas. circ. IN is *standard* then the measurement of the short-circuit direction determination function will be in line direction. The set rotary field needs to match the actual rotary field. It is now possible to simulate the various fault types as described under 'Direction testing of the phase current stages'. The trip signals of the residual current stages are now directional.

9 Commissioning

(continued)

Checking protective signaling

The protective signaling function can only be checked if protective signaling is ready. This can be determined via the logic state signal PSIG: Ready ('Oper/Cycl/Log' folder).

If protective signaling is not ready, this may be due to the following reasons:

- ☐ Protective signaling is not enabled.
PSIG: General enable USER is set to 'No'.
- ☐ Protective signaling is being blocked by the triggering of a correspondingly configured binary signal input (PSIG: Blocking EXT).
- ☐ A fault was detected in the telecommunications channel (PSIG: Telecom. faulty).

If the conditions for testing are satisfied, it is possible to generate a send signal for test purposes from the integrated local control panel (PSIG: Test telecom. USER). This pulse will be present for 1 ms and is extended for the set reset time. This pulse will be present for 1 s and will be extended for the set reset time. The generated signal can be checked via the logic state signal PSIG: Send (transm. relay).

9 Commissioning

(continued)

Checking the auto-reclosing control

The auto-reclosing function (ARC) can only be checked if it is ready. This can be determined via the logic state signal `ARC: Ready` ('Oper/Cycl/Log' folder).

If the ARC function is not ready, this may be due to the following reasons:

- The ARC function is not enabled
(this can be determined by checking the logic state signal `ARC: Enabled` ('Oper/Cycl/Log' folder). This can be due to the following reasons:
 - `ARC: General enable USER` ('Par/Func/Gen' folder) is set to 'No'.
 - The ARC has been disabled through an appropriately configured binary signal input `ARC: Disable EXT`. (This can be determined by checking the logic state signal `ARC: Ext. enabled` in the 'Oper/Cycl/Log' folder.)
- The ARC is being blocked. (This can be checked at the logic state signal `ARC: Blocked` in folder 'Oper/Cycl/Log'.)
- There is no signal with a logic value of "1" at the binary signal input configured for `ARC: CB drive ready EXT`.
- There is no signal with a logic value of '1' at the binary signal input configured for `MAIN: CB closed sig. EXT`. The circuit breaker position signal is only necessary if 'With' has been set at `ARC: CB clos. pos. sig.` (folder 'Par/Func/Gen').
- An ARC cycle is currently running. (This can be checked at logic state signal `ARC: Cycle running` in the 'Oper/Cycl/Log' folder.)

A test HSR for checking can be executed from the integrated local control panel or by triggering a binary signal input. The test HSR function first issues a trip command and then issues a reclose command after the set dead time has elapsed.

9 Commissioning

(continued)

Checking the motor protection function

By applying appropriate measuring variables, the overcurrent stages and the associated time delays can be tested.



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

In order to test the motor protection function, first clear the thermal replica. Clearing the thermal replica is achieved by briefly disabling the protection function (MAIN: Device on-line set to No, folder 'Par/Func/Glob/'). The updated status of the thermal replica can be interrogated via the operating data display MP: Therm. repl. buffer MS (folder 'Oper/Cycl/Data/'). The trip times depend on the set tripping characteristic:

With cleared thermal replica, the test current is changed abruptly from 0 (\equiv machine stopped) to a value \geq setting value MP: IStUp > PSx, folder 'Par/Func/Gen/' (\equiv machine running).

□ Reciprocally squared characteristic $t = t_{G_{ref}} \cdot \frac{36}{(I/I_{ref})^2}$

□ Logarithmic characteristic: $t = t_{G_{ref}} \cdot 36 \cdot \ln \frac{(I/I_{ref})^2}{(I/I_{ref})^2 - 1}$

9 Commissioning

(continued)

Checking the thermal overload protection function

By applying appropriate measuring variables, the reference current and the associated time delay can be tested.



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

In order to test the thermal overload protection function, first clear the thermal replica. Clearing the thermal replica is achieved by briefly disabling the protection function (MAIN: Device on-line set to No, folder 'Par/Func/Glob/'). The updated status of the thermal replica can be interrogated via the operating data display THERM: Therm. replica vers. (folder 'Oper/Cycl/Data/'). The trip time can be checked: With cleared thermal replica, the test current is changed abruptly from 0 to a value of $\geq 0.1 I_{ref}$

$$t = \tau \cdot \ln \frac{\left(\frac{I}{I_{ref}}\right)^2 - \Theta_P}{\left(\frac{I}{I_{ref}}\right)^2 - \Theta_{trip} \cdot \left(1 - \frac{\Theta_c - \Theta_{c,max}}{\Theta_{max} - \Theta_{c,max}}\right)}$$

9 Commissioning

(continued)

Checking the voltage-time protection function

By applying appropriate analog signals as 'measuring variables' to the measuring inputs, the user can check via the operating data displays (see Chapter 'Information and Control Functions') whether the unit detects the analog signals with the specified accuracy (folder 'Oper/Cycl/Data/').

- ☐ MAIN: Voltage A-G p.u.: Display of the updated phase-to-ground voltage A-G referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage B-G p.u.: Display of the updated phase-to-ground voltage B-G referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage C-G p.u.: Display of the updated phase-to-ground voltage C-G referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage PG,max p.u.: Display of the updated maximum phase-to-ground voltage referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage PG,min p.u.: Display of the updated minimum phase-to-ground voltage referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage A-B p.u.: Display of the updated phase-to-ground voltage A-B referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage B-C p.u.: Display of the updated phase-to-ground voltage B-C referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage C-A p.u.: Display of the updated phase-to-ground voltage C-A referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage PP,max p.u.: Display of the updated maximum phase-to-phase voltage referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage PP,min p.u.: Display of the updated minimum phase-to-phase voltage referred to the nominal voltage V_{nom} .
- ☐ MAIN: Voltage VNG p.u.: Display of the neutral-point displacement voltage as measured at transformer T 90, referred to V_{nom} .
- ☐ MAIN: Voltage $\Sigma(VPG)/\sqrt{3}$ p.u.: Display of the calculated neutral-point displacement voltage referred to V_{nom} .



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

9 Commissioning

(continued)

By applying appropriate measuring variables, the overvoltage stages and the undervoltage stages as well as the associated timer stages can be tested.



Application of analog signals to the measuring inputs must be in compliance with the maximum permissible rating of the measuring inputs (see the Chapter on Technical Data).

The P130C calculates the neutral-point displacement voltage from the input-side measured variables as follows:

$$|\underline{V}_{N-G}| = \frac{1}{3} \cdot |\underline{V}_{A-G} + \underline{V}_{B-G} + \underline{V}_{C-G}|$$

For a single-phase test where $|\underline{V}_{B-G}| = |\underline{V}_{C-G}| = 0$, the result of the calculation formula for \underline{V}_{N-G} just cited is that the $V_{N-G}>$ and $V_{N-G}>>$ triggers operate if the test voltage exceeds the following value:

$$|\underline{V}_{\text{test}}| = 3 \cdot V_{NG} \cdot \frac{V_{\text{nom}}}{\sqrt{3}}$$

V_{NG} : Setting $V_{<>}: V_{NG}>$ or $V_{<>}: V_{NG}>>$

9 Commissioning

(continued)

Checking the 'ground fault direction determination by steady-state values' (GFDSS) function

If both residual current and neutral displacement voltage are available as measured variables, then the P130C determines the ground fault direction by steady-state power evaluation of the measured variables if the operating mode is set to *Steady-state power* or *Steady-state admittance*. Depending on the setting, either the neutral-point displacement voltage calculated by the P130C or that measured at transformer T 90 is evaluated. If only the current can be measured, the P130C reaches a 'ground fault' decision on the basis of the level of the residual current (steady-state current evaluation). Switching to steady-state current evaluation is done from the integrated local control panel or by triggering an appropriately configured binary signal input.

If allowed by system operation, a ground fault can be closed on the busbar side (BS) or the line side (LS). The P130C must then transmit the corresponding signals. However, a requirement for ground fault recognition in the steady-state power evaluation mode is that the set thresholds for residual current (GFDSS: $IN_{act} > / IN_{reac} > BS$ or LS) and for neutral displacement voltage (GFDSS: $VNG >$) be exceeded. For steady-state current evaluation, the requirement is that the residual current threshold GFDSS: $IN >$ be exceeded. In the admittance evaluation mode, the requirement is that the set thresholds for conductance / susceptance (GFDSS: $G(N) > / B(N) LS$ or BS) and the neutral displacement voltage (GFDSS: $VNG >$) be exceeded or that the admittance (GFDSS: $Y(N) >$) be exceeded.

Because of the danger of a double ground fault, a function test involving the closing of a ground fault will not be possible in most cases. In these cases the current and voltage transformers in the system can be connected so that a function test is possible without a ground fault.

The residual current measured by the P130C and the neutral displacement voltage are displayed as measured operating data both in primary quantities and referred to the nominal quantities of the P130CP130C (see the section entitled 'Measured Operating Data' in the Address List).

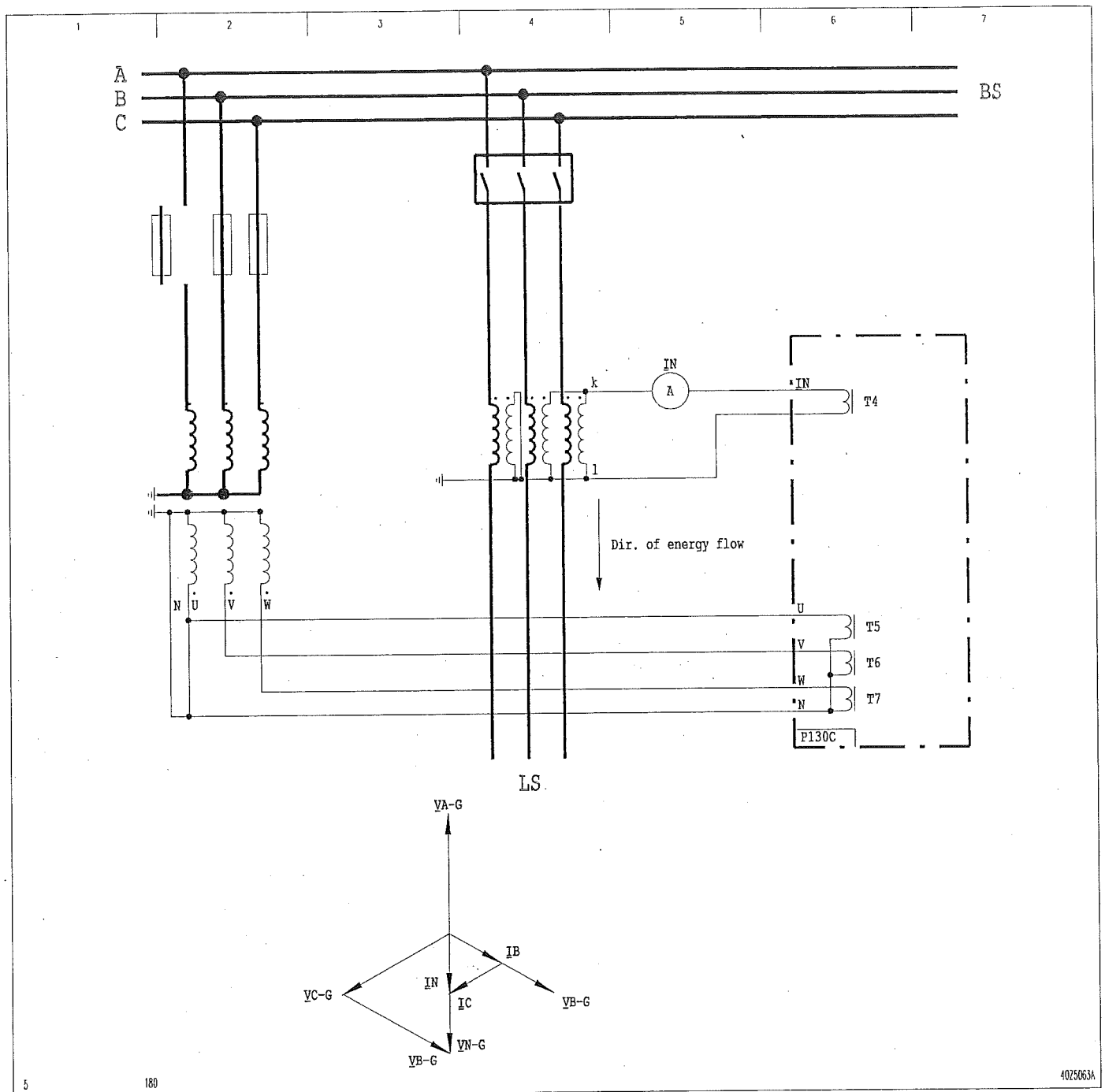
Auxiliary circuit in resonant-grounded systems

First the fuse in phase A of the voltage transformer is removed and the associated secondary side is short-circuited (see Figures 9-2 and 9-3). The result is a displacement voltage \underline{V}_{N-G} with a magnitude smaller by a factor of $\sqrt{3}$ than that of the displacement voltage in the case of a dead fault to ground.

If the current is measured in a Holmgreen group, then the current transformer in A on the secondary side must be disconnected and short-circuited (see Figure 9-2).

9 Commissioning

(continued)



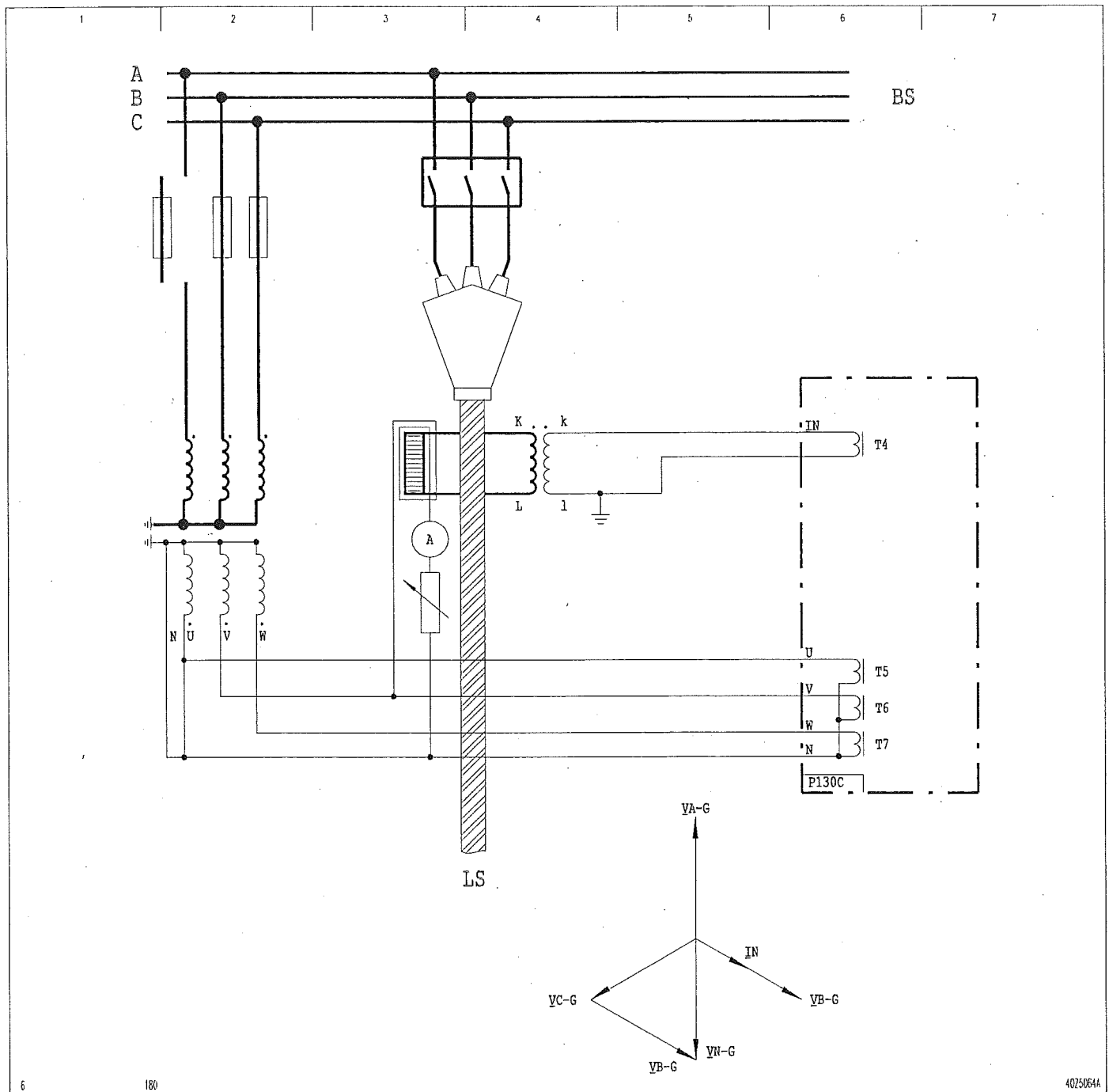
9-2 Auxiliary circuit in resonant-grounded systems with Holmgreen group, ground fault in BS direction

9 Commissioning

(continued)

A pilot wire is threaded into window-type current transformers, and a current is drawn from phase B through the wire (see Figure 9-3). The vectorial assignment of currents and voltages is shown in the phasor diagrams included with the terminal connection diagrams.

In the example shown below, a ground fault is simulated on the busbar side. To check a ground fault on the line side, the current or voltage connections must be switched.



9-3 Auxiliary circuit in resonant-grounded systems with window-type current transformer, ground fault in BS direction

9 Commissioning

(continued)

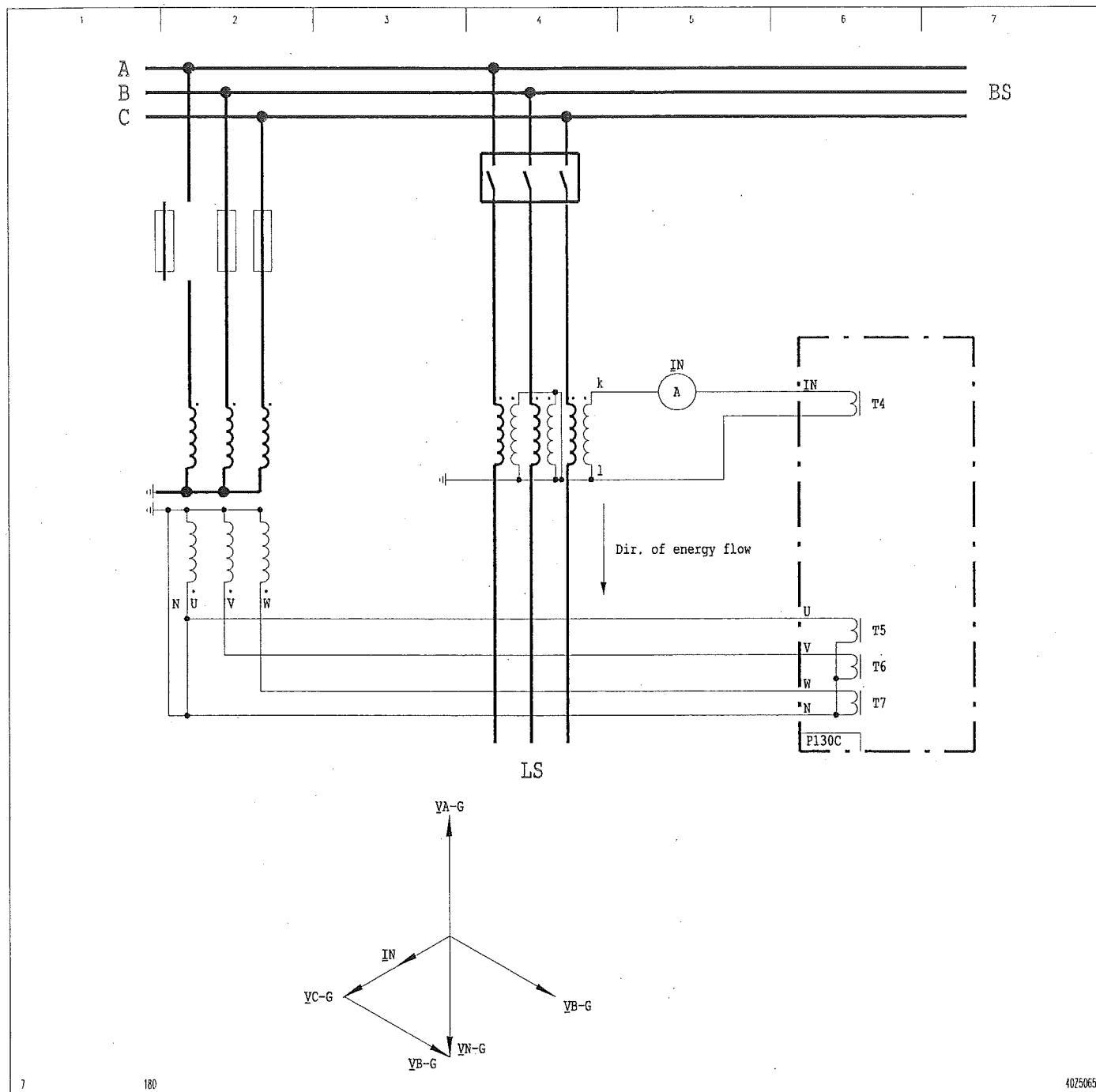
Auxiliary circuit in systems with isolated neutral

First the fuse in phase A on the primary side of the voltage transformer is removed and the corresponding secondary side is short-circuited (see Figures 9-4 and 9-5). The result is a displacement voltage \underline{V}_{N-G} with a magnitude smaller by a factor of $\sqrt{3}$ than that of the displacement voltage in the case of a dead fault to ground.

If the current is measured in a Holmgreen group, then the current transformers in A and B on the secondary side must be disconnected and short-circuited (see Figure 9-4).

9 Commissioning

(continued)



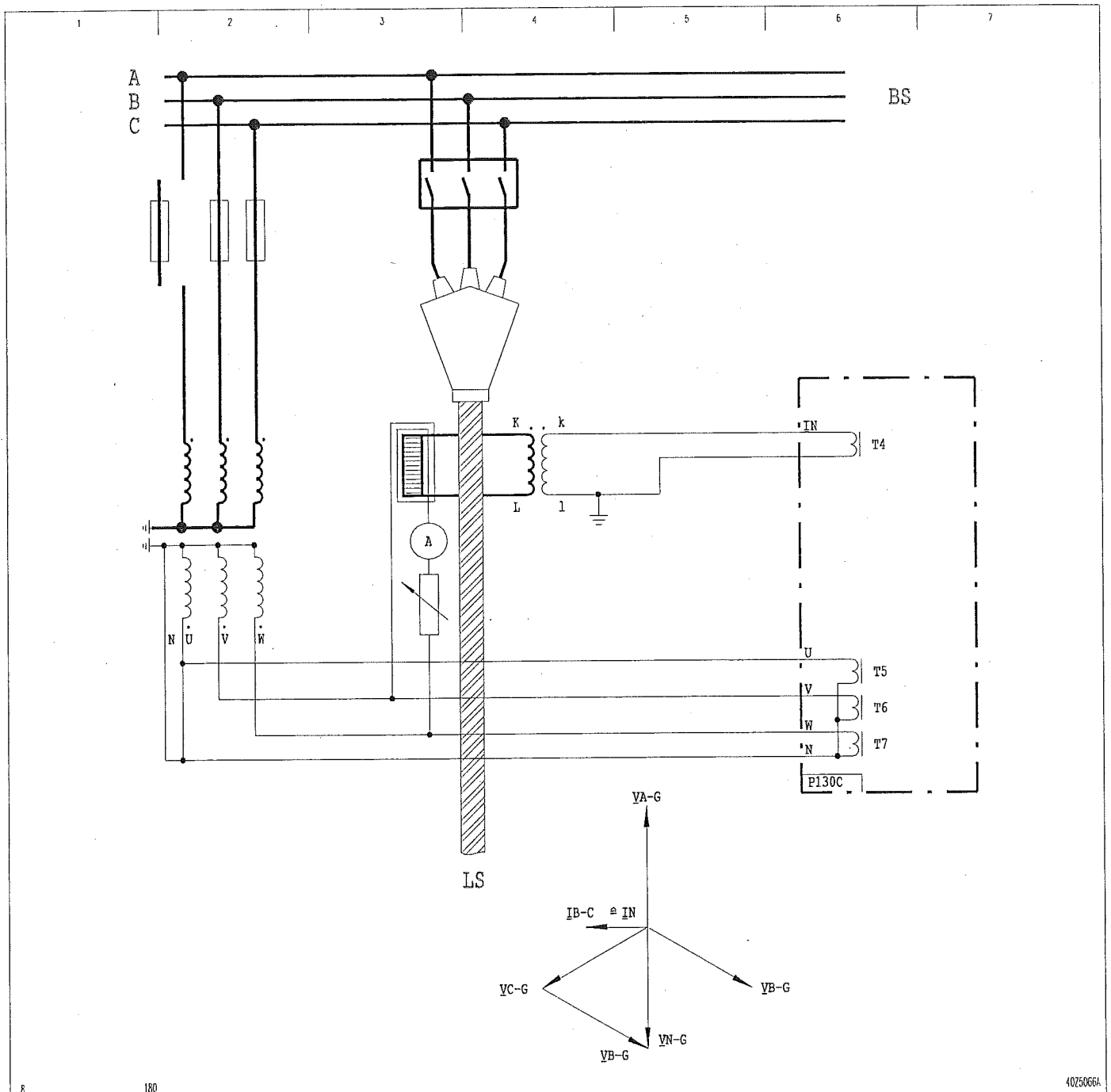
9-4 Auxiliary circuit in systems with isolated neutral and Holmgreen group, ground fault in BS direction

9 Commissioning

(continued)

A pilot wire is threaded into window-type current transformers, and a current is drawn from phases B and C through this wire (see Figure 9-5). The vectorial assignment of currents and voltages is shown in the phasor diagrams included with the terminal connection diagrams.

In the example shown below, a ground fault is simulated on the busbar side. To check a ground fault on the line side, the current or voltage connections must be switched.



9-5 Auxiliary circuit in systems with isolated neutral and window-type current transformer, ground fault in BS direction

9 Commissioning

(continued)

Completion of commissioning

Before the P130C is released for operation, the user should make sure that the following steps have been taken:

- ☐ All memories have been reset.
(Reset at MAIN: General reset (password-protected) and MT_RC: Reset recording, both in 'Oper/CtrlTest/' folder.)
- ☐ Blocking of output relays has been canceled.
(OUTP: Outp.rel.block USER in 'Par/Func/Glob/' folder, setting 'No')
- ☐ Blocking of the trip command has been canceled.
(MAIN: Trip cmd.block.USER, 'Par/Func/Glob/' folder, setting 'No')
- ☐ The device is on-line
(MAIN: Device on-line, 'Par/Func/Glob/' folder, setting 'Yes' (on).)
- ☐ The residual current stages of the protection functions are enabled (on).
(MAIN: Syst.IN enabled USER, 'Par/Func/Gen/' folder, setting 'Yes (on)')
- ☐ The measuring-circuit monitoring function is enabled – if it was disabled for testing purposes.
(MCMON: General enable USER, 'Par/Func/Gen/' folder, setting 'Yes')

After completion of commissioning, only the green LED indicator labeled 'HEALTHY' (H1)

9 Commissioning

(continued)

10 Troubleshooting

10 Troubleshooting

This chapter describes problems that might be encountered, their causes, and possible methods for eliminating them. It is intended as a general orientation only, and in cases of doubt it is better to return the P130C to the manufacturer. Please follow the packaging instructions in the section entitled 'Unpacking and Packing' in Chapter 5 when returning equipment to the manufacturer.

Problem:

- Lines of text are not displayed on the local control panel.
 - Check to see whether there is supply voltage at the device connection points.



Before checking further, disconnect the P130C from the power supply.



The local control panel is connected to the I/O module by a plug-in connecting cable. Make sure the connector position is correct. Do not bend the connecting cable.

- Check to see whether the magnitude of the auxiliary voltage is correct. The P130C has an auxiliary voltage supply that can be switched between ranges and is factory-set for the voltage range of $V_{A,nom} = 110$ to 250 V DC or 100 to 230 V AC. See Chapter 5 for information on switching to the voltage range of $V_{A,nom} = 24$ to 60 V DC. The P130C is protected against damage from polarity reversal.

10 Troubleshooting

(continued)

- The P130C issues a 'Warning' signal on LED H3. (H3 is labeled 'ALARM', it is coupled to the signal SFMON: Warning (LED).)

Identify the specific problem by reading out the monitoring signal memory (see the section entitled 'Monitoring Signal Memory Readout' in Chapter 6). The table below lists possible monitoring or warning indications (provided that a configuration setting has been entered at SFMON: Fct. assign. warning), the faulty area, the P130C response, and the mode of the output relay configured for 'Warning' and 'Blocked/faulty'.

| | |
|---|---------|
| SFMON: Warning (LED) | 036 070 |
| Warning configured for LED H3. | |
| SFMON: Warning (relay) | 036 100 |
| Warning configured for an output relay. | |

Key

- : No reaction and/or no output relay triggered.
- Yes: The corresponding output relay is triggered.
- Updating: The output relay configured for 'Warning' starts only if the monitoring signal is still present.
- 1): The 'Blocked/faulty' output relay only operates if the signal has been configured at MAIN: Fct. assignm. fault.
- 2): The 'Warning' output relay only operates if the signal has been configured at SFMON: Fct. assignm. warning.

| | |
|--|---------------------|
| SFMON: Cold restart | 093 024 |
| A cold restart has been carried out on account of a checksum error in the memory (NOVRAM). | |
| 1st device reaction / 2nd device reaction: Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes |
| 'Blocked/faulty' output relay: | Yes / Yes |
| SFMON: Cold rest./SW update | 093 025 |
| A cold restart has been carried out following a software update. | |
| 1st device reaction / 2nd device reaction: Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes |
| 'Blocked/faulty' output relay: | Yes / Yes |
| SFMON: Blocking HW failure | 090 019 |
| Supplementary warning that this device is blocked. | |
| 'Warning' output relay: | Updating / Updating |

10 Troubleshooting

(continued)

| | | |
|--|--------------------------------|---------|
| SFMON: Relay Kxx faulty | | 041 200 |
| Multiple signal: output relay defective. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Updating / Updating | |
| 'Blocked/faulty' output relay: | Yes / Yes ¹⁾ | |
| SFMON: Hardware clock fail. | | 093 040 |
| The hardware clock has failed. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Battery failure | | 090 010 |
| Battery voltage too low. Replace battery. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Updating / Updating | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Invalid SW d.loaded | | 096 121 |
| Wrong or invalid software has been downloaded. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: +15V supply faulty | | 093 081 |
| The +15 V internal supply voltage has dropped below a minimum value. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: +24V supply faulty | | 093 082 |
| The +24 V internal supply voltage has dropped below a minimum value. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: -15V supply faulty | | 093 080 |
| The -15 V internal supply voltage has dropped below a minimum value. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: Power supply faulty | | 093 083 |
| The +24 V or +15 V or -15 V internal supply voltage has dropped below a minimum value. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |

10 Troubleshooting

(continued)

| | |
|---|--------------------------------|
| SFMON: Wrong module slot 1 | 096 100 |
| SFMON: Wrong module slot 2 | 096 101 |
| Module in wrong slot. | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking |
| 'Warning' output relay: | Yes / Yes |
| 'Blocked/faulty' output relay: | Yes / Yes |
| SFMON: Defect.module slot 1 | 097 000 |
| SFMON: Defect.module slot 2 | 097 001 |
| Defective module in slot x. | |
| 1st device reaction / 2nd device reaction: | - / - |
| 'Warning' output relay: | Updating / Updating |
| 'Blocked/faulty' output relay: | Yes / Yes ¹⁾ |
| SFMON: Module A DPR faulty | 093 070 |
| Dual-Port-RAM fault on communication module A. This fault is only detected during device startup. | |
| 1st device reaction / 2nd device reaction: | - / - |
| 'Warning' output relay: | Yes / Yes |
| 'Blocked/faulty' output relay: | - / - |
| SFMON: Module A RAM faulty | 093 071 |
| RAM fault on communication module A. | |
| 1st device reaction / 2nd device reaction: | - / - |
| 'Warning' output relay: | Yes / Yes |
| 'Blocked/faulty' output relay: | - / - |
| SFMON: Error K 1 | 097 038 |
| SFMON: Error K 2 | 097 039 |
| SFMON: Error K 3 | 097 040 |
| SFMON: Error K 4 | 097 041 |
| SFMON: Error K 5 | 097 042 |
| SFMON: Error K 6 | 097 043 |
| SFMON: Error K 7 | 097 044 |
| SFMON: Error K 8 | 097 045 |
| Output relay K xxx defective. | |
| 1st device reaction / 2nd device reaction: | - / - |
| 'Warning' output relay: | Updating / Updating |
| 'Blocked/faulty' output relay: | Yes / Yes ¹⁾ |
| SFMON: Undef. operat. code | 093 010 |
| Undefined operation code, i.e. software error. | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking |
| 'Warning' output relay: | Yes / Yes |
| 'Blocked/faulty' output relay: | Yes / Yes |

10 Troubleshooting

(continued)

| | | |
|--|--------------------------------|--------|
| SFMON: Invalid arithm. op. | | 093011 |
| Invalid arithmetic operation, i.e. software error. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: Undefined interrupt | | 093012 |
| Undefined interrupt, i.e. software error. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: Exception oper.syst. | | 093013 |
| Interrupt of the operating system. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: Data acquis. failure | | 090021 |
| Watchdog is monitoring the periodic start of protection routines. It has detected an error. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: Checksum error param | | 090003 |
| A checksum error involving the parameters in the memory (NOVRAM) has been detected. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |
| SFMON: Clock sync. error | | 093041 |
| In 10 consecutive clock synchronization telegrams, the difference between the time of day given in the telegram and that of the hardware clock is greater than 10 ms. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Interm.volt.fail.RAM | | 093026 |
| Faulty test pattern in the RAM. This can occur, for example, if the processor module or the power supply module is removed from the bus module (digital). This fault is only detected during device startup. After the fault is detected, the software initializes the RAM. This means that all records are deleted. | | |
| 1st device reaction / 2nd device reaction: | Warm restart / Device blocking | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | Yes / Yes | |

10 Troubleshooting

(continued)

| | | |
|---|---|---------|
| SFMON: Overflow MT_RC | | 090 012 |
| Last entry in the monitoring signal memory in the event of overflow. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Semaph. MT_RC block. | | 093 015 |
| Software overloaded. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Inval. SW vers.COMM1 | | 093 075 |
| Incorrect or invalid communication software has been downloaded. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: IRIGB faulty | | 093 117 |
| Although the IRIG-B interface is enabled, no plausible input signal is received. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Time-out module L | | 093 130 |
| Watchdog is monitoring the periodic status signal of the local control component. It has detected an error. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: M.c.b. trip V | | 098 000 |
| The voltage transformer m.c.b. has tripped. | | |
| 1st device reaction / 2nd device reaction: | Blocking of distance protection, directional measurement of inverse-time overcurrent protection and time-voltage protection, and switching to backup overcurrent-time protection, if applicable | |
| 'Warning' output relay: | Yes / Yes ²⁾ | |
| 'Blocked/faulty' output relay: | - / - | |
| SFMON: Phase sequ. V faulty | | 098 001 |
| Measuring-circuit monitoring has detected a fault in the phase sequence of the phase-to-ground voltages. | | |
| 1st device reaction / 2nd device reaction: | - / - | |
| 'Warning' output relay: | Yes / Yes ²⁾ | |
| 'Blocked/faulty' output relay: | - / - | |

10 Troubleshooting

(continued)

SFMON: Undervoltage 098.009

The measuring-circuit monitoring function has detected an undervoltage.

1st device reaction / 2nd device reaction: - / -
 'Warning' output relay: Yes / Yes ²⁾
 'Blocked/faulty' output relay: - / -

SFMON: Meas. circ. V faulty 098.017

Multiple signaling: voltage-measuring circuits faulty.

1st device reaction / 2nd device reaction: Depends on type of fault detected.
 'Warning' output relay: Yes / Yes ²⁾
 'Blocked/faulty' output relay: - / -

SFMON: Meas. circ. I faulty 098.005

The measuring-circuit monitoring function has detected a fault in the current-measuring circuits.

1st device reaction / 2nd device reaction: - / -
 'Warning' output relay: Yes / Yes ²⁾
 'Blocked/faulty' output relay: - / -

SFMON: Meas.circ.V,I faulty 098.016

Multiple signaling: current- or voltage-measuring circuits faulty.

1st device reaction / 2nd device reaction: Depends on type of fault.
 'Warning' output relay: Yes / Yes ²⁾
 'Blocked/faulty' output relay: - / -

SFMON: Communic.fault COMM3 093.140

The set time COMM3: Time-out comm.fault has elapsed since the most recent 100% valid telegram was received. The receive signals are set to their user-defined default values.

1st device reaction / 2nd device reaction: - / -
 'Warning' output relay: Yes / Yes ²⁾
 'Blocked/faulty' output relay: - / -

SFMON: Hardware error COMM3 093.143

The device has detected a hardware fault in the InterMiCOM interface ("Logical" Communication Interface 3).

1st device reaction / 2nd device reaction: - / -
 'Warning' output relay: Yes / Yes
 'Blocked/faulty' output relay: - / -

SFMON: Comm.link fail.COMM3 093.142

Timer stage COMM3: Time-out link fail. has elapsed indicating a persistent failure of the transmission channel. The receive signals are set to their user-defined default values.

1st device reaction / 2nd device reaction: - / -
 'Warning' output relay: Yes / Yes ²⁾
 'Blocked/faulty' output relay: - / -

10 Troubleshooting

(continued)

| | | |
|--|--|---------|
| SFMON: Lim.exceed.,tel.err. | | 093 141 |
| The operate threshold COMM3: Limit telegr. errors has been exceeded. The receive signals are set to their user-defined default values. | | |
| 1st device reaction / 2nd device reaction: | – / – | |
| 'Warning' output relay: | Yes / Yes ²⁾ | |
| 'Blocked/faulty' output relay: | – / – | |
| SFMON: Telecom. faulty | | 098 006 |
| The transmission channel of protective signaling is faulty. | | |
| 1st device reaction / 2nd device reaction: | Blocking of protective signaling | |
| 'Warning' output relay: | Yes / Yes ²⁾ | |
| 'Blocked/faulty' output relay: | – / – | |
| SFMON: Setting error THERM | | 098 035 |
| Invalid parameters in the setting for the thermal replica. | | |
| 1st device reaction / 2nd device reaction: | Blocking of the thermal overload protection function | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | – / – | |
| SFMON: Peripheral fault | | 098 018 |
| Multiple signaling | | |
| 1st device reaction / 2nd device reaction: | Depends on type of fault. | |
| 'Warning' output relay: | Yes / Yes ²⁾ | |
| 'Blocked/faulty' output relay: | – / – | |
| SFMON: Setting error f<> | | 098 028 |
| The over-/underfrequency protection function has been set for 'overfrequency' monitoring (based on the settings for operate value and nominal frequency). This setting is not valid in the <i>f w. Delta f / Delta t</i> operating mode. | | |
| 1st device reaction / 2nd device reaction: | Blocking of over-/under-frequency protection | |
| 'Warning' output relay: | Yes / Yes ²⁾ | |
| 'Blocked/faulty' output relay: | – / – | |
| SFMON: Output 30 | | 098 053 |
| SFMON: Output 30 (t) | | 098 054 |
| SFMON: Output 31 | | 098 055 |
| SFMON: Output 31 (t) | | 098 056 |
| SFMON: Output 32 | | 098 057 |
| SFMON: Output 32 (t) | | 098 058 |
| These LOGIC outputs can be included in the list of warning signals by selection at SFMON: Fct. assign. warning. These warning signals are also recorded in the monitoring signal memory. | | |
| 1st device reaction / 2nd device reaction: | – / – | |
| 'Warning' output relay: | Yes / Yes | |
| 'Blocked/faulty' output relay: | – / – | |

11 Maintenance

11 Maintenance

The P130C is a low-maintenance device. The components used in the units are selected to meet exacting requirements. Recalibration is not necessary.

Maintenance procedures in the power supply area

Electrolytic capacitors are installed in the power supply area because of dimensioning requirements. The useful life of these capacitors is significant from a maintenance standpoint. When the equipment is operated continuously at the upper limit of the recommended temperature range (+55°C or 131°F), the useful life of these components is 80,000 hours, or more than 9 years. Under these conditions, replacement of the electrolytic capacitors is recommended after a period of 8 to 10 years. Component drift follows the '10-degree rule'. This means that the useful life is doubled for each 10 K reduction in temperature. When the operating temperatures inside the devices are low, the required maintenance intervals are increased accordingly.

The P130C is equipped with a lithium battery for non-volatile storage of fault data and for keeping the internal clock running in the event of failure of the auxiliary power supply. Loss of capacity due to module-internal self-discharging amounts to less than 1% per year over a period of availability of 10 years. Since the terminal voltage remains virtually constant until capacity is exhausted, usefulness is maintained until a very low residual capacity is reached. With a nominal capacity of 850 mAh and discharge currents of only a few µA during device storage or in the range of the self-discharge current during device operation, the result is a correspondingly long service life. It is therefore recommended that the lithium battery only be replaced after the maintenance interval cited above.

Replacement of the maintenance-related components named above is not possible without soldering and must be carried out by ALSTOM Service personnel.

11 Maintenance

(continued)

Routine functional testing

The P130C is used as a safety device and must therefore be routinely checked for proper operation. The first functional tests should be carried out approximately 6 to 12 months after commissioning. Additional functional tests should be performed at intervals of 2 to 3 years – 4 years at the maximum.

The P130C incorporates in its system a very extensive self-monitoring function for hardware and software. The internal structure guarantees, for example, that communication within the processor system will be checked on a continuing basis.

Nonetheless, there are a number of subfunctions that cannot be checked by the self-monitoring feature without running a test from the device terminals. The respective device-specific properties and setting parameters must be observed in such cases.

In particular, none of the control and signaling circuits that are run to the device from the outside are checked by the self-monitoring function.

Analog input circuits

The analog measured variables are fed through an analog preprocessing feature (anti-aliasing filtering) to a common analog-to-digital converter. In conjunction with the self-monitoring function, the measuring-circuit monitoring function that is available for the device's general functions can detect deviations in many cases, depending on the parameter settings for sensitivity. However, it is still necessary to test from the device terminals in order to make sure that the analog measuring circuits are functioning correctly.

The best way to carry out a static test of the analog input circuits is to check the primary measured operating data using the operating data measurement function or to use a suitable testing instrument. A "small" measured value (such as the nominal current in the current path) and a "large" measured value (such as the nominal voltage in the voltage path) should be used to check the measuring range of the A/D converter. This makes it possible to check the entire control range.

The accuracy of operating data measurement is <1 %. An important factor in evaluating device performance is long-term performance based on comparison with previous measurements.

In addition, a dynamic test can be used to check transmission performance and the phase relation of the current transformers and the anti-aliasing filter. This can best be done by measuring the trigger point of the first zone when there is a two-phase ungrounded fault. For this test, the short-circuit current should be dimensioned so that a loop voltage of approximately 2 V is obtained at the device terminals with the set impedance. Furthermore, a suitable testing instrument that correctly replicates the two-phase ungrounded fault should be used for this purpose.

This dynamic test is not absolutely necessary, since it only checks the stability of a few less passive components. Based on reliability analysis, the statistical expectation is that only one component in 10 years in 1000 devices will be outside the tolerance range.

11 Maintenance

(continued)

Additional analog testing of such factors as the impedance characteristic or the starting characteristic is not necessary, in our opinion, since information processing is completely digital and is based on the measured analog current and voltage values. Proper operation was checked in conjunction with type testing.

Binary inputs

The binary inputs are not checked by the self-monitoring function. However, a testing function is integrated into the software so that the trigger state of each input can be read out ('Oper/Cycl/Phys' folder). This check should be performed for each input being used and can be done, if necessary, without disconnecting any device wiring.

Binary outputs

With respect to binary outputs, the integrated self-monitoring function includes even two-phase triggering of the relay coils of all the all-or-nothing relays. There is no monitoring function for the external contact circuit. In this case, the all-or-nothing relays must be triggered by way of device functions or integrated test functions. For these testing purposes, triggering of the output circuits is integrated into the software through a special control function ('Oper/CtrlTest' folder).



Before starting testing, open any triggering circuits for external devices so that no inadvertent switching operations will take place.

Serial interfaces

The integrated self-monitoring function for the PC or communication interface also includes the communication module. The complete communication system, including connecting link and fiber-optic module (if applicable), is always totally monitored as long as a link is established through the control program or the communication protocol.

12 Storage

12 Storage

Devices must be stored in a dry and clean environment. A temperature range of -25°C to $+70^{\circ}\text{C}$ (-13°F to $+158^{\circ}\text{F}$) must be maintained during storage (see chapter entitled 'Technical Data'). The relative humidity must be controlled so that neither condensation nor ice formation will result.

If the units are stored without being connected to auxiliary voltage, then the electrolytic capacitors in the power supply area need to be reformed every 4 years. Reform the capacitors by connecting auxiliary voltage to the P130C for approximately 10 minutes.

13 Accessories and Spare Parts

13 Accessories and Spare Parts

The P130C is supplied with standard labeling for the LED indicators. LED indicators that are not already configured and labeled can be labeled using the label strips supplied with the P130C. Affix the label strips to the front of the unit at the appropriate location.

The label strips can be filled in using a Stabilo brand pen containing water-resistant ink (Type OH Pen 196 PS).

| Description | Order No. |
|-------------------------------|------------|
| Operating program for Windows | On request |

14 Order Information

14 Order Information

| MiCOM P130C | | | | | | | | | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|-----------|---|---|---|---|---|---|---|------|------|
| Name | | | | | | | | | | Order No. | | | | | | | | | |
| Frequency Protection (without Current Transformer) | | | | | | | | | | P 1 3 0 - | 9 | 8 | 0 | 0 | 3 | 0 | 2 | 0 | -301 |
| Directional Overcurrent Protection | | | | | | | | | | P 1 3 0 - | 9 | 8 | 9 | 0 | 3 | 0 | 2 | 0 | -301 |
| Basic device: | | | | | | | | | | | | | | | | | | | |
| Compact device | | | | | | | | | | | 9 | | | | | | | | |
| with 2 binary inputs and 8 output relays | | | | | | | | | | | | | | | | | | | |
| Mounting options and display: | | | | | | | | | | | | | | | | | | | |
| Surface- and flush-mounted, local control panel with text display | | | | | | | | | | | 8 | | | | | | | | |
| Current transformer: | | | | | | | | | | | | | | | | | | | |
| None | | | | | | | | | | | | 0 | | | | | | | |
| Inom = <u>1 A</u> / 5 A (T1 to T4) ²⁾ | | | | | | | | | | | | 9 | | | | | | | |
| Voltage transformer: | | | | | | | | | | | | | | | | | | | |
| Vnom = 50 to 130 V (3-pole) | | | | | | | | | | | | | 3 | | | | | | |
| Power supply and additional outputs: | | | | | | | | | | | | | | | | | | | |
| VA,nom = 24 to 60 VDC or <u>110 to 250 VDC</u> / 100 to 230 VAC ¹⁾ | | | | | | | | | | | | | | | | 2 | | | |
| Switching threshold on binary inputs: | | | | | | | | | | | | | | | | | | | |
| 18 V (standard variant) | | | | | | | | | | | | | | | | | | | |
| Without order extension no. | | | | | | | | | | | | | | | | | | | |
| 90 V (60 to 70% of Vnom = 125 to 150 V) ⁸⁾ | | | | | | | | | | | | | | | | | | -461 | |
| 155 V (60 to 70% of Vnom = 220 to 250 V) ⁸⁾ | | | | | | | | | | | | | | | | | | -462 | |
| With communication / information interface: | | | | | | | | | | | | | | | | | | | |
| Only IIRIG-B input for clock synchronization | | | | | | | | | | | | | | | | | | -90 | 0 |
| Protocol IEC 60870-5-103 only | | | | | | | | | | | | | | | | | | -91 | |
| Protocol can be switched between: | | | | | | | | | | | | | | | | | | -92 | |
| IEC 60870-5-101/-103, Modbus, DNP3, Courier | | | | | | | | | | | | | | | | | | | |
| and IIRIG-B input for clock synchronization | | | | | | | | | | | | | | | | | | | |
| and 2 nd interface (RS485, IEC 60870-5-103) | | | | | | | | | | | | | | | | | | | |
| For connection to wire, RS485, isolated | | | | | | | | | | | | | | | | | | 1 | |
| For connection to plastic fiber, FSMA connector | | | | | | | | | | | | | | | | | | 2 | |
| For connection to glass fiber, ST connector | | | | | | | | | | | | | | | | | | 4 | |
| With guidance / protection interface: | | | | | | | | | | | | | | | | | | | |
| Protocol InterMiCOM | | | | | | | | | | | | | | | | | | -95 | |
| For connection to wire, RS485, isolated | | | | | | | | | | | | | | | | | | | 1 |
| For connection to plastic fiber, FSMA connector | | | | | | | | | | | | | | | | | | | 2 |
| For connection to glass fiber, ST connector | | | | | | | | | | | | | | | | | | | 4 |
| Language: | | | | | | | | | | | | | | | | | | | |
| English (German) ⁴⁾ | | | | | | | | | | | | | | | | | | | |
| Without order extension No. | | | | | | | | | | | | | | | | | | | |
| Px40 English (English) ⁴⁾ | | | | | | | | | | | | | | | | | | | -800 |
| German (English) ⁴⁾ | | | | | | | | | | | | | | | | | | | -801 |
| French (English) ⁴⁾ | | | | | | | | | | | | | | | | | | | -802 |
| Not available yet | | | | | | | | | | | | | | | | | | | |
| Spanish (English) ⁴⁾ | | | | | | | | | | | | | | | | | | | -803 |
| Not available yet | | | | | | | | | | | | | | | | | | | |
| Polish (English) ⁴⁾ | | | | | | | | | | | | | | | | | | | -804 |
| Not available yet | | | | | | | | | | | | | | | | | | | |
| Russian (English) ^{4) 7)} | | | | | | | | | | | | | | | | | | | -805 |
| Not available yet | | | | | | | | | | | | | | | | | | | |

1) Range selection via jumper, default setting underlined

2) Switching via parameter, default setting underlined

4) Second included language in brackets

7) Hardware option, supports Cyrillic letters instead of special West European characters

8) Standard variant recommended unless there is a special requirement for higher thresholds

14 Order Information

(continued)

Notes on the Ordering Options

Language Versions

For a display of the Russian data model (menu texts), order extension No. -805 must be specified with the order. The device will then be fitted with the hardware supporting Cyrillic characters. The English reference texts are fully supported by this hardware option but additional characters in other West European languages are not. The Russian / English language version is therefore not suited to a subsequent loading of West European data models.

Operate Value of the Binary Inputs

The standard variant of the binary inputs (optical couplers) operates for all input voltages of 18 V and above and is therefore recommended for most applications. The special variants with higher operate / release values (see "Technical Data") are designed for applications with a special requirement for operate values of 60 to 70 % V_{nom} .

Appendix

A Glossary

B List of Signals

C Terminal Connection Diagrams

D Address Lists

(Available as a PDF file. Not included in the printed manual.)

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Appendix

(continued)

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Appendix A - Glossary

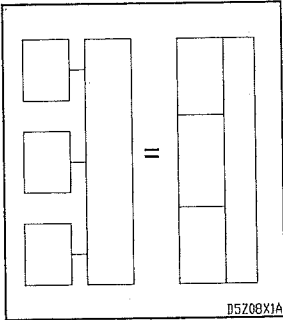
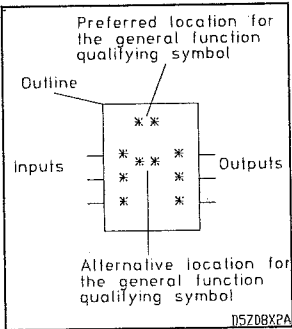
A 1 Function Groups

| | Current Transformers | CT fitted | CT not fitted |
|--------|--|-----------|---------------|
| ARC: | Auto-reclosing control | X | |
| CBF: | Circuit breaker failure protection | X | |
| COMM1: | "Logical" communication interface 1 | X | X |
| COMM2: | "Logical" communication interface 2 | X | X |
| COMM3: | "Logical" communication interface 3 | X | X |
| DTOC: | Definite-time overcurrent protection | X | |
| DVICE: | Device | X | |
| FT_DA: | Fault data acquisition | X | |
| FT_RC: | Fault recording | X | X |
| f<>: | Frequency protection | X | X |
| F_KEY | Function Keys | X | X |
| GF_DA: | Ground fault data acquisition | X | |
| GF_RC: | Ground fault recording | X | |
| GFDSS: | Ground fault direction determination using steady-state values | X | |
| I2>: | Unbalance protection | X | |
| IDMT: | Inverse-time overcurrent protection | X | |
| INP: | Binary input | X | X |
| LED: | LED indicators | X | X |
| LIMIT: | Limit monitoring | X | |
| LOC: | Local control panel | X | X |
| LOGIC: | Logic | X | X |
| MAIN: | Main function | X | X |
| MCMON: | Measuring-circuit monitoring | X | X |
| MP: | Motor protection | X | |
| MT_RC: | Monitoring signal recording | X | |
| OL_DA: | Overload data acquisition | X | |
| OL_RC: | Overload recording | X | |
| OP_RC: | Operating data recording | X | X |
| OUTP: | Binary and analog output | X | X |
| P<>: | Power directional protection | X | |
| PC: | PC link | X | X |
| PSIG: | Protective signaling | X | |
| PSS: | Parameter subset selection | X | X |
| SCDD: | Short-circuit direction determination | X | |
| SFMON: | Self-monitoring | X | X |
| SOTF: | Switch on to fault protection | X | |
| THERM: | Thermal overload protection | X | |
| V<>: | Time-voltage protection | X | X |

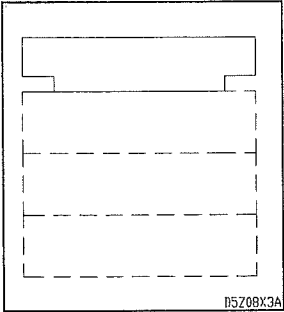
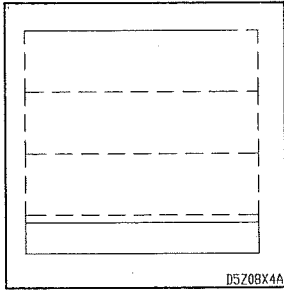
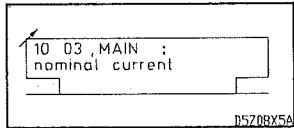
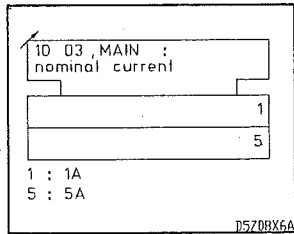
A 2 Symbols

Graphic symbols for block diagrams
Binary elements according to DIN 40900 Part 12, September 1992,
IEC 617-12: amended 1991
Analog information processing according to DIN 40900 Part 13, January 1981

To document the linking of analog and binary signals, additional symbols have been used, taken from several DIN documents.
As a rule, direction of the signal flow is from left to right and from top to bottom. Other flow directions are marked by an arrow. Input signals are listed on the left side of the signal flow, output signals on the right side.


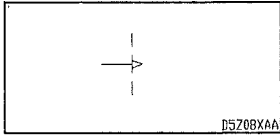
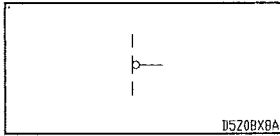
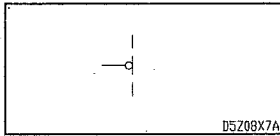
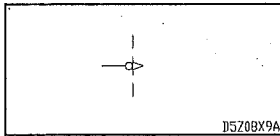
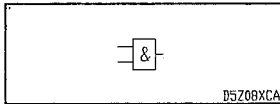
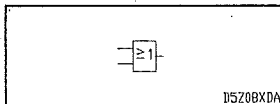
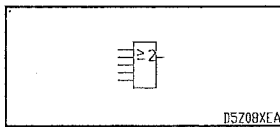
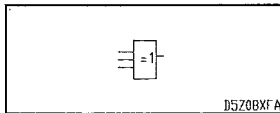
| Symbol | Description |
|---|--|
|  | <p>To obtain more space for representing a group of related elements, contours of the elements may be joined or cascaded if the following rules are met:</p> <p>There is no functional linkage between elements whose common contour line is oriented in the signal flow direction.</p> <p>Note: This rule does not necessarily apply to configurations with two or more signal flow directions, such as for symbols with a control block and an output block.</p> <p>There exists at least one logical link between elements whose common contour line runs perpendicularly to the signal flow direction.</p> |
|  | <p><u>Components of a symbol</u> A symbol consists of a contour or contour combination and one or more qualifiers.</p> |

Appendix A - Glossary
(continued)

| Symbol | Description |
|---|--|
|  | <p><u>Control block</u> A control block contains an input function common to several symbols. It is used for the collective setting of several trigger elements, for example.</p> |
|  | <p><u>Output block</u> An output block contains an output function common to several symbols.</p> |
|  | <p><u>Settable control block</u> The four digits represent the address under which the function shown in the text after the colon may be set via the local control panel.</p> |
|  | <p><u>Settable control block with function blocks</u> The digits in the function block show the settings that are possible at this address. The text below the symbol shows the setting and the corresponding unit or meaning.</p> |

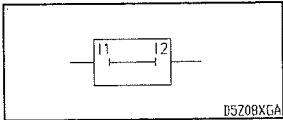
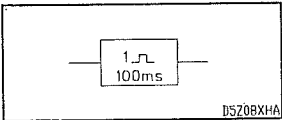
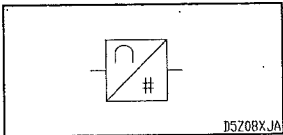
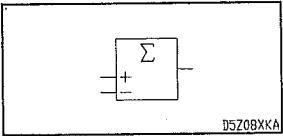
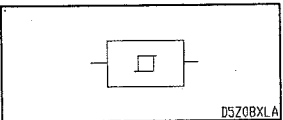
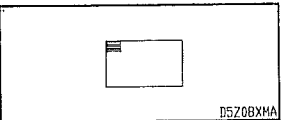
Appendix A - Glossary

(continued)

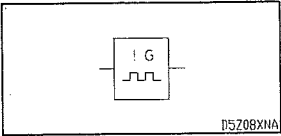
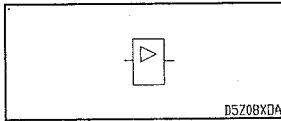
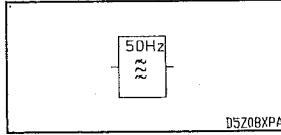
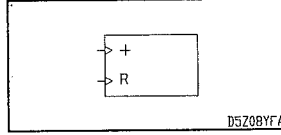
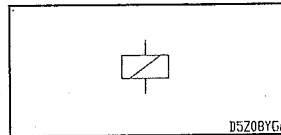
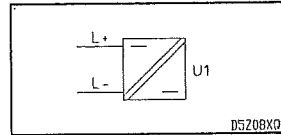
| Symbol | Description |
|---|---|
|  | <p><u>Static input</u> Only the state of the binary input variable is effective.</p> |
|  | <p><u>Dynamic input</u> Only the transition from value 0 to value 1 is effective.</p> |
|  | <p><u>Negation of an output</u> The value up to the border line is negated at the output.</p> |
|  | <p><u>Negation of an input</u> The input value is negated before the border line.</p> |
|  | <p><u>Dynamic input with negation</u> Only the transition from value 1 to value 0 is effective.</p> |
|  | <p><u>AND element</u> The output variable will be 1 only if all input variables are 1.</p> |
|  | <p><u>OR element</u> The output variable will be 1 only if at least one input variable is 1.</p> |
|  | <p><u>Threshold element</u> The output variable will be 1 only if at least two input variables are 1. The number in the symbol may be replaced by any other number.</p> |
|  | <p><u>(m out of n) element</u> The output variable will be 1 only if just one input variable is 1.</p> <p>The number in the symbol may be replaced by any other number if the number of inputs is increased or decreased accordingly.</p> |

Appendix A - Glossary

(continued)

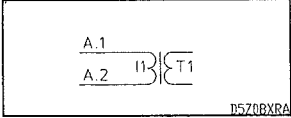
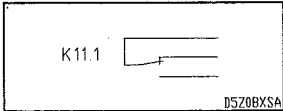
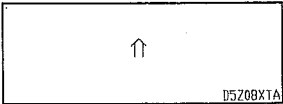
| Symbol | Description |
|---|---|
|  | <p><u>Delay element</u></p> <p>The transition from value 0 to 1 at the output occurs after a time delay of t_1 relative to the corresponding transition at the input.</p> <p>The transition from value 1 to 0 at the output occurs after a time delay of t_2 relative to the corresponding transition at the input.</p> <p>t_1 and t_2 may be replaced by the actual delay values (in seconds or strobe ticks).</p> |
|  | <p><u>Monostable flip-flop</u></p> <p>The output variable will be 1 only if the input variable changes to 1. The output variable will remain 1 for 100 ms, independent of the duration of the input value 1 (non-retriggerable).</p> <p>Without a 1 in the function block the monostable flip-flop is retriggerable.</p> <p>The time is 100 ms in this example, but it may be changed to any other duration.</p> |
|  | <p><u>Analog-digital converter</u></p> <p>An analog input signal is converted to a binary signal.</p> |
|  | <p><u>Subtractor</u></p> <p>The output variable is the difference between the two input variables.</p> <p>A <i>summing element</i> is obtained by changing the minus sign to a plus sign at the symbol input.</p> |
|  | <p><u>Schmitt Trigger with binary output signal</u></p> <p>The binary output variable will be 1 if the input signal exceeds a specific threshold. The output variable remains 1 until the input signal drops below the threshold again.</p> |
|  | <p><u>Memory, general</u></p> <p>Storage of a binary or analog signal.</p> |

Appendix A - Glossary
(continued)

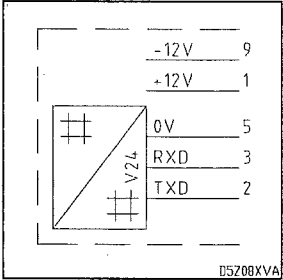
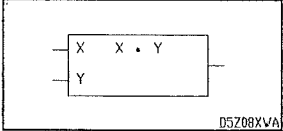
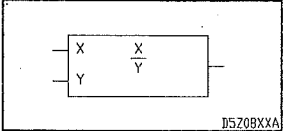
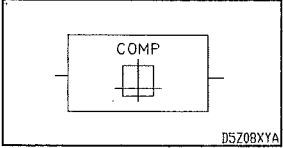
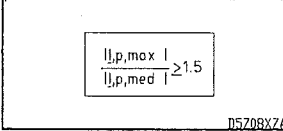
| Symbol | Description |
|---|--|
|  D5Z08XNA | <p><u>Non-stable flip-flop</u> When the input variable changes to 1, a pulse sequence is generated at the output.</p> <p>The ! to the left of the G indicates that the pulse sequence starts with the input variable transition (synchronized start). If there is a ! to the right of the G, the pulse sequence ends with the ending of the 1 signal at the input (synchronized stop).</p> |
|  D5Z08XDA | <p><u>Amplifier</u> The output variable is 1 only if the input variable is also 1.</p> |
|  D5Z08XPA | <p><u>Band pass filter</u> The output only transmits the 50 Hz component of the input signals. All other frequencies (above and below 50 Hz) are attenuated.</p> |
|  D5Z08YFA | <p><u>Counter</u> At the + input the input variable transitions from 0 to 1 are counted and stored in the function block. At the R(reset) input a transition of the input variable from 0 to 1 resets the counter to 0.</p> |
|  D5Z08YGA | <p><u>Electromechanical drive</u> in general, here a relay, for example.</p> |
|  D5Z08XDA | <p><u>Signal level converter</u> with electrical isolation between input and output. L+ = pos. voltage input L- = neg. voltage input U1 = device identifier</p> |

Appendix A - Glossary

(continued)

| Symbol | Description |
|---|--|
|  | <p><u>Input transformer</u> <u>with phase and item identifiers</u> (according to DIN EN 60445)</p> <p>Phase identifiers for current inputs: for A: A1 and A2 for B: B1 and B2 for C: C1 and C2 for N: N1 and N2</p> <p>Phase identifiers for voltage inputs via transformer 1: for A: 1U for B: 1V for C: 1W for N: 1N via transformer 2: for A: 2U for B: 2V</p> <p>Item identifiers for current transformers: for A: T1 for B: T2 for C: T3 for N: T4 for voltage transformer 1: for A: T5 for B: T6 for C: T7 for N: T8 for V_{G-N} transformer: T90 for voltage transformer 2: for A: T15</p> |
|  | <p><u>Change-over contact</u> <u>with item identifier</u></p> |
|  | <p><u>Special symbol</u> Output relay in normally-energized arrangement ('closed-circuit operation').</p> |

Appendix A - Glossary
(continued)

| Symbol | Description |
|---|---|
|  | <u>PC interface</u> with pin connections |
|  | <u>Multiplier</u> The output variable is the result of the multiplication of the two input variables. |
|  | <u>Divider</u> The output variable is the result of the division of the two input variables. |
|  | <u>Comparator</u> The output variable becomes 1 only if the input variable(s) are equal to the function in the function block. |
|  | <u>Formula block</u> The output variable becomes 1 only if the input variable(s) satisfy the equation in the function block |

Appendix A - Glossary

(continued)

A 3 Examples of Signal Names

All settings and signals relevant for protection are shown in the block diagrams of Chapter 3 as follows:

| Signal Name | Description |
|---|--|
| ◆ FT_RC: Fault recording n 305 100 | <u>Internal signal names</u> are not coded by a data model address. In the block diagrams they are marked with a diamond. The small figure underneath the signal name represents a code that is irrelevant to the user. The internal signal names used and their origins are listed in Appendix B. |
| DIST: VNG>> triggered [036 015] | Signal names coded by a data model address are represented by their address (shown in square brackets). Their origin is given in Chapters 7 and 8. |
| MAIN: General reset [003 002] ↗1: Execute | A specific setting to be used later on is shown with its signal name, address, and the setting preceded by the setting arrow. |

Appendix A - Glossary

(continued)

A 4 Symbols Used

| Symbol | Meaning |
|-------------------|---|
| t | Time duration |
| V | Voltage, potential difference |
| \underline{V} | Complex voltage |
| I | Electrical current |
| \underline{I} | Complex current |
| \underline{Z} | Complex impedance |
| $ \underline{Z} $ | Modulus of complex impedance |
| f | Frequency |
| δ | Temperature in °C |
| Σ | Sum, result |
| Ω | Unit of electrical resistance |
| α | Angle |
| φ | Phase angle. With subscripts: specific angle between a defined current and a defined voltage. |
| τ | Time constant |
| ΔT | Temperature difference in K |

Appendix B - List of Signals

B 1 Internal Signal Names

| | | |
|--------|-----------------------|---------------------------------------|
| ARC: | Block/reset HSR | Fig.3-132 |
| ARC: | Block/reset TDR | Fig.3-132 |
| ARC: | Close request | Fig.3-134 |
| ARC: | HSR not permitted | Fig.3-134 |
| ARC: | HSR trip t. elapsed | Fig.3-126, 3-128, 3-129, 3-130, 3-131 |
| ARC: | HSR trip t. l> runn. | Fig.3-121, 3-135, 3-137 |
| ARC: | Starting GFDSS | Fig.3-129 |
| ARC: | TDR not permitted | Fig.3-134 |
| ARC: | TDR trip t. elapsed | Fig.3-127, 3-128, 3-129, 3-130, 3-131 |
| ARC: | TDR trip t. l> runn. | Fig.3-121 |
| COMM1: | Selected protocol | Fig.3-7 |
| DTOC: | <u>I</u> N | Fig.3-88 |
| DTOC: | Pulse prolong. runn. | Fig.3-91 |
| DTOC: | Starting A | Fig.3-84 |
| DTOC: | Starting B | Fig.3-84 |
| DTOC: | Starting C | Fig.3-84 |
| DTOC: | Starting N | Fig.3-89 |
| DTOC: | t2 N | Fig.3-91 |
| f<>: | <u>V</u> Meas | Fig.3-179 |
| f<>: | fMeas | Fig.3-180 |
| f<>: | No. periods reached | Fig.3-180 |
| FT_DA: | <u>I</u> A-kG | Fig.3-75 |
| FT_DA: | <u>I</u> B-kG | Fig.3-75 |
| FT_DA: | <u>I</u> C-kG | Fig.3-75 |
| FT_DA: | <u>I</u> kG | Fig.3-75 |
| FT_DA: | Output fault locat. | Fig.3-74 |
| FT_DA: | Output meas. values | Fig.3-74 |
| GFDSS: | <u>V</u> NG | Fig.3-140 |
| GFDSS: | <u>V</u> NG filtered | Fig.3-141, 3-147 |
| GFDSS: | Direction BS | Fig.3-141, 3-147 |
| GFDSS: | Direction LS | Fig.3-141, 3-147 |
| GFDSS: | IN> triggered | Fig.3-145 |
| GFDSS: | <u>I</u> N filtered | Fig.3-145 |
| GFDSS: | Op. delay IN elapsed | Fig.3-145 |
| GFDSS: | Oper.delayY(N)> elaps | Fig.3-151 |
| GFDSS: | P | Fig.3-141, 3-147 |
| GFDSS: | Q | Fig.3-141, 3-147 |

Appendix B - List of Signals

(continued)

| | | |
|---------|-----------------------|---------------------------------------|
| GFDSS: | VNG> triggered | Fig.3-141, 3-147 |
| IDMT: | <u>I</u> N | Fig.3-102 |
| IDMT: | Starting A | Fig.3-99 |
| IDMT: | Starting B | Fig.3-99 |
| IDMT: | Starting C | Fig.3-99 |
| LOGIC: | Output n | Fig.3-198, 3-199, 3-200, 3-201, 3-202 |
| LOGIC: | Output n (t) | Fig.3-198, 3-199, 3-200, 3-201, 3-202 |
| MAIN: | <u>V</u> meas | Fig.3-76 |
| MAIN: | Blck.1 sel.functions | Fig.3-40 |
| MAIN: | Blck.2 sel.functions | Fig.3-40 |
| MAIN: | Block start. signal | Fig.3-45 |
| MAIN: | Block tim.st. IN,neg | Fig.3-45 |
| MAIN: | Block. I>,klref,P> | Fig.3-46 |
| MAIN: | General starting int. | Fig.3-46 |
| MAIN: | Inrush stabil. trigg | Fig.3-39 |
| MAIN: | <u>I</u> meas | Fig.3-76 |
| MAIN: | Protection active | Fig.3-36 |
| MAIN: | Reset LED | Fig.3-52 |
| MAIN: | Sel. meas. loop A-B | Fig.3-76 |
| MAIN: | Sel. meas. loop A-G | Fig.3-76 |
| MAIN: | Sel. meas. loop B-C | Fig.3-76 |
| MAIN: | Sel. meas. loop B-G | Fig.3-76 |
| MAIN: | Sel. meas. loop C-A | Fig.3-76 |
| MAIN: | Sel. meas. loop C-G | Fig.3-76 |
| MAIN: | Sel. meas. loop PG | Fig.3-76 |
| MAIN: | Sel. meas. loop PP | Fig.3-76 |
| MAIN: | Starting A int. | Fig.3-45 |
| MAIN: | Starting B int. | Fig.3-45 |
| MAIN: | Starting C int. | Fig.3-45 |
| MAIN: | Starting Ineg | Fig.3-45 |
| MAIN: | Starting N int. | Fig.3-45 |
| MAIN: | Time tag | Fig.3-51 |
| MP: | Block. replica THERM | Fig.3-159 |
| MP: | IP,max r.m.s./Iref | Fig.3-154 |
| MP: | Istup> | Fig.3-159 |
| MP: | Machine stopped | Fig.3-159 |
| MP: | St. kP*Iref>/Istup> | Fig.3-154 |
| OL_RC:: | Overload recording n | Fig.3-63 |

Appendix B - List of Signals

(continued)

| | | |
|--------|-----------------------|-----------|
| P<>: | P | Fig.3-184 |
| P<>: | P- | Fig.3-184 |
| P<>: | P+ | Fig.3-184 |
| P<>: | Q | Fig.3-184 |
| P<>: | Q- | Fig.3-184 |
| P<>: | Q+ | Fig.3-184 |
| SCDD: | Block. dir. tkINref> | Fig.3-114 |
| SCDD: | Block. dir. tkIref> | Fig.3-110 |
| SCDD: | Block. direct. tI> | Fig.3-110 |
| SCDD: | Block. direct. tI>> | Fig.3-110 |
| SCDD: | Block. direct. tIN> | Fig.3-114 |
| SCDD: | Block. direct. tIN>> | Fig.3-114 |
| SCDD: | Determin. N enabled | Fig.3-112 |
| SCDD: | Determin. P enabled | Fig.3-108 |
| SCDD: | Phase curr.stage bl. | Fig.3-108 |
| SCDD: | Resid. curr.stage bl. | Fig.3-112 |
| SOTF: | Bl. ARC by close cmd | Fig.3-116 |
| THERM: | I | Fig.3-165 |
| V<>: | <u>V</u> neg | Fig.3-173 |
| V<>: | <u>V</u> NG | Fig.3-176 |
| V<>: | <u>V</u> pos | Fig.3-173 |

Appendix B - List of Signals

(continued)

B 2 Telecontrol Interface per EN 60870-5-101 or IEC 870-5-101 (Companion Standard)

This section incorporates Section 8 of EN 60870-5-101 (1996), which includes a general definition of the telecontrol interface for substation control systems.

B 2.1 Interoperability

This application-based standard (companion standard) specifies parameter sets and other options from which subsets are to be selected in order to implement specific telecontrol systems. Certain parameters such as the number of octets in the COMMON ADDRESS of the ASDU are mutually exclusive. This means that only one value of the defined parameter is allowed per system. Other parameters, such as the listed set of different process information in the command and monitor direction, permit definition of the total number or of subsets that are suitable for the given application. This section combines the parameters given in the previous sections in order to facilitate an appropriate selection for a specific application. If a system is made up of several system components supplied by different manufacturers ("equipment stemming"), then it is necessary for all partners to agree on the selected parameters.

The boxes for the selected parameters should be checked.

Note: The overall definition of a system may also require individual selection of certain parameters for specific parts of a system such as individual selection of scaling factors for individually addressable measured values.

B 2.1.1 Network Configuration (Network-Specific Parameters)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Point-to-point configuration | <input checked="" type="checkbox"/> Multipoint-party line configuration |
| <input checked="" type="checkbox"/> Multiple point-to-point configuration | <input type="checkbox"/> Multipoint-star configuration |

Appendix B - List of Signals

(continued)

B 2.1.2 Physical Layer (Network-Specific Parameters)

Transmission Rate (Control Direction) ¹

| Unbalanced interface V.24/V.28 Standardized | Unbalanced interface V.24/V.28 Recommended with > 1 200 bit/s | Balanced interface X.24/X.27 |
|---|--|--|
| <input type="checkbox"/> 100 bit/s | <input checked="" type="checkbox"/> 2 400 bit/s | <input type="checkbox"/> 2 400 bit/s <input type="checkbox"/> 56 000 bit/s |
| <input type="checkbox"/> 200 bit/s | <input checked="" type="checkbox"/> 4 800 bit/s | <input type="checkbox"/> 4 800 bit/s <input type="checkbox"/> 64 000 bit/s |
| <input type="checkbox"/> 300 bit/s | <input checked="" type="checkbox"/> 9 600 bit/s | <input type="checkbox"/> 9 600 bit/s <input type="checkbox"/> |
| <input checked="" type="checkbox"/> 600 bit/s | | <input type="checkbox"/> 19 200 bit/s <input type="checkbox"/> |
| <input checked="" type="checkbox"/> 1 200 bit/s | | <input type="checkbox"/> 38 400 bit/s <input type="checkbox"/> |

Transmission Rate (Monitor Direction) ²

| Unbalanced interface V.24/V.28 Standardized | Unbalanced interface V.24/V.28 Recommended with > 1 200 bit/s | Balanced interface X.24/X.27 |
|---|--|--|
| <input type="checkbox"/> 100 bit/s | <input checked="" type="checkbox"/> 2 400 bit/s | <input type="checkbox"/> 2 400 bit/s <input type="checkbox"/> 56 000 bit/s |
| <input type="checkbox"/> 200 bit/s | <input checked="" type="checkbox"/> 4 800 bit/s | <input type="checkbox"/> 4 800 bit/s <input type="checkbox"/> 64 000 bit/s |
| <input type="checkbox"/> 300 bit/s | <input checked="" type="checkbox"/> 9 600 bit/s | <input type="checkbox"/> 9 600 bit/s <input type="checkbox"/> |
| <input checked="" type="checkbox"/> 600 bit/s | | <input type="checkbox"/> 19 200 bit/s <input type="checkbox"/> |
| <input checked="" type="checkbox"/> 1 200 bit/s | | <input type="checkbox"/> 38 400 bit/s <input type="checkbox"/> |

¹ The transmission rates for control direction and monitor direction must be identical.

Appendix B - List of Signals

(continued)

B 2.1.3 Link Layer (Network-Specific Parameters)

Frame format FT 1.2, single character 1, and the fixed time-out interval are used exclusively in this companion standard.

| Link Transmission Procedure | Address Field of the Link |
|--|---|
| <div><input checked="" type="checkbox"/> Balanced transmission</div> | <div><input checked="" type="checkbox"/> Not present (balanced transmission only)</div> |
| <div><input checked="" type="checkbox"/> Unbalanced transmission</div> | <div><input checked="" type="checkbox"/> One octet</div> <div><input checked="" type="checkbox"/> Two octets ¹</div> |
| Frame Length | <div><input checked="" type="checkbox"/> Structured</div> <div><input checked="" type="checkbox"/> Unstructured</div> |
| <div>240 Maximum length L (number of octets)</div> | |

¹ Balanced only.

Appendix B - List of Signals

(continued)

B 2.1.4 Application Layer

Transmission mode for application data

Mode 1 (least significant octet first), as defined in clause 4.10 of IEC 870-5-4, is used exclusively in this companion standard.

Common Address of ASDU (System-Specific Parameter)

☒ One octet

☒ Two octets

Information Object Address (System-Specific Parameter)

☒ One octet

☒ Structured

☒ Two octets

☒ Unstructured

☒ Three octets

☐

Cause of Transmission (System-Specific Parameter)

☒ One octet

☒ Two octets (with originator address)

Appendix B - List of Signals

(continued)

Selection of Standard ASDUs

Process Information in Monitor Direction (Station-Specific Parameter)

| | | | | |
|-------------------------------------|------|---|--|-----------|
| <input checked="" type="checkbox"/> | <1> | = | Single-point information | M_SP_NA_1 |
| <input checked="" type="checkbox"/> | <2> | = | Single-point information with time tag | M_SP_TA_1 |
| <input checked="" type="checkbox"/> | <3> | = | Double-point information | M_DP_NA_1 |
| <input checked="" type="checkbox"/> | <4> | = | Double-point information with time tag | M_DP_TA_1 |
| <input checked="" type="checkbox"/> | <5> | = | Step position information | M_ST_NA_1 |
| <input checked="" type="checkbox"/> | <6> | = | Step position information with time tag | M_ST_TA_1 |
| <input checked="" type="checkbox"/> | <7> | = | Bit string of 32 bit | M_BO_NA_1 |
| <input checked="" type="checkbox"/> | <8> | = | Bit string of 32 bit with time tag | M_BO_TA_1 |
| <input checked="" type="checkbox"/> | <9> | = | Measured value, normalized value | M_ME_NA_1 |
| <input checked="" type="checkbox"/> | <10> | = | Measured value, normalized value with time tag | M_ME_TA_1 |
| <input type="checkbox"/> | <11> | = | Measured value, scaled value | M_ME_NB_1 |
| <input checked="" type="checkbox"/> | <12> | = | Measured value, scaled value with time tag | M_ME_TB_1 |
| <input type="checkbox"/> | <13> | = | Measured value, short floating point value | M_ME_NC_1 |
| <input type="checkbox"/> | <14> | = | Measured value, short floating point value with time tag | M_ME_TC_1 |
| <input checked="" type="checkbox"/> | <15> | = | Integrated totals | M_IT_NA_1 |
| <input checked="" type="checkbox"/> | <16> | = | Integrated totals with time tag | M_IT_TA_1 |
| <input checked="" type="checkbox"/> | <17> | = | Event of protection equipment with time tag | M_EP_TA_1 |

Appendix B - List of Signals

(continued)

| | | | | |
|-------------------------------------|------|---|---|------------|
| <input checked="" type="checkbox"/> | <18> | = | Packed start events of protection equipment with time tag | ME_EP_TB_1 |
| <input checked="" type="checkbox"/> | <19> | = | Packed output circuit information of protection equipment with time tag | M_EP_TC_1 |
| <input type="checkbox"/> | <20> | = | Packed single-point information with status change detection | M_PS_NA_1 |
| <input type="checkbox"/> | <21> | = | Measured value, normalized value without quality descriptor | M_ME_ND_1 |

Appendix B - List of Signals

(continued)

Process Information in Monitor Direction ¹ (Station-Specific Parameter)

| | | | | |
|-------------------------------------|------|---|---|-----------|
| <input checked="" type="checkbox"/> | <45> | = | Single command | C_SC_NA_1 |
| <input checked="" type="checkbox"/> | <46> | = | Double command | C_DC_NA_1 |
| <input checked="" type="checkbox"/> | <47> | = | Regulating step command | C_IT_NA_1 |
| <input type="checkbox"/> | <48> | = | Set point command, normalized value | C_RC_NA_1 |
| <input type="checkbox"/> | <49> | = | Set point command, scaled value | C_SE_NB_1 |
| <input type="checkbox"/> | <50> | = | Set point command, short floating point value | C_SE_NC_1 |
| <input type="checkbox"/> | <51> | = | Bit string of 32 bit | C_BO_NA_1 |

System Information in Monitor Direction (Station-Specific Parameter)

| | | | | |
|-------------------------------------|------|---|-----------------------|------------|
| <input checked="" type="checkbox"/> | <70> | = | End of initialization | ME_EI_NA_1 |
|-------------------------------------|------|---|-----------------------|------------|

¹ Incorrectly identified with control direction in IEC 870-5-101.

Appendix B - List of Signals

(continued)

System Information in Control Direction (Station-Specific Parameter)

| | | | | |
|-------------------------------------|-------|---|--|-----------|
| <input checked="" type="checkbox"/> | <100> | = | Interrogation command | C_IC_NA_1 |
| <input checked="" type="checkbox"/> | <101> | = | Counter interrogation command | C_CI_NA_1 |
| <input checked="" type="checkbox"/> | <102> | = | Read command | C_RD_NA_1 |
| <input checked="" type="checkbox"/> | <103> | = | Clock synchronization command ¹ | C_CS_NA_1 |
| <input checked="" type="checkbox"/> | <104> | = | Test command | C_TS_NB_1 |
| <input type="checkbox"/> | <105> | = | Reset process command | C_RP_NC_1 |
| <input type="checkbox"/> | <106> | = | Delay acquisition command | C_CD_NA_1 |

¹ The command procedure is formally processed, but there is no change in the local time in the station.

Appendix B - List of Signals

(continued)

Parameter in Control Direction (Station-Specific Parameter)

| | | | | |
|-------------------------------------|-------|---|---|-----------|
| <input checked="" type="checkbox"/> | <110> | = | Parameter of measured value, normalized value | P_ME_NA_1 |
| <input checked="" type="checkbox"/> | <111> | = | Parameter of measured value, scaled value | P_ME_NB_1 |
| <input type="checkbox"/> | <112> | = | Parameter of measured value, short floating point value | P_ME_NC_1 |
| <input type="checkbox"/> | <113> | = | Parameter activation | P_AC_NA_1 |

File Transfer (Station-Specific Parameter)

| | | | | |
|--------------------------|-------|---|--|-----------|
| <input type="checkbox"/> | <120> | = | File ready | F_FR_NA_1 |
| <input type="checkbox"/> | <121> | = | Section ready | F_SR_NA_1 |
| <input type="checkbox"/> | <122> | = | Call directory, select file, call file, call section | F_SC_NA_1 |
| <input type="checkbox"/> | <123> | = | Last section, last segment | F_LS_NA_1 |
| <input type="checkbox"/> | <124> | = | Ack file, ack section | F_AF_NA_1 |
| <input type="checkbox"/> | <125> | = | Segment | F_SG_NA_1 |
| <input type="checkbox"/> | <126> | = | Directory | F_DR_TA_1 |

Appendix B - List of Signals

(continued)

B 2.1.5 Basic Application Functions

Station Initialization (Station-Specific Parameter)

☒ Remote initialization

General Interrogation (System- or Station-Specific Parameter)

☒ Global

☒ Group 1

☒ Group 7

☒ Group 13

☒ Group 2

☒ Group 8

☒ Group 14

☒ Group 3

☒ Group 9

☒ Group 15

☒ Group 4

☒ Group 10

☒ Group 16

☒ Group 5

☒ Group 11

☒ Group 6

☒ Group 12

Addresses per group have to be defined.

Clock Synchronization (Station-Specific Parameter)

☒ Clock synchronization

Appendix B - List of Signals

(continued)

Command Transmission (Object-Specific Parameter)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Direct command transmission | <input type="checkbox"/> Select and execute command |
| <input type="checkbox"/> Direct set point command transmission | <input type="checkbox"/> Select and execute set point command |
| | <input type="checkbox"/> C_SE ACTTERM used |
| <input type="checkbox"/> No additional definition | |
| <input type="checkbox"/> Short pulse duration (Execution duration determined by a system parameter in the outstation) | |
| <input type="checkbox"/> Long pulse duration (Execution duration determined by a system parameter in the outstation) | |
| <input type="checkbox"/> Persistent output | |

Transmission of Integrated Totals (Station- or Object-Specific Parameter)

- | | |
|---|---|
| <input type="checkbox"/> Counter request | <input checked="" type="checkbox"/> General request counter |
| <input type="checkbox"/> Counter freeze without reset | <input checked="" type="checkbox"/> Request counter group 1 |
| <input type="checkbox"/> Counter freeze with reset | <input checked="" type="checkbox"/> Request counter group 2 |
| <input type="checkbox"/> Counter reset | <input checked="" type="checkbox"/> Request counter group 3 |
| Addresses per group have to be specified | <input checked="" type="checkbox"/> Request counter group 4 |

Appendix B - List of Signals

(continued)

Parameter Loading (Object-Specific Parameter)

- ☒ Threshold value
- ☐ Smoothing factor
- ☐ Low limit for transmission of measured value
- ☐ High limit for transmission of measured value

Parameter Activation (Object-Specific Parameter)

- ☐ Act/deact of persistent cyclic or periodic transmission of the addressed object

File Transfer (Station-Specific Parameter)

- | | | |
|--------------------------|-------------------------------------|-----------|
| <input type="checkbox"/> | File transfer in monitor direction] | F_FR_NA_1 |
| <input type="checkbox"/> | File transfer in control direction] | F_FR_NA_1 |

Appendix B - List of Signals

(continued)

B 3 Communication Interface per IEC 60870-5-103

This section incorporates Section 8 of IEC 60870-5-103, including definitions applicable to the PQ 7x2.

B 3.1 Interoperability

B 3.1.1 Physical Layer

B 3.1.1.1 Electrical Interface



EIA RS 485



No. of loads 32 for one device

Note: EIA RS 485 defines the loads in such a way that 32 of them can be operated on one line. For detailed information see EIA RS 485, Section 3.

B 3.1.1.2 Optical Interface



Glass fiber



Plastic fiber



F-SMA connector



BFOC/2.5 connector

B 3.1.1.3 Transmission Rate



9 600 bit/s



19 200 bit/s

Appendix B - List of Signals

(continued)

B 3.1.2 Link Layer

There are no selection options for the link layer.

B 3.1.3 Application Layer

B 3.1.3.1 Transmission Mode for Application Data

Mode 1 (least significant octet first) as defined in clause 4.10 of IEC 60870-5-4 is used exclusively in this companion standard.

B 3.1.3.2 Common Address of ASDU

☒ One COMMON ADDRESS of ASDU (identical to the station address)

☐ More than one COMMON ADDRESS of ASDU

B 3.1.3.3 Selection of Standard Information Numbers in Monitor Direction

B 3.1.3.3.1 System Functions in Monitor Direction

| INF | Description |
|---|------------------------------|
| <input checked="" type="checkbox"/> <0> | End of general interrogation |
| <input checked="" type="checkbox"/> <0> | Time synchronization |
| <input checked="" type="checkbox"/> <2> | Reset FCB |
| <input checked="" type="checkbox"/> <3> | Reset CU |
| <input checked="" type="checkbox"/> <4> | Start / restart |
| <input type="checkbox"/> <5> | Power on |

Appendix B - List of Signals

(continued)

B 3.1.3.3.2 Status Indications in Monitor Direction

| Designations as in IEC 60870-5-103 Section 8 ¹ | | | Designations as in the Device Address List | |
|---|-----------|---------------------------|--|-----------------------------|
| INF | Semantics | | Address | Descriptor |
| <input checked="" type="checkbox"/> | <16> | Auto-recloser active | 015 064 | ARC: Enabled |
| <input checked="" type="checkbox"/> | <17> | Teleprotection active | 015 008 | PSIG: Enabled |
| <input checked="" type="checkbox"/> | <18> | Protection active | 003 030 | MAIN: Protection enabled |
| <input type="checkbox"/> | <19> | LED reset | 021 010 | MAIN: Reset indicat. USER |
| <input checked="" type="checkbox"/> | <20> | Monitor direction blocked | 037 075 | COMM1: Sig./meas.val.block. |
| <input checked="" type="checkbox"/> | <21> | Test mode | 037 071 | MAIN: Test mode |
| <input type="checkbox"/> | <22> | Local parameter setting | | |
| <input checked="" type="checkbox"/> | <23> | Characteristic 1 | 036 090 | PSS: PS 1 active |
| <input checked="" type="checkbox"/> | <24> | Characteristic 2 | 036 091 | PSS: PS 2 active |
| <input checked="" type="checkbox"/> | <25> | Characteristic 3 | 036 092 | PSS: PS 3 active |
| <input checked="" type="checkbox"/> | <26> | Characteristic 4 | 036 093 | PSS: PS 4 active |
| <input type="checkbox"/> | <27> | Auxiliary input 1 | 034 000 | LOGIC: Input 1 EXT |
| <input checked="" type="checkbox"/> | <28> | Auxiliary input 2 | 034 001 | LOGIC: Input 2 EXT |
| <input checked="" type="checkbox"/> | <29> | Auxiliary input 3 | 034 002 | LOGIC: Input 3 EXT |
| <input checked="" type="checkbox"/> | <30> | Auxiliary input 4 | 034 003 | LOGIC: Input 4 EXT |

¹ Different designations are used, for example, in IEC 60870-5-103 Annex A (phase A rather than L1).

Appendix B - List of Signals

(continued)

B 3.1.3.3.3 Monitoring Signals (Supervision Indications) in Monitor Direction

| Designations as in IEC 60870-5-103 Section 8 | | | Designations as in the Device Address List | |
|--|-------------------|----------------------------|--|-----------------------------|
| INF | Semantics | | Address | Descriptor |
| <input checked="" type="checkbox"/> | <32> | Measurand supervision I | 040 087 | MCMON: Meas. circ. I faulty |
| <input checked="" type="checkbox"/> | <33> | Measurand supervision V | 038 023 | MCMON: Meas. circ. V faulty |
| <input checked="" type="checkbox"/> | <35> | Phase sequence supervision | 038 049 | MCMON: Phase sequ. V faulty |
| <input checked="" type="checkbox"/> | <36> ¹ | Trip circuit supervision | 041 200 | SFMON: Relay Kxx faulty |
| <input type="checkbox"/> | <37> | I>> back-up operation | | |
| <input checked="" type="checkbox"/> | <38> | VT fuse failure | 004 061 | MAIN: M.c.b. trip V EXT |
| <input checked="" type="checkbox"/> | <39> | Teleprotection disturbed | 036 060 | PSIG: Telecom. faulty |
| <input checked="" type="checkbox"/> | <46> | Group warning | 036 100 | SFMON: Warning (relay) |
| <input checked="" type="checkbox"/> | <47> | Group alarm | 004 065 | MAIN: Blocked/faulty |

¹ The message content is formed from the OR operation of the individual signals

Appendix B - List of Signals

(continued)

B 3.1.3.3.4 Earth Fault Indications in Monitor Direction

| Designations as in IEC 60870-5-103 Section 8 ¹ | | | Designations as in the Device Address List | |
|---|-----------|----------------------------------|--|----------------------------|
| INF | Semantics | | Address | Descriptor |
| <input checked="" type="checkbox"/> | <48> | Earth fault L1 | 041 054 | MAIN: Ground fault A |
| <input checked="" type="checkbox"/> | <49> | Earth fault L2 | 041 055 | MAIN: Ground fault B |
| <input checked="" type="checkbox"/> | <50> | Earth fault L3 | 041 056 | MAIN: Ground fault C |
| <input type="checkbox"/> | <51> | Earth fault forward, i.e. line | 041 088 | MAIN: Gnd. fault forw./LS |
| <input checked="" type="checkbox"/> | <52> | Earth fault reverse, i.e. busbar | 041 089 | MAIN: Gnd. fault backw./BS |

¹ Different designations are used, for example, in IEC 60870-5-103 Annex A (phase A rather than L1).

Appendix B - List of Signals

(continued)

B 3.1.3.3.5 Fault Indications in Monitor Direction

| Designations as in IEC 60870-5-103 Section 8 ¹ | | | Designations as in the Device Address List | |
|---|--|--|--|----------------------------|
| INF | Semantics | | Address | Descriptor |
| <input checked="" type="checkbox"/> | <64> Start /pick-up L1 | | 040 005 | MAIN: Starting A |
| <input checked="" type="checkbox"/> | <65> Start /pick-up L2 | | 040 006 | MAIN: Starting B |
| <input checked="" type="checkbox"/> | <66> Start /pick-up L3 | | 040 007 | MAIN: Starting C |
| <input checked="" type="checkbox"/> | <67> Start /pick-up N | | 040 008 | MAIN: Starting GF |
| <input checked="" type="checkbox"/> | <68> General trip | | 036 071 | MAIN: Gen. trip command 1 |
| <input type="checkbox"/> | <69> Trip L1 | | | |
| <input type="checkbox"/> | <70> Trip L2 | | | |
| <input type="checkbox"/> | <71> Trip L3 | | | |
| <input type="checkbox"/> | <72> Trip I>> (back-up operation) | | | |
| <input checked="" type="checkbox"/> | <73> Fault location X in ohms | | 004 029 | FT_DA: Fault react., prim. |
| <input checked="" type="checkbox"/> | <74> Fault forward/line | | 036 018 | SCDD: Fault P forward |
| <input checked="" type="checkbox"/> | <75> Fault reverse/busbar | | 036 019 | SCDD: Fault P backward |
| <input checked="" type="checkbox"/> | <76> Teleprotection signal transmitted | | 036 035 | PSIG: Send (signal) |
| <input checked="" type="checkbox"/> | <77> Teleprotection signal received | | 037 029 | PSIG: Receive (signal) |
| <input type="checkbox"/> | <78> Zone 1 | | | |
| <input type="checkbox"/> | <79> Zone 2 | | | |
| <input type="checkbox"/> | <80> Zone 3 | | | |
| <input type="checkbox"/> | <81> Zone 4 | | | |
| <input type="checkbox"/> | <82> Zone 5 | | | |
| <input type="checkbox"/> | <83> Zone 6 | | | |

¹ Different designations are used, for example, in IEC 60870-5-103 Annex A (phase A rather than L1).

Appendix B - List of Signals

(continued)

Designations as in IEC 60870-5-103 Section 8 ¹

INF Semantics

| | | |
|-------------------------------------|------|--------------------------|
| <input checked="" type="checkbox"/> | <84> | General start/pick-up |
| <input checked="" type="checkbox"/> | <85> | Breaker failure |
| <input type="checkbox"/> | <86> | Trip measuring system L1 |
| <input type="checkbox"/> | <87> | Trip measuring system L2 |
| <input type="checkbox"/> | <88> | Trip measuring system L3 |
| <input type="checkbox"/> | <89> | Trip measuring system E |
| <input checked="" type="checkbox"/> | <90> | Trip I> |
| <input checked="" type="checkbox"/> | <91> | Trip I>> |
| <input checked="" type="checkbox"/> | <92> | Trip IN> |
| <input checked="" type="checkbox"/> | <93> | Trip IN>> |

Designations as in the Device Address List

Address Descriptor

| | |
|---------|----------------------------|
| 040 000 | MAIN: General starting |
| 036 017 | CBF: CB failure |
| 040 042 | MAIN: TripSig. tl>/tlrefP> |
| 040 011 | DTOC: Trip signal tl>> |
| 040 043 | MAIN: TripSig tIN>/tlrefN> |
| 040 028 | DTOC: Trip signal tIN>> |

Appendix B - List of Signals

(continued)

B 3.1.3.3.6 Auto-Reclosure Indications in Monitor Direction

| Designations as in IEC 60870-5-103 Section 8 | | | Designations as in the Device Address List | |
|--|-----------|-------------------------|--|---------------------------|
| INF | Semantics | | Address | Descriptor |
| <input checked="" type="checkbox"/> | <128> | CB 'on' by AR | 037 007 | ARC: (Re)close signal HSR |
| <input checked="" type="checkbox"/> | <129> | CB 'on' by long-time AR | 037 006 | ARC: (Re)close signal TDR |
| <input checked="" type="checkbox"/> | <130> | AR blocked | 037 008 | ARC: Not ready |

B 3.1.3.3.7 Measurands in Monitor Direction

| Designations as in IEC 60870-5-103 Section 8 | | | Designations as in the Device Address List | |
|--|--------------------|--|--|----------------------------|
| INF | Semantics | | Address | Descriptor |
| <input checked="" type="checkbox"/> | <144> ¹ | Measurand I | 006 041 | MAIN: Current B p.u. |
| <input checked="" type="checkbox"/> | <145> ² | Measurands I, V | 006 041 | MAIN: Current B p.u. |
| | | | 005 045 | MAIN: Voltage A-B p.u. |
| <input checked="" type="checkbox"/> | <146> ³ | Measurands I, V, P, Q | 006 041 | MAIN: Current B p.u. |
| | | | 005 045 | MAIN: Voltage A-B p.u. |
| | | | 004 051 | MAIN: Active power P p.u. |
| | | | 004 053 | MAIN: Reac. power Q p.u. |
| <input checked="" type="checkbox"/> | <147> ⁴ | Measurands I _N , V _{EN} | 005 011 | MAIN: Current Σ(IP) p.u. |
| | | | 005 013 | MAIN: Volt. Σ(VPG)/√3 p.u. |
| <input checked="" type="checkbox"/> | <148> ⁵ | Measurands I _{L1,2,3} , V _{L1,2,3} , P, Q, f | 005 041 | MAIN: Current A p.u. |
| | | | 006 041 | MAIN: Current B p.u. |
| | | | 007 041 | MAIN: Current C p.u. |
| | | | 005 043 | MAIN: Voltage A-G p.u. |
| | | | 006 043 | MAIN: Voltage B-G p.u. |
| | | | 007 043 | MAIN: Voltage C-G p.u. |
| | | | 004 051 | MAIN: Active power P p.u. |
| | | | 004 053 | MAIN: Reac. power Q p.u. |
| | | | 004 040 | MAIN: Frequency f |

¹ Only when COMM1: Transm. enab. cycl. data is set at "ASDU 3.1 per IEC"

² Only when COMM1: Transm. enab. cycl. data is set at "ASDU 3.2 per IEC"

³ Only when COMM1: Transm. enab. cycl. data is set at "ASDU 3.3 per IEC"

⁴ Only when COMM1: Transm. enab. cycl. data is set at "ASDU 3.4 per IEC"

⁵ Only when COMM1: Transm. enab. cycl. data is set at "ASDU 9 per IEC"

Appendix B - List of Signals

(continued)

B 3.1.3.3.8 Generic Functions in Monitor Direction

Designations as in IEC 60870-5-103 Section 8

| INF | Semantics |
|--------------------------------|---|
| <input type="checkbox"/> <240> | Read headings of all defined groups |
| <input type="checkbox"/> <241> | Read values or attributes of all entries of one group |
| <input type="checkbox"/> <243> | Read directory of a single entry |
| <input type="checkbox"/> <244> | Read value or attribute of a single entry |
| <input type="checkbox"/> <245> | End of general interrogation of generic data |
| <input type="checkbox"/> <249> | Write entry with confirmation |
| <input type="checkbox"/> <250> | Write entry with execution |
| <input type="checkbox"/> <251> | Write entry aborted |

Appendix B - List of Signals

(continued)

B 3.1.3.4 Selection of Standard Information Numbers in Control Direction

B 3.1.3.4.1 System Functions in Control Direction

Designations as in IEC 60870-5-103 Section 8

INF

Semantics



<0>

Initiation of general interrogation



<0>

Time synchronization

B 3.1.3.4.2 General Commands in Control Direction

Designations as in IEC 60870-5-103 Section 8

INF

Semantics



<16>

Auto-recloser on/off



<17>

Teleprotection on/off



<18>

Protection on/off



<19>

LED reset



<23>¹

Activate characteristic 1



<24>²

Activate characteristic 2



<25>³

Activate characteristic 3



<26>⁴

Activate characteristic 4

Designations as in the Device Address List

Address Descriptor

015 060 ARC: General enable USER

015 004 PSIG: General enable USER

003 030 MAIN: Protection enabled

021 010 MAIN: Reset indicat. USER

003 060 PSS: Param.subs.sel. USER

003 060 PSS: Param.subs.sel. USER

003 060 PSS: Param.subs.sel. USER

003 060 PSS: Param.subs.sel. USER

¹ Switches PSS: Select PS USER to "Parameter set 1"

² Switches PSS: Select PS USER to "Parameter set 2"

³ Switches PSS: Select PS USER to "Parameter set 3"

⁴ Switches PSS: Select PS USER to "Parameter set 4"

Appendix B - List of Signals

(continued)

B 3.1.3.4.3 Generic Functions in Control Direction

Designations as in IEC 60870-5-103 Section 8

INF

Semantics

| | | |
|--------------------------|-------|---|
| <input type="checkbox"/> | <240> | Read headings of all defined groups |
| <input type="checkbox"/> | <241> | Read values or attributes of all entries of one group |
| <input type="checkbox"/> | <243> | Read directory of a single entry |
| <input type="checkbox"/> | <244> | Read value or attribute of a single entry |
| <input type="checkbox"/> | <245> | General interrogation of generic data |
| <input type="checkbox"/> | <248> | Write entry |
| <input type="checkbox"/> | <249> | Write entry with confirmation |
| <input type="checkbox"/> | <250> | Write entry with execution |
| <input type="checkbox"/> | <251> | Write entry abort |

Appendix B - List of Signals

(continued)

B 3.1.3.5 Basic Application Functions

- ☒ Test mode
- ☒ Blocking of monitor direction
- ☒ Disturbance data
- ☐ Generic services
- ☒ Private data

B 3.1.3.6 Miscellaneous

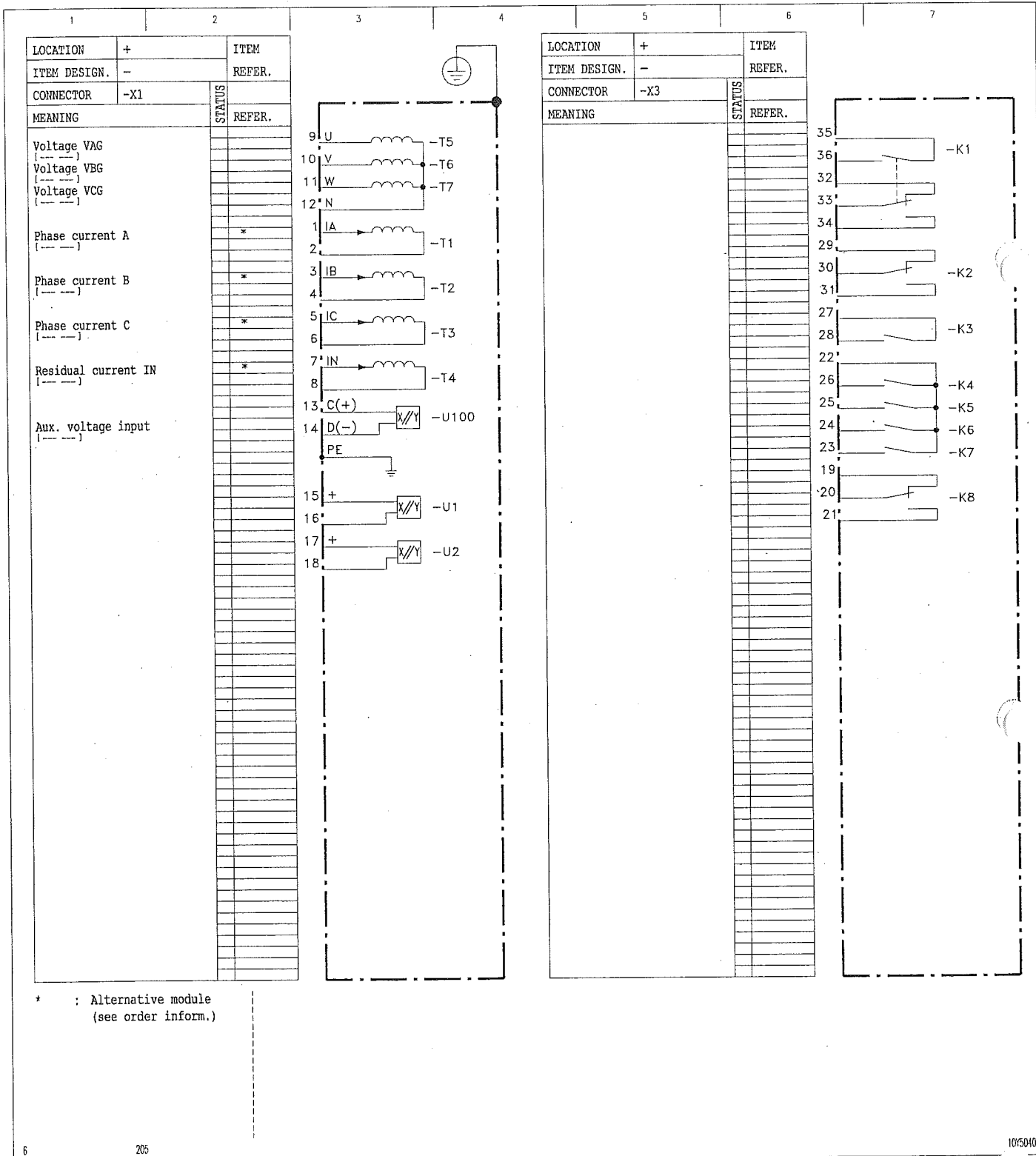
Measured values are transmitted both with ASDU 3 and ASDU 9. As defined in Sec. 7.2.6.8, the maximum MVAL can be either 1.2 or 2.4 times the rated value. In ASDU 3 and ASDU 9, different ratings may not be used; in other words, there is only one choice for each measurand.

| Measurand Designations as in IEC 60870-5-103 Section 8 ¹ | Measured value Designations as in the Device Address List | Max. MVAL = nom. value multiplied by | |
|---|---|---|-------------------------------------|
| | | 1.2 | or 2.4 |
| Current L1 | Current A | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Current L2 | Current B | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Current L3 | Current C | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Voltage L1-E | Voltage A-G | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Voltage L2-E | Voltage B-G | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Voltage L3-E | Voltage C-G | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Active power P | Active power P | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Reactive power Q | Reactive power Q | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Frequency f | Frequency f | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Voltage L1-L2 | Voltage A-B | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

¹ IEC 60870-5-103 Annex also uses phase A rather than L1.

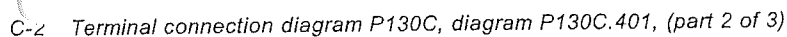
Appendix C - Terminal Connection Diagrams

C 1 Terminal Connection Diagrams



C-1 Terminal connection diagram P130C, diagram P130C.401, (part 1 of 3)

(continued)



(continued)

8

8

Anhang D / Appendix D - Adressenliste / Address List

Legende

Spalte "Ändern"

on: "on" bedeutet, daß der Wert auch bei eingeschalteter Schutzfunktion geändert werden kann.

off: "off" bedeutet, daß der Wert nur bei ausgeschalteter Schutzfunktion geändert werden kann.

-. "-" bedeutet, daß der Wert nicht durch Bedienung änderbar ist.

Spalten "Wertebereich" und "Einheit bzw. Bedeutung"

Die Grundeinstellung ist unterstrichen.

Spalte "Anmerkungen"

Reset: Der Zähler, Meßwert usw. kann einzeln rückgestellt werden.

003 002: Der Zähler, Meßwert usw. kann über Adresse xxx yyy, in diesem Beispiel 003 002, rückgestellt werden.

P): Die Werteänderung ist paßwortgeschützt.

28 aus n: Aus der Auswahltable mit n Einträgen können 28 (Beispiel) ausgewählt werden.

Funktionsgruppen

| | |
|--------|--|
| AMZ: | Abhängiger Überstromzeitschutz |
| AUSG: | Binäre Ausgabe |
| AWE: | Automatische Wiedereinschaltung |
| BT_AZ: | Betriebsaufzeichnung |
| EING: | Binäre Eingabe |
| ES_AZ: | Erdschlußaufzeichnung |
| ES_ME: | Erdschlußmeßwerterfassung |
| EWATT: | Erdschlußrichtungserkennung, wattmetrisch |
| FKT_T | Konfigurierbare Funktionstasten |
| f<>: | Frequenzschutz |
| GERÄT: | Gerät |
| GRENZ: | Grenzwertüberwachung |
| GRUND: | Grundfunktion |
| IRIGB: | IRIG-B-Schnittstelle |
| I2> | Unsymmetrieschutz |
| KOMM1 | "Logische" Kommunikationsschnittstelle 1 |
| KOMM2 | "Logische" Kommunikationsschnittstelle 2 |
| KOMM3 | "Logische" Kommunikationsschnittstelle 3 |
| KURI: | Kurzschlußrichtungserkennung |
| LED: | Leuchtanzeige (LED) |
| LOGIK: | Logik |
| LSV: | Leistungsschalterversagerschutz |
| MS: | Motorschutz |
| MKÜ: | Meßkreisüberwachung |
| PC: | PC-Kopplung |
| P<>: | Leistungsrichtungsschutz |
| PSU: | Parametersatzumschaltung |
| SELBÜ: | Selbstüberwachung |
| ST_AZ: | Störfallaufzeichnung |
| ST_ME: | Störfallmeßwerterfassung |
| SV: | Signalvergleich |
| THERM: | Thermischer Überlastschutz |
| U<>: | Spannungszeitschutz |
| ÜL_AZ: | Überlastaufzeichnung |
| ÜL_ME: | Überlastmeßwerterfassung |
| UMZ: | Unabhängiger Überstromzeitschutz |
| ÜW_AZ: | Überwachungsaufzeichnung |
| VOB: | Vor-Ort-Bedienung |
| ZUKS: | Schutz bei Zuschalten auf einen Kurzschluß |

Anhang D / Appendix D - Adressenliste / Address List

(Fortsetzung / continued)

Key

"Change" Column

on: "on" (on-line) means that the value can be changed even when the protective function is enabled.

off: "off" (off-line) means that the value can be changed provided that the protective function is disabled.

-: "-" means that the value cannot be modified by control action.

"Range of Values" Column

The default setting is underlined.

"Unit or Meaning" Column

The default setting is underlined.

"Remarks" Column

Reset: The counter, measured value, etc. can be reset separately.

003 002: The counter, measured value, etc. can be reset via address xxx yyy (address 003 002 in this example).

P): The value change is password-protected.

28 out of n: From the selection table containing n entries, 28 entries (in this example) may be selected.

Function Groups

| | |
|--------|--|
| ARC: | Auto-reclosing control |
| CBF: | Circuit breaker failure protection |
| COMM1: | "Logical" communication interface 1 |
| COMM2: | "Logical" communication interface 2 |
| COMM3: | "Logical" communication interface 3 |
| DTOC: | Definite-time overcurrent protection |
| DVICE: | Device |
| FT_DA: | Fault data acquisition |
| FT_RC: | Fault recording |
| f<>: | Frequency protection |
| F_KEY | Function Keys |
| GF_DA: | Ground fault data acquisition |
| GF_RC: | Ground fault recording |
| GFDSS: | Ground fault direction determination using steady-state values |
| I2>: | Unbalance protection |
| IDMT: | Inverse-time overcurrent protection |
| INP: | Binary input |
| LED: | LED indicators |
| LIMIT: | Limit monitoring |
| LOC: | Local control panel |
| LOGIC: | Logic |
| MAIN: | Main function |
| MCMON: | Measuring-circuit monitoring |
| MP: | Motor protection |
| MT_RC: | Monitoring signal recording |
| OL_DA: | Overload data acquisition |
| OL_RC: | Overload recording |
| OP_RC: | Operating data recording |
| OUTP: | Binary and analog output |
| P<>: | Power directional protection |
| PC: | PC link |
| PSIG: | Protective signaling |
| PSS: | Parameter subset selection |
| SCDD: | Short-circuit direction determination |
| SFMON: | Self-monitoring |
| SOTF: | Switch on to fault protection |
| THERM: | Thermal overload protection |
| V<>: | Time-voltage protection |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-3
Par/Kenn // Par/DvID

D 1 Parameter / Parameters

D 1.1 Kennwerte / Device Identification

| Adresse /Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------------------|--|------------------|--|---|------------------------|
| 000 000 | GERÄT: Gerätetyp DVICE: Device type | - | PX 130 | | |
| 002 120 | GERÄT: Softwarestand DVICE: Software version | - | 0.00 ... 655.35 nicht eingemessen / Not measured Überlauf / Overflow | | |
| 002 122 | GERÄT: SW Datum DVICE: SW date | - | 0 ... 37200 | tt.mm.jj dd.mm.yy | |
| 002 103 | GERÄT: SW-Stand Kommu. DVICE: SW version communic. | - | 0.00 ... 655.35 nicht eingemessen / Not measured | | |
| 002 123 | GERÄT: Sprachversion DVICE: Language version | - | 0.0 ... 899.9 | | |
| 002 121 | GERÄT: Textvers.Datenmodell DVICE: Text vers.data model | - | 0 ... 255 | | |
| 002 124 | GERÄT: F-Nummer DVICE: F number | - | 6.xxxxxxx.x | | |
| 000 001 | GERÄT: Bestell-Nr. DVICE: Order No. | - | 0 ... 9999 | | |
| 000 003 | GERÄT: Best.-Anh.-Nr. 1 DVICE: Order ext. No. 1 | off | 0 ... 999 | | |
| 000 004 | GERÄT: Best.-Anh.-Nr. 2 DVICE: Order ext. No. 2 | off | 0 ... 999 | | |
| 000 005 | GERÄT: Best.-Anh.-Nr. 3 DVICE: Order ext. No. 3 | off | 0 ... 999 | | |
| 000 006 | GERÄT: Best.-Anh.-Nr. 4 DVICE: Order ext. No. 4 | off | 0 ... 999 | | |
| 000 007 | GERÄT: Best.-Anh.-Nr. 5 DVICE: Order ext. No. 5 | off | 0 ... 999 | | |
| 000 008 | GERÄT: Best.-Anh.-Nr. 6 DVICE: Order ext. No. 6 | off | 0 ... 999 | | |
| 000 009 | GERÄT: Best.-Anh.-Nr. 7 DVICE: Order ext. No. 7 | off | 0 ... 999 | | |
| 000 010 | GERÄT: Best.-Anh.-Nr. 8 DVICE: Order ext. No. 8 | off | 0 ... 999 | | |
| 000 011 | GERÄT: Best.-Anh.-Nr. 9 DVICE: Order ext. No. 9 | off | 0 ... 999 | | |

| Adresse | / Address | Bereichung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------|-----------|--|------------------|---------------------------------|---|------------------------|
| 000 012 | | GERÄT: Best.-Anh.-Nr. 10 DVICE: Order ext. No. 10 | off | 0 ... 999 | | |
| 000 013 | | GERÄT: Best.-Anh.-Nr. 11 DVICE: Order ext. No. 11 | off | 0 ... 999 | | |
| 000 014 | | GERÄT: Best.-Anh.-Nr. 12 DVICE: Order ext. No. 12 | off | 0 ... 999 | | |
| 000 015 | | GERÄT: Best.-Anh.-Nr. 13 DVICE: Order ext. No. 13 | off | 0 ... 999 | | |
| 000 016 | | GERÄT: Best.-Anh.-Nr. 14 DVICE: Order ext. No. 14 | off | 0 ... 999 | | |
| 000 017 | | GERÄT: Best.-Anh.-Nr. 15 DVICE: Order ext. No. 15 | off | 0 ... 999 | | |
| 000 018 | | GERÄT: Best.-Anh.-Nr. 16 DVICE: Order ext. No. 16 | off | 0 ... 999 | | |
| 000 019 | | GERÄT: Best.-Anh.-Nr. 17 DVICE: Order ext. No. 17 | off | 0 ... 999 | | |
| 000 020 | | GERÄT: Best.-Anh.-Nr. 18 DVICE: Order ext. No. 18 | off | 0 ... 999 | | |
| 000 021 | | GERÄT: Best.-Anh.-Nr. 19 DVICE: Order ext. No. 19 | off | 0 ... 999 | | |
| 000 022 | | GERÄT: Best.-Anh.-Nr. 20 DVICE: Order ext. No. 20 | off | 0 ... 999 | | |
| 000 023 | | GERÄT: Best.-Anh.-Nr. 21 DVICE: Order ext. No. 21 | off | 0 ... 999 | | |
| 000 024 | | GERÄT: Best.-Anh.-Nr. 22 DVICE: Order ext. No. 22 | off | 0 ... 999 | | |
| 000 025 | | GERÄT: Best.-Anh.-Nr. 23 DVICE: Order ext. No. 23 | off | 0 ... 999 | | |
| 000 026 | | GERÄT: Best.-Anh.-Nr. 24 DVICE: Order ext. No. 24 | off | 0 ... 999 | | |
| 000 027 | | GERÄT: Best.-Anh.-Nr. 25 DVICE: Order ext. No. 25 | off | 0 ... 999 | | |
| 000 028 | | GERÄT: Best.-Anh.-Nr. 26 DVICE: Order ext. No. 26 | off | 0 ... 999 | | |
| 000 029 | | GERÄT: Best.-Anh.-Nr. 27 DVICE: Order ext. No. 27 | off | 0 ... 999 | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Anhang D / Appendix D / Adressenliste / Address List

(Fortsetzung / continued)

D-5
Par/Kenn // Par/DvID

| Adresse | / Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------|-----------|--|------------------|---|--|------------------------|
| 086 050 | | GERÄT: Baust.var. Platz 1 DVICE: Module var. slot 1 | - | 92 276 277 278 280 281 282 | Baustein P: 9650185 Module P: 9650185 Baustein P: 9651412 Module P: 9651412 Baustein P: 9651413 Module P: 9651413 Baustein P: 9651414 Module P: 9651414 Baustein P: 9651416 Module P: 9651416 Baustein P: 9651417 Module P: 9651417 Baustein P: 9651418 Module P: 9651418 | |
| 086 193 | | GERÄT: Baust.vers. Platz 1 DVICE: Module vers. slot 1 | - | s. Auswahltablelle F 571 see selection table F 571 27 27 | nicht bestückt Not fitted | |
| 086 051 | | GERÄT: Baust.var. Platz 2 DVICE: Module var. slot 2 | - | 93 189 217 245 270 271 272 273 | Baustein X: 9650252 Module X: 9650252 Baustein X: 9651325 Module X: 9651325 Baustein X: 9651353 Module X: 9651353 Baustein X: 9651381 Module X: 9651381 Baustein X: 9651406 Module X: 9651406 Baustein X: 9651407 Module X: 9651407 Baustein X: 9651408 Module X: 9651408 Baustein X: 9651409 Module X: 9651409 | |
| 086 194 | | GERÄT: Baust.vers. Platz 2 DVICE: Module vers. slot 2 | - | s. Auswahltablelle F 571 see selection table F 571 27 27 | nicht bestückt Not fitted | |
| 086 047 | | GERÄT: Baust.var. Baust. A DVICE: Variant of module A | - | 65535 | nicht bestückt Not fitted | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-6
Par/Kenn // Par/DvID

| Adresse | /Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------|----------|---|------------------|-----------------------------------|---|------------------------|
| 086 190 | | GERÄT: Baust.vers. Baust. A DVICE: Version of module A | - | s. Auswahltable F 571 27 27 | nicht bestückt Not fitted | |
| 086 049 | | GERÄT: Baust.vers. Baust. B DVICE: Variant of module B | - | 65535 | nicht bestückt Not fitted | |
| 086 192 | | GERÄT: Baust.vers. Baust. B DVICE: Version of module B | - | s. Auswahltable F 571 27 27 | nicht bestückt Not fitted | |
| 000 040 | | GERÄT: Kundenkenndaten 1 DVICE: Customer ID data 1 | off | 0.00 ... 99.99 | | |
| 000 041 | | GERÄT: Kundenkenndaten 2 DVICE: Customer ID data 2 | off | 0.00 ... 99.99 | | |
| 000 042 | | GERÄT: Kundenkenndaten 3 DVICE: Customer ID data 3 | off | 0.00 ... 99.99 | | |
| 000 043 | | GERÄT: Kundenkenndaten 4 DVICE: Customer ID data 4 | off | 0.00 ... 99.99 | | |
| 000 044 | | GERÄT: Kundenkenndaten 5 DVICE: Customer ID data 5 | off | 0.00 ... 99.99 | | |
| 000 045 | | GERÄT: Kundenkenndaten 6 DVICE: Customer ID data 6 | off | 0.00 ... 99.99 | | |
| 000 046 | | GERÄT: Kundenkenndaten 7 DVICE: Customer ID data 7 | off | 0.00 ... 99.99 | | |
| 000 047 | | GERÄT: Kundenkenndaten 8 DVICE: Customer ID data 8 | off | 0.00 ... 99.99 | | |
| 000 035 | | GERÄT: Geräteerkennung DVICE: Device ID | off | 0 ... 9999 | | |
| 000 036 | | GERÄT: Stationskennung DVICE: Substation ID | off | 0 ... 9999 | | |
| 000 037 | | GERÄT: Abzweigenkennung DVICE: Feeder ID | off | 0 ... 9999 | | |
| 000 048 | | GERÄT: Geräte-Passwort 1 DVICE: Device password 1 | off | 0 ... 9999 | | |
| 000 049 | | GERÄT: Geräte-Passwort 2 DVICE: Device password 2 | off | 0 ... 9999 | | |

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Par/Konf // Par/Conf

D 1.2 Konfigurationsparameter / Configuration Parameters

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--|--|-----------------------|
| | VOB: Landessprache LOC: Language | on | 1 | Deutsch Regional language | |
| | | | 2 | Referenzsprache Reference language | |
| | | on | 1 / 2 | Punkt / Komma Dot / Comma | P |
| | VOB: Dezimaltrennzeichen LOC: Decimal delimiter | on | 0 ... 1234 ... 4444 | | |
| | VOB: Passwort LOC: Password | on | | | |
| | VOB: Fkt. Protokolltaste LOC: Fct. read key | off | siehe Auswahltablelle K 31 see selection table K 31 | GRUND: ohne Funktion MAIN: Without function | 16 aus/of n |
| | VOB: Fkt. Menüspr. liste 1 LOC: Fct. menu jmp list 1 | off | siehe Auswahltablelle K 31 see selection table K 31 | GRUND: ohne Funktion MAIN: Without function | 16 aus/of n |
| | VOB: Fkt. Menüspr. liste 2 LOC: Fct. menu jmp list 2 | off | siehe Auswahltablelle K 31 see selection table K 31 | GRUND: ohne Funktion MAIN: Without function | 16 aus/of n |
| | VOB: Fkt. Betriebstafel LOC: Fct. Operation Panel | off | siehe Auswahltablelle K 6 see selection table K 6 | GRUND: ohne Funktion MAIN: Without function | 28 aus/of n |
| | VOB: Fkt. Überlasttafel LOC: Fct. Overload Panel | off | siehe Auswahltablelle K 6 see selection table K 6 | GRUND: ohne Funktion MAIN: Without function | 8 aus/of n |
| | VOB: Fkt. Erdschlußtafel LOC: Fct. Grd. Fault Panel | off | siehe Auswahltablelle K 6 see selection table K 6 | GRUND: ohne Funktion MAIN: Without function | 8 aus/of n |
| | VOB: Fkt. Störfalltafel LOC: Fct. Fault Panel | off | siehe Auswahltablelle K 4 see selection table K 4 | GRUND: ohne Funktion MAIN: Without function | 8 aus/of n |

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| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|-------------------------------------|--|-----------------------|
| 031 075 | VOB: Haltezeit für Tafeln LOC: Hold-time for Panels | on | 1 ... 5 ... 10 | s | |
| 003 014 | VOB: Autom. Rückspr.zeit LOC: Autom. return time | on | 60 ... 60000 | s | |
| 003 023 | VOB: Rückspr.zeit Beleuch. LOC: Return time illumin. | on | 60 ... 60000 blockiert / Blocked | s | |
| 003 183 | PC: Herstellerkennung PC: Name of manufacturer | off | 1 | ALSTOM | |
| | | | 2 | ALSTOM | |
| | | | 3 | REG | |
| | | | | REG | |
| | | | | ALSTOM D | |
| | | | | ALSTOM D | |
| 003 068 | PC: Feldadresse PC: Bay address | off | 0 ... 1 ... 254 | | |
| 003 069 | PC: Geräteadresse PC: Device address | off | 0 ... 1 ... 255 | | |
| 003 081 | PC: Baudrate PC: Baud rate | off | 300 | 300 Baud | |
| | | | 600 | 300 Baud | |
| | | | 1200 | 600 Baud | |
| | | | 2400 | 600 Baud | |
| | | | 4800 | 1200 Baud | |
| | | | 9600 | 1200 Baud | |
| | | | | 2400 Baud | |
| | | | | 2400 Baud | |
| | | | | 4800 Baud | |
| | | | | 4800 Baud | |
| | | | | 9600 Baud | |
| | | | | 9600 Baud | |
| | | | 19.2 | 19.2 kBaud | |
| | | | 38.4 | 19.2 kBaud | |
| | | | 57.6 | 38.4 kBaud | |
| | | | 115.2 | 38.4 kBaud | |
| | | | | 57.6 kBaud | |
| | | | | 115.2 kBaud | |
| | | | | 115.2 kBaud | |
| 003 181 | PC: Paritätsbit PC: Parity bit | on | 0 / 1 | ohne / even Without / Even | |

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|--|-----------------------|
| 003 187 | PC: Freigabe Spontanmeld. PC: Spontan. sig. enable | on | 0 1 2 65535 | keine None nur VDEW VDEW only VDEW + ausgew.Mldgen VDEW + selected sig. alle All | 32 aus/of n |
| 003 189 | PC: Ausw. Spontanmeldg. PC: Select. spontan.sig. | off | siehe Auswahltable K 99 see selection table K 99 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 003 084 | PC: Freigabe zykl. Daten PC: Transm.enab.cycl.dat | on | 0 1 2 3 4 5 6 11 12 13 15 16 | ohne Without ASDU 3.1 n. IEC ASDU 3.1 per IEC ASDU 3.2 n. IEC ASDU 3.2 per IEC ASDU 3.3 n. IEC ASDU 3.3 per IEC ASDU 3.4 n. IEC ASDU 3.4 per IEC ASDU 9 n. IEC ASDU 9 per IEC ILS Telegramm ILS telegram ASDU 3.1 u.3.4 n.IEC ASDU 3.1 & 3.4 p.IEC ASDU 3.2 u.3.4 n.IEC ASDU 3.2 & 3.4 p.IEC ASDU 3.3 u. 3.4n.IEC ASDU 3.3 & 3.4 p.IEC ASDU 9 u. 3.4 n. IEC ASDU 9 & 3.4 per IEC ASDU 9 u. ILS ASDU 9 & ILS telegr. | |
| 003 185 | PC: zykl. D. ILS Telegr. PC: Cycl. data ILS tel. | off | siehe Auswahltable K 10 see selection table K 10 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 10 aus/of n |

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(Fortsetzung / continued)

D-10
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 003 055 | PC: Delta U PC: Delta V | on | 0.0 ... 3.0 ... 15.0 | %Unom %Vnom | |
| 003 056 | PC: Delta I PC: Delta I | on | 0.0 ... 3.0 ... 15.0 | %Inom %Inom | |
| 003 059 | PC: Delta P PC: Delta P | on | 0.0 ... 15.0 | %Snom %Snom | |
| 003 057 | PC: Delta f PC: Delta f | on | 0.0 ... 2.0 | %fnom %fnom | |
| 003 155 | PC: Delta Maßw. IIS Tele PC: Delta meas.v.IIS tel | on | 0.0 ... 3.0 ... 15.0 | | |
| 003 058 | PC: Delta t PC: Delta t | on | 0 ... 1 ... 15 | min min | |
| 003 188 | PC: Timeout PC: Time-out | on | 1 ... 60 | min min | |
| 056 026 | KOMMI: Fkt.gruppe KOMMI KOMMI: Function group KOMMI | off | 0 / 1 | ohne / mit Without / With | |
| 003 170 | KOMMI: eingeschaltet BED KOMMI: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 003 215 | KOMMI: Grund IEC870-5 freig KOMMI: Basic IEC870-5enable | on | 0 / 1 | nein / ja No / Yes | |
| 003 216 | KOMMI: Zusatz -101 freig. KOMMI: Addit. -101 enable | on | 0 / 1 | nein / ja No / Yes | |
| 003 217 | KOMMI: Zusatz IIS freig. KOMMI: Addit. IIS enable | on | 0 / 1 | nein / ja No / Yes | |
| 003 220 | KOMMI: MODBUS freigeben KOMMI: MODBUS enable | on | 0 / 1 | nein / ja No / Yes | |
| 003 231 | KOMMI: DNP3 freigeben KOMMI: DNP3 enable | on | 0 / 1 | nein / ja No / Yes | |
| 103 040 | KOMMI: COURIER freigeben KOMMI: COURIER enable | on | 0 / 1 | nein / ja No / Yes | |
| 003 167 | KOMMI: Komm.protokoll KOMMI: Communicat. protocol | off | siehe Auswahltable K 23 see selection table K 23 | | |
| 003 214 | KOMMI: Variante MODBUS-Prot KOMMI: MODBUS prot. variant | on | 060 000 060 000 1 / 2 | GRUND: ohne Funktion MAIN: Without function ALSTOM / ALSTOM D ALSTOM / ALSTOM D | |
| | | | | | |
| | | | | | |
| | | | | | |

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D-11
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 003 165 | KOM1: Zeichen-Ruhelage COM1: Line idle state | off | 0 <u>1</u> | Licht Aus / Low Light off / low Licht Ein / High Light on / high | |
| 003 071 | KOM1: Baudrate COM1: Baud rate | off | 300 600 1200 2400 4800 9600 <u>19.2</u> 38.4 57.6 64.0 | 300 Baud 300 Baud 600 Baud 600 Baud 1200 Baud 1200 Baud 2400 Baud 2400 Baud 4800 Baud 4800 Baud 9600 Baud 9600 Baud <u>19.2 kBaud</u> <u>19.2 kBaud</u> 38.4 kBaud 38.4 kBaud 57.6 kBaud 57.6 kBaud 64.0 kBaud 64.0 kBaud | |
| 003 171 | KOM1: Paritätsbit COM1: Parity bit | on | 0 1 <u>2</u> | ohne without odd Odd <u>even</u> Even | |
| 003 176 | KOM1: Pausenüberwachung COM1: Dead time monitoring | off | 0 / <u>1</u> | nein / ja No / Yes | |
| 003 202 | KOM1: Überw.zeit Pollen COM1: Mon. time polling | off | 3 ... <u>25</u> ... 254 blockiert / Blocked | s s | |
| 003 072 | KOM1: Oktett Komm. Adresse COM1: Octet comm. address | off | 0 ... <u>1</u> ... 254 | | |
| 003 240 | KOM1: Okt.2 Komm.Adr.,DNP3 COM1: Oct.2 comm.addr.DNP3 | off | 0 ... <u>255</u> | | |
| 003 166 | KOM1: Testmonitor eingesch COM1: Test monitor on | on | 0 / <u>1</u> | nein / ja No / Yes | |

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|---|-----------------------|
| 003 074 | KOM1: Freigabe zykl. Daten COM1: Transm. enab. cycl. dat | on | 0 1 2 3 4 5 6 11 12 13 15 16 | ohne Without ASDU 3.1 n. IEC ASDU 3.1 per IEC ASDU 3.2 n. IEC ASDU 3.2 per IEC ASDU 3.3 n. IEC ASDU 3.3 per IEC ASDU 3.4 n. IEC ASDU 3.4 per IEC ASDU 9 n. IEC ASDU 9 per IEC ILS Telegramm ILS telegram ASDU 3.1 u. 3.4 n. IEC ASDU 3.1 & 3.4 p. IEC ASDU 3.2 u. 3.4 n. IEC ASDU 3.2 & 3.4 p. IEC ASDU 3.3 u. 3.4 n. IEC ASDU 3.3 & 3.4 p. IEC ASDU 9 u. 3.4 n. IEC ASDU 9 & 3.4 per IEC ASDU 9 u. ILS ASDU 9 & ILS telegr. | |
| 003 175 | KOM1: zykl. D. ILS Telegr. COM1: Cycl. data ILS tel. | off | siehe Auswahltable K 10 see selection table K 10 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 20 aus/of n |
| 003 050 | KOM1: Delta U COM1: Delta V | on | 0.0 ... 3.0 ... 15.0 | %Unom %Vnom | |
| 003 051 | KOM1: Delta I COM1: Delta I | on | 0.0 ... 3.0 ... 15.0 | %Inom %Inom | |
| 003 054 | KOM1: Delta P COM1: Delta P | on | 0.0 ... 15.0 | %Snom %Snom | |
| 003 052 | KOM1: Delta f COM1: Delta f | on | 0.0 ... 2.0 | %fnom %fnom | |
| 003 150 | KOM1: Delta Mesß. ILS Tele COM1: Delta meas. v. ILS tel | on | 0.0 ... 3.0 ... 15.0 | | |
| 003 053 | KOM1: Delta t COM1: Delta t | on | 0 ... 1 ... 15 | min min | |

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D-14
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|------------------------------------|--|-----------------------|
| 003 151 | KOMM1: Delta t (Arbeit) KOMM1: Delta t (energy) | on | 0 ... 15 blockiert / Blocked | min min | |
| 003 077 | KOMM1: schleich. Gen.abfr. KOMM1: Contin. general scan | on | 10 ... 9000 blockiert / Blocked | s s | |
| 003 201 | KOMM1: Länge Komm. Adresse KOMM1: Comm. address length | off | 1 ... 2 | Byte Byte | |
| 003 200 | KOMM1: Oktett 2 Komm. Adr. KOMM1: Octet 2 comm. addr. | off | 0 ... 255 | | |
| 003 192 | KOMM1: Länge Übertr.ursache KOMM1: Cause transm. length | off | 1 2 | ohne Herkunftsadr. w/o source address mit Herkunftsadr. with source address | |
| 003 193 | KOMM1: Länge Adresse ASDU KOMM1: Address length ASDU | off | 1 ... 2 | Byte Byte | |
| 003 194 | KOMM1: Oktett 2 Adr. ASDU KOMM1: Octet 2 addr. ASDU | off | 0 ... 255 | | |
| 003 196 | KOMM1: Länge Adr. Inf.Obj. KOMM1: Addr.length inf.obj. | off | 2 ... 3 | Byte Byte | |
| 003 197 | KOMM1: Okt. 3 Adr. Inf.Obj. KOMM1: Oct.3 addr. inf.obj. | off | 0 ... 255 | | |
| 003 195 | KOMM1: Inf.Nr. <-> F-typ KOMM1: Inf.No.<->func.type | off | 0 / 1 | nein / ja No / Yes | |
| 003 198 | KOMM1: Länge Zeitstempel KOMM1: Time tag length | off | 3 ... 7 | Byte Byte | |
| 003 190 | KOMM1: Konv. ASDU1 / ASDU20 KOMM1: ASDU1 / ASDU20 conv. | off | 1 2 | Einzelmeldung Single signal Doppelmeldung Double signal | |
| 003 191 | KOMM1: Konvertierung ASDU2 KOMM1: ASDU2 conversion | off | 1 2 3 | Einzelmeldung Single signal Doppelmeldung Double signal Schutzereignis Protection event | |
| 003 199 | KOMM1: Anlaufmeldung KOMM1: Initializ. signal | off | 0 / 1 | nein / ja No / Yes | |
| 003 226 | KOMM1: Symmetr. Betrieb KOMM1: Balanced operation | on | 0 / 1 | nein / ja No / Yes | |

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(Fortsetzung / continued)

D-15
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|---|-----------------------|
| 003 227 | KOM1: Richtungs-Bit COM1: Direction bit | off | 0 ... 1 | s | |
| 003 228 | KOM1: Überw.zeit Quittung COM1: Time-out interval | off | 0.10 ... 0.40 ... 2.55 | s | |
| 003 210 | KOM1: Reg.zuo. ausgew.Bef. COM1: Reg.asg. selec. cmds | off | siehe Auswahltable K 101 see selection table K 101 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 64 aus/of n |
| 003 211 | KOM1: Reg.zuo. ausgew.Mlg. COM1: Reg.asg. selec. sig. | off | siehe Auswahltable K 102 see selection table K 102 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 64 aus/of n |
| 003 212 | KOM1: Reg.zuo. ausgew.Meßw COM1: Reg.asg. sel. m.val. | off | siehe Auswahltable K 103 see selection table K 103 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 64 aus/of n |
| 003 213 | KOM1: Reg.zuo. ausgew.Para COM1: Reg.asg. sel. param. | off | siehe Auswahltable K 104 see selection table K 104 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 64 aus/of n |
| 003 152 | KOM1: Delta t (MODEBUS) COM1: Delta t (MODEBUS) | on | 1 ... 5 ... 120 | s s | |
| 003 249 | KOM1: Autom. Ereign.bestät. COM1: Autom.event confirm. | off | 0 / 1 | ohne / mit Without / With | |
| 003 241 | KOM1: Phys. Charact. Delay COM1: Phys. Charact. Delay | off | 0 ... 254 | Bit Bit | |
| 003 242 | KOM1: Phys. Char. Timeout COM1: Phys. Char. Timeout | off | 0 ... 40 ... 254 | Bit Bit | |
| 003 243 | KOM1: Link Confirm. Mode COM1: Link Confirm. Mode | off | 0 | Never Never | |
| 003 244 | KOM1: Link Confirm.Timeout COM1: Link Confirm.Timeout | off | 0.05 ... 0.10 ... 2.54 | Multi-frame fragment Multi-frame fragment | |
| 003 245 | KOM1: Link Max. Retries COM1: Link Max. Retries | off | 1 ... 2 ... 10 | All frames All frames | |

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D-16
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 003 246 | KOMMI: Appl. Confirm. Timeout COMMI: Appl. Confirm. Timeout | off | 0.5 ... 5.0 ... 25.4 | S | |
| 003 247 | KOMMI: Appl. Need Time Del. COMMI: Appl. Need Time Del. | off | 5 ... 60 ... 254 | S | |
| 003 232 | KOMMI: Ind./Kl. bin. Eing. COMMI: Ind./cl. bin. inputs | off | siehe Auswahltable K 102 see selection table K 102 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 64 aus/of n |
| 003 233 | KOMMI: Ind./Kl. bin. Ausg. COMMI: Ind./cl. bin. outputs | off | siehe Auswahltable K 101 see selection table K 101 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 32 aus/of n |
| 003 235 | KOMMI: Ind./Kl. anal. Eing. COMMI: Ind./cl. analog inp. | off | siehe Auswahltable K 103 see selection table K 103 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 32 aus/of n |
| 003 236 | KOMMI: Ind./Kl. anal. Ausg. COMMI: Ind./cl. analog outp. | off | siehe Auswahltable K 104 see selection table K 104 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 16 aus/of n |
| 003 250 | KOMMI: Delta Meßw. (DNP3) COMMI: Delta meas. v. (DNP3) | on | 0 ... 16 ... 255 | | |
| 003 248 | KOMMI: Delta t (DNP3) COMMI: Delta t (DNP3) | on | 1 ... 5 ... 120 | S | |
| 103 042 | KOMMI: Auswahl Befehle COMMI: Command selection | off | siehe Auswahltable K 101 see selection table K 101 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 32 aus/of n |
| 103 043 | KOMMI: Auswahl Meldungen COMMI: Signal selection | off | siehe Auswahltable K 102 see selection table K 102 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 64 aus/of n |
| 103 044 | KOMMI: Auswahl Meßwerte COMMI: Meas. val. selection | off | siehe Auswahltable K 103 see selection table K 103 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 32 aus/of n |
| 103 045 | KOMMI: Auswahl Parameter COMMI: Parameter selection | off | siehe Auswahltable K 104 see selection table K 104 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 16 aus/of n |

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|--|-----------------------|
| 103 046 | KOMM1: Delta t (COURIER) KOMM1: Delta t (COURIER) | on | 1 ... 5 ... 120 | s | |
| 056 057 | KOMM2: Fkt.gruppe KOMM2 KOMM2: Function group KOMM2 | off | 0 / 1 | ohne / mit Without / With | |
| 103 170 | KOMM2: eingeschaltet BED KOMM2: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 103 165 | KOMM2: Zeichen-Ruhelage KOMM2: Line idle state | off | 0 | Licht Aus / Low Light off / low | |
| | | | 1 | Licht Ein / High Light on / high | |
| 103 071 | KOMM2: Baudrate KOMM2: Baud rate | off | 300 | 300 Baud | |
| | | | 600 | 600 Baud | |
| | | | 1200 | 600 Baud | |
| | | | 2400 | 1200 Baud | |
| | | | 4800 | 1200 Baud | |
| | | | 9600 | 2400 Baud | |
| | | | 19.2 | 2400 Baud | |
| | | | 38.4 | 4800 Baud | |
| | | | 57.6 | 4800 Baud | |
| | | | | 9600 Baud | |
| | | | | 19.2 kBaud | |
| | | | | 19.2 kBaud | |
| | | | | 38.4 kBaud | |
| | | | | 38.4 kBaud | |
| | | | | 57.6 kBaud | |
| | | | | 57.6 kBaud | |
| 103 171 | KOMM2: Paritätsbit KOMM2: Parity bit | on | 0 | ohne without | |
| | | | 1 | odd | |
| | | | 2 | Odd | |
| | | | | even | |
| | | | | Even | |
| 103 176 | KOMM2: Pausenüberwachung KOMM2: Dead time monitoring | off | 0 / 1 | nein / ja No / Yes | |
| 103 202 | KOMM2: Überw.zeit Pollen KOMM2: Mon. time polling | off | 3 ... 25 ... 254 blockiert / Blocked | s | |
| 103 072 | KOMM2: Oktett Komm. Adresse KOMM2: Octet comm. address | off | 0 ... 1 ... 254 | s | |

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Par/Konf // Par/Konf

Par/Konf // Par/Conf

[illegible]

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|--|-----------------------|
| 103 074 | KOM2: Freigabe zykl. Daten COM2: Transm.enab.cycl.dat | on | 0 1 2 3 4 5 6 11 12 13 15 16 | ohne Without ASDU 3.1 n. IEC ASDU 3.1 per IEC ASDU 3.2 n. IEC ASDU 3.2 per IEC ASDU 3.3 n. IEC ASDU 3.3 per IEC ASDU 3.4 n. IEC ASDU 3.4 per IEC ASDU 9 n. IEC ASDU 9 per IEC ILS Telegramm ILS telegram ASDU 3.1 u.3.4 n. IEC ASDU 3.1 & 3.4 p. IEC ASDU 3.2 u.3.4 n. IEC ASDU 3.2 & 3.4 p. IEC ASDU 3.3 u. 3.4n. IEC ASDU 3.3 & 3.4 p. IEC ASDU 9 u. 3.4 n. IEC ASDU 9 & 3.4 per IEC ASDU 9 u. ILS ASDU 9 & ILS telegr. | |
| 103 175 | KOM2: zykl. D. ILS Telegr. COM2: Cycl. data ILS tel. | off | siehe Auswahltabelle K 10 see selection table K 10 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 20 aus/of n |
| 103 050 | KOM2: Delta U COM2: Delta V | on | 0.0 ... 3.0 ... 15.0 | %Inom %Vnom | |
| 103 051 | KOM2: Delta I COM2: Delta I | on | 0.0 ... 3.0 ... 15.0 | %Inom %Irom | |
| 103 054 | KOM2: Delta P COM2: Delta P | on | 0.0 ... 15.0 | %Snom %Snom | |
| 103 052 | KOM2: Delta f COM2: Delta f | on | 0.0 ... 2.0 | %fnom %fnom | |
| 103 150 | KOM2: Delta Meßw. ILS Tele COM2: Delta meas.v. ILS tel | on | 0.0 ... 3.0 ... 15.0 | | |
| 103 053 | KOM2: Delta t COM2: Delta t | on | 0 ... 1 ... 15 | min min | |

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Par/Konf // Par/Konf

Par/Konf // Par/Conf

[illegible]

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--|--|-----------------------|
| 120 032 | KOM3: Empfangsadresse COM3: Receiving address | on | 1 2 3 4 5 6 7 8 9 10 | 1 1 2 2 3 3 4 4 5 5 6 6 7 7 8 8 9 9 10 10 | |
| 121 001 | KOM3: Fkt.zuord. Senden 1 COM3: Fct. assignm. send 1 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 121 003 | KOM3: Fkt.zuord. Senden 2 COM3: Fct. assignm. send 2 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 121 005 | KOM3: Fkt.zuord. Senden 3 COM3: Fct. assignm. send 3 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 121 007 | KOM3: Fkt.zuord. Senden 4 COM3: Fct. assignm. send 4 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 121 009 | KOM3: Fkt.zuord. Senden 5 COM3: Fct. assignm. send 5 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-22
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|--|--|-----------------------|
| | 121 011 KOM3: Fkt. zuord. Senden 6 COM3: Fct. assignm. send 6 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 121 013 KOM3: Fkt. zuord. Senden 7 COM3: Fct. assignm. send 7 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 121 015 KOM3: Fkt. zuord. Senden 8 COM3: Fct. assignm. send 8 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 001 KOM3: Fkt. zuord. Empfang 1 COM3: Fct. assignm. rec. 1 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 004 KOM3: Fkt. zuord. Empfang 2 COM3: Fct. assignm. rec. 2 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 007 KOM3: Fkt. zuord. Empfang 3 COM3: Fct. assignm. rec. 3 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 010 KOM3: Fkt. zuord. Empfang 4 COM3: Fct. assignm. rec. 4 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 013 KOM3: Fkt. zuord. Empfang 5 COM3: Fct. assignm. rec. 5 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 016 KOM3: Fkt. zuord. Empfang 6 COM3: Fct. assignm. rec. 6 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |
| | 120 019 KOM3: Fkt. zuord. Empfang 7 COM3: Fct. assignm. rec. 7 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: Without function | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-23
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|--|---|-----------------------|
| | 120 022 KOM3: Fkt. zuord. Empfang 8 COM3: Fct. assignm. rec. 8 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND: ohne Funktion MAIN: without function | |
| | 120 002 KOM3: Betriebsart Empf. 1 COM3: Oper. mode receive 1 | off | 0 / 1 | schnell / sicher Blocking / Direct intertrip | |
| | 120 005 KOM3: Betriebsart Empf. 2 COM3: Oper. mode receive 2 | off | 0 / 1 | schnell / sicher Blocking / Direct intertrip | |
| | 120 008 KOM3: Betriebsart Empf. 3 COM3: Oper. mode receive 3 | off | 0 / 1 | schnell / sicher Blocking / Direct intertrip | |
| | 120 011 KOM3: Betriebsart Empf. 4 COM3: Oper. mode receive 4 | off | 0 / 1 | schnell / sicher Blocking / Direct intertrip | |
| | 120 014 KOM3: Betriebsart Empf. 5 COM3: Oper. mode receive 5 | off | 0 | schnell / sicher Blocking / Direct intertrip | |
| | 120 017 KOM3: Betriebsart Empf. 6 COM3: Oper. mode receive 6 | off | 0 | verlässlich Permissive sicher Direct intertrip | |
| | 120 020 KOM3: Betriebsart Empf. 7 COM3: Oper. mode receive 7 | off | 1 | verlässlich Permissive sicher Direct intertrip | |
| | 120 023 KOM3: Betriebsart Empf. 8 COM3: Oper. mode receive 8 | off | 0 | verlässlich Permissive sicher Direct intertrip | |
| | 120 060 KOM3: Defaultwert Empf. 1 COM3: Default value rec. 1 | on | 0 / 1 | 0 / 1 0 / 1 | |
| | 120 061 KOM3: Defaultwert Empf. 2 COM3: Default value rec. 2 | on | 0 / 1 | 0 / 1 0 / 1 | |
| | 120 062 KOM3: Defaultwert Empf. 3 COM3: Default value rec. 3 | on | 0 / 1 | 0 / 1 0 / 1 | |
| | 120 063 KOM3: Defaultwert Empf. 4 COM3: Default value rec. 4 | on | 0 / 1 | 0 / 1 0 / 1 | |
| | 120 064 KOM3: Defaultwert Empf. 5 COM3: Default value rec. 5 | on | 0 / 1 | 0 / 1 0 / 1 | |

Anhang D / Appendix D / Adressenliste / Address List

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|--|-----------------------|
| 120 065 | KOM3: Defaultwert Empf. 6 KOM3: Default value rec. 6 | on | 0 / 1 | 0 / 1 0 / 1 | |
| 120 066 | KOM3: Defaultwert Empf. 7 KOM3: Default value rec. 7 | on | 0 / 1 | 0 / 1 0 / 1 | |
| 120 067 | KOM3: Defaultwert Empf. 8 KOM3: Default value rec. 8 | on | 0 / 1 | 0 / 1 0 / 1 | |
| 120 033 | KOM3: Zeit bis Ü-Störung KOM3: Time-out comm. fault | on | 10 ... 50 ... 60000 blockiert / Blocked | ms ms | |
| 120 034 | KOM3: Sign.zuord. Ü-Stör. KOM3: Sig. asg. comm. fault | off | 0 / 1 | ohne / Ü-Kanal gest. SV None / Telecom. faulty/PSIG | |
| 120 035 | KOM3: Zeit bis Ü-Kan. ausg. KOM3: Time-out link fail. | on | 0 ... 5 ... 600 blockiert / Blocked | s s | |
| 120 036 | KOM3: Anz. n.akz. T.fehler KOM3: Limit telegr. errors | on | 1 ... 100 blockiert / Blocked | % % | |
| 056 072 | IRIGB: Fkt.gruppe IRIGB IRIGB: Function group IRIGB | off | 0 / 1 | ohne / mit Without / With | |
| 023 200 | IRIGB: eingeschaltet BED IRIGB: General enable USER | on | 0 / 1 | nein / ja No / Yes | P |
| 003 036 | FKT_T: Passwort Fkt.tastel F_KEY: Password funct. key1 | on | 0 ... 1423 ... 4444 | | P |
| 030 242 | FKT_T: Passwort Fkt.taste2 F_KEY: Password funct. key2 | on | 0 ... 1423 ... 4444 | | P |
| 030 243 | FKT_T: Passwort Fkt.taste3 F_KEY: Password funct. key3 | on | 0 ... 1423 ... 4444 | | P |
| 030 244 | FKT_T: Passwort Fkt.taste4 F_KEY: Password funct. key4 | on | 0 ... 1423 ... 4444 | | P |
| 080 112 | FKT_T: Fkt.zuordnung F1 F_KEY: Fct. assignm. F1 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | |
| 080 113 | FKT_T: Fkt.zuordnung F2 F_KEY: Fct. assignm. F2 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | |
| 080 114 | FKT_T: Fkt.zuordnung F3 F_KEY: Fct. assignm. F3 | off | siehe Auswahltable binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 080 115 | FKT T: Fkt.zuordnung F4 F_KEY: Fct. assignm. F4 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | |
| 080 132 | FKT T: Betriebsart F1 F_KEY: Operating mode F1 | off | 1 / 2 | Taster / Schalter Key / Switch | |
| 080 133 | FKT T: Betriebsart F2 F_KEY: Operating mode F2 | off | 1 / 2 | Taster / Schalter Key / Switch | |
| 080 134 | FKT T: Betriebsart F3 F_KEY: Operating mode F3 | off | 1 / 2 | Taster / Schalter Key / Switch | |
| 080 135 | FKT T: Betriebsart F4 F_KEY: Operating mode F4 | off | 1 / 2 | Taster / Schalter Key / Switch | |
| 003 037 | FKT T: Rückspr.z.Fkt.tasten F_KEY: Return time fct.keys | on | 1 ... 10 ... 60000 | s s | |
| 178 002 | EING: Fkt.zuordnung U 1 INP: Fct. assignm. U 1 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | |
| 178 006 | EING: Fkt.zuordnung U 2 INP: Fct. assignm. U 2 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | |
| 178 003 | EING: Betriebsart U 1 INP: Oper. mode U 1 | off | 0 1 | aktiv "Low" Active "low" aktiv "High" Active "high" | |
| 178 007 | EING: Betriebsart U 2 INP: Oper. mode U 2 | off | 0 1 | aktiv "Low" Active "low" aktiv "High" Active "high" | |
| 157 002 | AUSG: Fkt.zuordnung K 1 OUTP: Fct. assignm. K 1 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 006 | AUSG: Fkt.zuordnung K 2 OUTP: Fct. assignm. K 2 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |

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Par/Konf // Par/Conf

Par/Konf // Par/Conf

| Adresse | /Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------|----------|--|------------------|--|---|------------------------|
| 157 010 | | AUSG: Fkt.zuordnung K 3 OUTP: Fct. assignm. K 3 | off | s. Auswahltablelle bin. Ausgänge u. LED <u>060 000</u> 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 014 | | AUSG: Fkt.zuordnung K 4 OUTP: Fct. assignm. K 4 | off | s. Auswahltablelle bin. Ausgänge u. LED <u>060 000</u> 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 018 | | AUSG: Fkt.zuordnung K 5 OUTP: Fct. assignm. K 5 | off | s. Auswahltablelle bin. Ausgänge u. LED <u>060 000</u> 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 022 | | AUSG: Fkt.zuordnung K 6 OUTP: Fct. assignm. K 6 | off | s. Auswahltablelle bin. Ausgänge u. LED <u>060 000</u> 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 026 | | AUSG: Fkt.zuordnung K 7 OUTP: Fct. assignm. K 7 | off | s. Auswahltablelle bin. Ausgänge u. LED <u>060 000</u> 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 030 | | AUSG: Fkt.zuordnung K 8 OUTP: Fct. assignm. K 8 | off | s. Auswahltablelle bin. Ausgänge u. LED <u>060 000</u> 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 157 003 | | AUSG: Betriebsart K 1 OUTP: Oper. mode K 1 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netztst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|--------------------------------|--|-----------------------|
| | 157 007 AUSG: Betriebsart K 2 OUTP: Oper. mode K 2 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating | |
| | | | | AS man. Rückstellung | |
| | | | | ES manual reset | |
| | | | | AS Rückst. b. Störf. | |
| | | | | ES reset (fault) | |
| | | | | AS Rückst. b. Netzst | |
| | 157 011 AUSG: Betriebsart K 3 OUTP: Oper. mode K 3 | off | 1 2 3 4 5 6 | ES reset (syst.dist) | |
| | | | | RS nicht speichernd | |
| | | | | NE updating | |
| | | | | RS man. Rückstellung | |
| | | | | NE manual reset | |
| | | | | AS nicht speichernd ES updating | |
| | 157 015 AUSG: Betriebsart K 4 OUTP: Oper. mode K 4 | off | 1 2 3 4 5 6 | AS man. Rückstellung | |
| | | | | ES manual reset | |
| | | | | AS Rückst. b. Störf. | |
| | | | | ES reset (fault) | |
| | | | | AS Rückst. b. Netzst | |
| | | | | ES reset (syst.dist) | |
| | | | | RS nicht speichernd | |
| | | | | NE updating | |
| | | | | RS man. Rückstellung | |
| | | | | NE manual reset | |
| | | | | | |
| | | | | | |

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Par/Konf // Par/Conf

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 157 031 | AUSG: Betriebsart K 8 OUTP: Oper. mode K 8 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |
| 085 001 | LED: Fkt.zuordnung H 2 LED: Fct. assignm. H 2 | - | 004 065 004 065 | GRUND:Blockade/Störung MAIN :Blocked/faulty | |
| 085 004 | LED: Fkt.zuordnung H 3 LED: Fct. assignm. H 3 | - | 036 070 036 070 | SELB:Warnung (LED) STROM:Warning (LED) | |
| 085 007 | LED: Fkt.zuordnung H 4 LED: Fct. assignm. H 4 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 036 251 036 251 | GRUND:Gen. Aus Meldung MAIN :Gen. trip signal | 1 aus/of n |
| 085 010 | LED: Fkt.zuordnung H 5 LED: Fct. assignm. H 5 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 013 | LED: Fkt.zuordnung H 6 LED: Fct. assignm. H 6 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 016 | LED: Fkt.zuordnung H 7 LED: Fct. assignm. H 7 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 019 | LED: Fkt.zuordnung H 8 LED: Fct. assignm. H 8 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 022 | LED: Fkt.zuordnung H 9 LED: Fct. assignm. H 9 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |

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(Fortsetzung / continued)

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|--|-----------------------|
| 085 025 | LED: Fkt. zuordnung H 10 LED: Fct. assignm. H 10 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 028 | LED: Fkt. zuordnung H 11 LED: Fct. assignm. H 11 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 031 | LED: Fkt. zuordnung H 12 LED: Fct. assignm. H 12 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 034 | LED: Fkt. zuordnung H 13 LED: Fct. assignm. H 13 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 037 | LED: Fkt. zuordnung H 14 LED: Fct. assignm. H 14 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 040 | LED: Fkt. zuordnung H 15 LED: Fct. assignm. H 15 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 043 | LED: Fkt. zuordnung H 16 LED: Fct. assignm. H 16 | off | s. Auswahltablelle bin. Ausgänge u. LED 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 085 002 | LED: Betriebsart H 2 LED: Operating mode H 2 | - | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) ES nicht speichernd NE updating RS man. Rückstellung NE manual reset | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

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Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--------------------------------|--|-----------------------|
| 085 005 | LED: Betriebsart H 3 LED: Operating mode H 3 | - | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| 085 008 | LED: Betriebsart H 4 LED: Operating mode H 4 | off | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |
| 085 011 | LED: Betriebsart H 5 LED: Operating mode H 5 | off | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| | | | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |
| | | | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| | | | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |
| | | | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| | | | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |

D-32
Par/Konf // Par/ConfP130C-301-401-601 / AFSV.12.09340 DE/EN

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-33
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--------------------------------|--|-----------------------|
| 085 023 | LED: Betriebsart H 9 LED: Operating mode H 9 | off | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| 085 026 | LED: Betriebsart H 10 LED: Operating mode H 10 | off | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |
| 085 029 | LED: Betriebsart H 11 LED: Operating mode H 11 | off | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| | | | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |
| | | | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| | | | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |
| | | | 1 | AS nicht speichernd | |
| | | | 2 | ES updating | |
| | | | 3 | AS man. Rückstellung | |
| | | | 4 | ES manual reset | |
| | | | 5 | AS Rückst. b. Störf. | |
| | | | 6 | ES reset (fault) | |
| | | | 1 | AS Rückst. b. Netzst | |
| | | | 2 | ES reset (syst.dist) | |
| | | | 3 | RS nicht speichernd | |
| | | | 4 | NE updating | |
| | | | 5 | RS man. Rückstellung | |
| | | | 6 | NE manual reset | |

Anhang D / Appendix D / Adressenliste / Address List

(Fortsetzung / continued)

D-34
Par/Konf // Par/Conf

| Adresse | /Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------|----------|--|------------------|---------------------------------|--|------------------------|
| | | 085 032 LED: Betriebsart H 12 LED: Operating mode H 12 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |
| | | 085 035 LED: Betriebsart H 13 LED: Operating mode H 13 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |
| | | 085 038 LED: Betriebsart H 14 LED: Operating mode H 14 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |
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Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-35
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--------------------------------|--|-----------------------|
| 085 041 | LED: Betriebsart H 15 LED: Operating mode H 15 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |
| 085 044 | LED: Betriebsart H 16 LED: Operating mode H 16 | off | 1 2 3 4 5 6 | AS nicht speichernd ES updating AS man. Rückstellung ES manual reset AS Rückst. b. Störf. ES reset (fault) AS Rückst. b. Netzst ES reset (syst.dist) RS nicht speichernd NE updating RS man. Rückstellung NE manual reset | |
| 003 169 | GRUND: Kanaluordn. KOM1/2 MAIN: Chann.assign.COM1/2 | off | 1 2 | KOM1->Kanal 1. (2-2) COM1->chann.1. (2-2) KOM1->Kanal 2. (2-1) COM1->chann.2. (2-1) | |
| 035 160 | ST_AZ: Aufz. Analogkanal 1 FT_RC: Rec. analog chann. 1 | - | 1 | Strom I1 Current IA | |
| 035 161 | ST_AZ: Aufz. Analogkanal 2 FT_RC: Rec. analog chann. 2 | - | 2 | Strom I2 Current IB | |
| 035 162 | ST_AZ: Aufz. Analogkanal 3 FT_RC: Rec. analog chann. 3 | - | 3 | Strom I3 Current IC | |
| 035 163 | ST_AZ: Aufz. Analogkanal 4 FT_RC: Rec. analog chann. 4 | - | 5 | Spannung U1E Voltage A-G | |
| 035 164 | ST_AZ: Aufz. Analogkanal 5 FT_RC: Rec. analog chann. 5 | - | 6 | Spannung U2E Voltage B-G | |
| 035 165 | ST_AZ: Aufz. Analogkanal 6 FT_RC: Rec. analog chann. 6 | - | 7 | Spannung U3E Voltage C-G | |

Anhang D / Appendix D / Adressenliste / Address List

(Fortsetzung / continued)

D-36
Par/Konf // Par/Conf

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--------------------------------|--|-----------------------|
| 035 166 | ST AZ: Aufz. Analogkanal 7 FT AC: Rec. analog chann. 7 | - | 4 | Strom IE Current IE | |
| 056 008 | UMZ: Fkt.gruppe UMZ DTOC: Function group DTOC | off | 0 / 1 | ohne / mit Without / With | |
| 056 009 | AMZ: Fkt.gruppe AMZ IDMT: Function group IDMT | off | 0 / 1 | ohne / mit Without / With | |
| 056 021 | KURI: Fkt.gruppe KURI SCDD: Function group SCDD | off | 0 / 1 | ohne / mit Without / With | |
| 056 003 | ZUKS: Fkt.gruppe ZUKS SOTF: Function group SOTF | off | 0 / 1 | ohne / mit Without / With | |
| 056 004 | SV: Fkt.gruppe SV PSIG: Function group PSIG | off | 0 / 1 | ohne / mit Without / With | |
| 056 005 | AWE: Fkt.gruppe AWE ARC: Function group ARC | off | 0 / 1 | ohne / mit Without / With | |
| 056 012 | EWAIT: Fkt.gruppe EWAIT GFDSS: Function group GFDSS | off | 0 / 1 | ohne / mit Without / With | |
| 056 022 | MS: Fkt.gruppe MS MP: Function group MP | off | 0 / 1 | ohne / mit Without / With | |
| 056 023 | THERM: Fkt.gruppe THERM THERM: Function group THERM | off | 0 / 1 | ohne / mit Without / With | |
| 056 024 | I2>: Fkt.gruppe I2> I2>: Function group I2> | off | 0 / 1 | ohne / mit Without / With | |
| 056 010 | U<>: Fkt.gruppe U<> V<>: Function group V<> | off | 0 / 1 | ohne / mit Without / With | |
| 056 033 | f<>: Fkt.gruppe f<> f<>: Function group f<> | off | 0 / 1 | ohne / mit Without / With | |
| 056 045 | P<>: Fkt.gruppe P<> P<>: Function group P<> | off | 0 / 1 | ohne / mit Without / With | |
| 056 007 | LSV: Fkt.gruppe LSV CBF: Function group CBF | off | 0 / 1 | ohne / mit Without / With | |
| 056 015 | MKÜ: Fkt.gruppe MKÜ MCMON: Function group MCMON | off | 0 / 1 | ohne / mit Without / With | |
| 056 025 | GRENZ: Fkt.gruppe GRENZ LIMIT: Function group LIMIT | off | 0 / 1 | ohne / mit Without / With | |
| 056 017 | LOGIK: Fkt.gruppe LOGIK LOGIC: Function group LOGIC | off | 0 / 1 | ohne / mit Without / With | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-37
Par/Funk/Glob // Par/Funk/Glob

D 1.3 Funktionsparameter / Function Parameters

D 1.3.1 Global / Global

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--------------------------------|---|-----------------------|
| 003 182 | PC: Befehlssperre PC: Command blocking | on | 0 / 1 | nein / ja No / Yes | |
| 003 086 | PC: Melde-/Meßwertsperr PC: Sig./meas.val.block. | on | 0 / 1 | nein / ja No / Yes | |
| 003 172 | KOMM1: Befehlssperre BED COMM1: Command block. USER | on | 0 / 1 | nein / ja No / Yes | |
| 003 076 | KOMM1: Melde-/Meßw.sp. BED COMM1: Sig./meas.block.USER | on | 0 / 1 | nein / ja No / Yes | |
| 103 172 | KOMM2: Befehlssperre BED COMM2: Command block. USER | on | 0 / 1 | nein / ja No / Yes | |
| 103 076 | KOMM2: Melde-/Meßw.sp. BED COMM2: Sig./meas.block.USER | on | 0 / 1 | nein / ja No / Yes | |
| 021 014 | AUSG: Block. Ausg.r. BED OUTP: Outp.rel.block.USER | on | 0 / 1 | nein / ja No / Yes | |
| 003 030 | GRUND: Gerät on-line MAIN: Device on-line | on | 0 / 1 | nein (= off) / ja (= on) No (= off) / Yes (= on) | |
| 003 012 | GRUND: Prüf-Modus BED MAIN: Test mode USER | on | 0 / 1 | nein / ja No / Yes | |
| 010 030 | GRUND: Nennfrequenz f _{nom} MAIN: Nominal frequ. f _{nom} | off | 50 / 60 | 50 Hz / 60 Hz 50 Hz / 60 Hz | |
| 010 049 | GRUND: Drehfeld MAIN: Rotary field | on | 1 | rechtsdrehend Clockwise rotation | |
| 010 001 | GRUND: Incom Wandler prim. MAIN: Incom C.T. prim. | on | 1 ... 1000 ... 10000 | linksdrehend Anti-clockwise rot. | |
| 010 018 | GRUND: IE, nom Wandler prim. MAIN: IE, nom C.T. prim. | on | 1 ... 1000 ... 10000 | A A | |
| 010 002 | GRUND: Uncom Wandler prim. MAIN: Vnom V.T. prim. | on | 0.1 ... 100.0 ... 1000.0 | kV kV | |
| 010 003 | GRUND: Incom Gerät MAIN: Incom device | off | 1.0 / 5.0 | 1.0 A / 5.0 A 1.0 A / 5.0 A | |
| 010 026 | GRUND: IE, nom Gerät MAIN: IE, nom device | off | 1.0 / 5.0 | 1.0 A / 5.0 A 1.0 A / 5.0 A | |

Anhang D / Appendix D / Adressenliste / Address List

(Fortsetzung / continued)

D-38
Par/Funk/Glob // Par/Funk/Glob

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|--|--|-----------------------|
| 010 009 | GRUND: Unom Wandler sek. MAIN: Vnom V.T. sec. | off | 50 ... 100 ... 130 | V | |
| 010 004 | GRUND: Anschl. Meßkreise IL MAIN: Conn. meas. circ. IP | off | 1 / 2 | standardmäßig / umgekehrt Standard / Opposite | |
| 010 019 | GRUND: Anschl. Meßkreise IE MAIN: Conn. meas. circ. IN | on | 1 / 2 | standardmäßig / umgekehrt Standard / Opposite | |
| 011 030 | GRUND: Freigabe Meßwerte IL MAIN: Meas. value rel. IP | on | 0.000 ... 0.200 | Inom Inom | |
| 011 031 | GRUND: Freigabe Meßwerte IE MAIN: Meas. value rel. IN | on | 0.000 ... 0.200 | IE, nom IN, nom | |
| 011 032 | GRUND: Freigabe Meßwerte U MAIN: Meas. value rel. V | on | 0.000 ... 0.200 | Unom Vnom | |
| 010 138 | GRUND: Betr. art Arbeitseim. MAIN: Op. mode energy cnt. | on | 1 / 2 | Verfahren 1 / Verfahren 2 Procedure 1 / Procedure 2 | |
| 010 113 | GRUND: Einst. z. IL, max, verz MAIN: Settl. t. IP, max, del | on | 0.1 ... 15.0 ... 60.0 | min min | 10 aus/of n |
| 021 021 | GRUND: Fkt. zuordn. Block. 1 MAIN: Fct. assign. block. 1 | off | siehe Auswahltablelle K 8 see selection table K 8 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | |
| 021 022 | GRUND: Fkt. zuordn. Block. 2 MAIN: Fct. assign. block. 2 | off | siehe Auswahltablelle K 8 see selection table K 8 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 10 aus/of n |
| 021 012 | GRUND: Block. Aus K. BED MAIN: Trip cmd. block. USER | on | 0 / 1 | nein / ja No / Yes | |
| 021 001 | GRUND: Fkt. zuordn. Aus K. 1 MAIN: Fct. assign. trip cmd. 1 | off | siehe Auswahltablelle K 2 see selection table K 2 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 20 aus/of n |
| 021 002 | GRUND: Fkt. zuordn. Aus K. 2 MAIN: Fct. assign. trip cmd. 2 | off | siehe Auswahltablelle K 2 see selection table K 2 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 20 aus/of n |
| 021 003 | GRUND: Mindestzeit Aus K. 1 MAIN: Min. dur. trip cmd. 1 | on | 0.10 ... 0.25 ... 10.00 | S S | |
| 021 004 | GRUND: Mindestzeit Aus K. 2 MAIN: Min. dur. trip cmd. 2 | on | 0.10 ... 0.25 ... 10.00 | S S | |

Anhang D / Appendix D / Adressenliste / Address List

(Fortsetzung / continued)

D-39
Par/Funk/Glob // Par/Func/Glob

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|---|--|-----------------------|
| 021 023 | GRUND: Selbsthltg. Aus K. 1 MAIN: Latching trip cmd. 1 | on | 0 / 1 | nein / ja No / Yes | |
| 021 024 | GRUND: Selbsthltg. Aus K. 2 MAIN: Latching trip cmd. 2 | on | 0 / 1 | nein / ja No / Yes | |
| 015 067 | GRUND: Ein-Kommandozeit MAIN: Close cmd.pulse time | on | 0.10 ... 0.25 ... 10.00 | s | |
| 021 031 | GRUND: Fkt.zuordn. Störung MAIN: Fct. assign. fault | off | siehe Auswahltable K 7 see selection table K 7 | s | 20 aus/of n |
| 003 100 | PSU: Steuerung ü. Bed BED PSS: Control via USER | on | 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | |
| 003 060 | PSU: Auswahl PS BED PSS: Param.subs.sel. USER | on | 0 / 1 | nein / ja No / Yes | |
| | | on | 1 | Parametersatz 1 Parameter subset 1 | |
| | | on | 2 | Parametersatz 2 Parameter subset 2 | |
| | | on | 3 | Parametersatz 3 Parameter subset 3 | |
| | | on | 4 | Parametersatz 4 Parameter subset 4 | |
| 003 063 | PSU: Überbrückungszeit PSS: Keep time | on | 0.000 ... 65.000 blockiert / Blocked | s | |
| 021 030 | SELBU: Fkt.zuordn. Warnung SEMON: Fct. assign. warning | off | siehe Auswahltable K 9 see selection table K 9 | s | 15 aus/of n |
| 010 005 | ST ME: Leitungslänge FT DA: Line length | on | 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | |
| 010 012 | ST ME: Leitungsreaktanz FT DA: Line reactance | on | 0.01 ... 10.00 ... 500.00 | km km | |
| 012 036 | ST ME: Winkel KE FT DA: Angle kg | on | 0.10 ... 10.00 ... 200.00 | Ω bei Incom = 1.0 A Ω for Incom = 1.0 A | |
| 012 037 | ST ME: Betrag KE FT DA: Abs. value kg | on | 0.02 ... 2.00 ... 40.00 | Ω bei Incom = 5.0 A Ω for Incom = 5.0 A | |
| 010 011 | ST ME: Erfassungszeitpunkt FT DA: Start data acquisit. | on | -180 ... 0 ... 180 | ° ° | |
| | | on | 0.00 ... 1.00 ... 8.00 | | |
| | | on | 1 | Störfall-Ende End of fault | |
| | | on | 2 | Trigg., Aus, GA-Ende Trigg., trip, GS end | |

Anhang D / Appendix D / Adressenliste / Address List

(Fortsetzung / continued)

D-40
Par/Funk/Glob // Par/Func/Glob

| Adresse / Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|-------------------|--|------------------|---|---|------------------------|
| 010 032 | ST ME: Ausgabe Fehlerort FT DA: Output fault locat. | on | 1 2 | bei Generalanregung On general starting bei Gen.anr. mit Aus On gen.start.w.trip | |
| 003 085 | ST AZ: Fkt.zuordn. Trigger FT RC: Fct. assig. trigger | off | siehe Auswahltable K 5 see selection table K 5 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 10 aus/of n |
| 017 065 | ST AZ: I> FT RC: I> | on | 0.01 ... 40.00 blockiert / Blocked | Inom Inom | |
| 003 078 | ST AZ: Vorlaufzeit FT RC: Pre-fault time | on | 1 ... 5 ... 50 | Perioden Periods | |
| 003 079 | ST AZ: Nachlaufzeit FT RC: Post-fault time | on | 1 ... 2 ... 50 | Perioden Periods | |
| 003 075 | ST AZ: Max. Aufzeichn.zeit FT RC: Max. recording time | on | 5 ... 50 ... 300 | Perioden Periods | |

Anhang D / Appendix D / Adressenliste / Address List (Fortsetzung / continued)

D-41
Par/Funk/Haupt // Par/Func/Gen

D 1.3.2 Hauptfunktionen / General Functions

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--|---|-----------------------|
| 018 003 | GRUND: Haltezeit dyn. Para. MAIN: Hold time dyn.param. | on | 0.00 ... 100.00 blockiert / Blocked | s | |
| 018 008 | GRUND: Schutz E eing. BED MAIN: Syst.IN enabled USER | on | 0 / 1 | nein / ja No / Yes | |
| 017 015 | GRUND: Bl. Zeitst. E, gegen MAIN: Block tim.st. IN,neg | on | 0 | ohne Without | |
| | | | 1 | bei einph. Anregung For single-ph. start | |
| | | | 2 | bei mehrph. Anregung For multi-ph. start | |
| 017 027 | GRUND: Betr.art Gen.Anreg. MAIN: Gen. starting mode | on | 0 | o. Anreg. IE, Igegen W/o start. IN, Ineg | |
| | | | 1 | mit Anreg. IE, Igegen With start. IN, Ineg | |
| 017 097 | GRUND: Betr.art Rushstab. MAIN: Op. mode rush restr. | on | 0 | ohne Without | |
| | | | 1 | leiterübergreifend Not phase-selective | |
| | | | 2 | leiterselektiv Phase-selective | |
| 017 098 | GRUND: Rush I(2*fn)/I(fn) MAIN: Rush I(2*fn)/I(fn) | on | 10 ... 20 ... 35 | % | |
| 017 095 | GRUND: I> Rushst. aufheben MAIN: I> lift rush restr. | on | 5.0 ... 10.0 ... 20.0 blockiert / Blocked | Inom | |
| 017 054 | GRUND: Unterdr. Anreg.Mldg. MAIN: Suppress start. sig. | on | 0.00 ... 100.00 | s | |
| 017 005 | GRUND: tGA MAIN: tGS | on | 0.00 ... 100.00 blockiert / Blocked | s | |
| 022 075 | UNZ: eingeschaltet BED DTOC: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 017 096 | ANZ: eingeschaltet BED IDMT: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 017 070 | KURI: eingeschaltet BED SCDD: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 011 068 | ZUKS: eingeschaltet BED SOTF: General enable USER | on | 0 / 1 | nein / ja No / Yes | |

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Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Änderung / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-------------------|---|---|-----------------------|
| 011 061 | ZUKS: Betriebsart SOTF: Operating mode | on | 1 2 3 4 | Aus bei I> Trip by I> Aus bei I>> Trip by I>> Aus bei I>>> Trip by I>>> Aus bei Gen.anregung Trip by gen. start. | |
| 011 060 | ZUKS: tHand-Ein SOTF: Manual close timer | on | 0.00 ... 1.00 ... 10.00 | s s | |
| 015 004 | SV: eingeschaltet BED PSIG: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 015 060 | AME: eingeschaltet BED ARC: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 015 105 | AME: Sig.zuo.Startz.EWATT ARC: Sig.asg.trip t.GFDSS | on | 1 2 3 | Anregung LS Starting LS Anregung Y(E)> Starting Y(N)> Anregung LS/Y(E)> Starting LS/Y(N)> | |
| 015 033 | AME: Fkt.zuordn. tLOGIK ARC: Fct.assgn. tLOGIC | off | siehe Auswahltable K 11 see selection table K 11 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | |
| 016 060 | EWATT: eingeschaltet BED GFDSS: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 016 090 | EWATT: Betriebsart GFDSS: Operating mode | on | 1 2 3 | wattmetrisch Steady-state power amperemetrisch Steady-state current Admittanzbestimmung Steady-state admitt. | |
| 016 063 | EWATT: Betr.art watt./Adm. GFDSS: Op. mode GF pow./adm | on | 1 2 | cos phi-Schaltung cos phi circuit sin phi-Schaltung sin phi circuit | |
| 016 070 | EWATT: Meßrichtung GFDSS: Measuring direction | on | 1 / 2 | standardmäßig / umgekehrt Standard / Opposite | |
| 016 062 | EWATT: UNE> GFDSS: VNG> | on | 0.02 ... 0.25 ... 1.00 | Unom(/f3) Vnom(/f3) | |

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D-43
Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 016 061 | EWATT: TUNE> GFDSS: TVNG> | on | 0.02 ... 1.00 ... 10.00 | S | |
| 016 091 | EWATT: f/finom (watt) GFDSS: f/finom (pow.meas.) | on | 1 / 5 | 1 / 5 1 / 5 | |
| 016 092 | EWATT: f/finom (amp) GFDSS: f/finom (curr.meas.) | on | 1 / 5 | 1 / 5 1 / 5 | |
| 016 064 | EWATT: IE,w> / IE,b> LS GFDSS: IN,act>/IN, reac> LS | on | 0.003 ... 0.050 ... 1.000 | IE, nom IN, nom | |
| 016 065 | EWATT: Sektorwinkel LS GFDSS: Sector angle LS | on | 80 ... 86 ... 89 | ° | |
| 016 066 | EWATT: Ansprechverz. LS GFDSS: Operate delay LS | on | 0.00 ... 0.10 ... 100.00 blockiert / Blocked | S | |
| 016 072 | EWATT: Rückfallverz. LS GFDSS: Release delay LS | on | 0.00 ... 10.00 | S | |
| 016 067 | EWATT: IE,w> / IE,b> SS GFDSS: IN,act>/IN, reac> BS | on | 0.003 ... 0.050 ... 1.000 | IE, nom IN, nom | |
| 016 068 | EWATT: Sektorwinkel SS GFDSS: Sector angle BS | on | 80 ... 86 ... 89 | ° | |
| 016 069 | EWATT: Ansprechverz. SS GFDSS: Operate delay BS | on | 0.00 ... 0.10 ... 100.00 blockiert / Blocked | S | |
| 016 073 | EWATT: Rückfallverz. SS GFDSS: Release delay BS | on | 0.00 ... 10.00 | S | |
| 016 093 | EWATT: IE> GFDSS: IN> | on | 0.003 ... 0.050 ... 1.000 | IE, nom IN, nom | |
| 016 094 | EWATT: Ansprechverz. IE GFDSS: Operate delay IN | on | 0.00 ... 0.10 ... 100.00 blockiert / Blocked | S | |
| 016 095 | EWATT: Rückfallverz. IE GFDSS: Release delay IN | on | 0.00 ... 10.00 | S | |
| 016 111 | EWATT: G(E)> / B(E)> LS GFDSS: G(N)> / B(N)> LS | on | 0.01 ... 0.05 ... 1.00 | YE, nom YN, nom | |
| 016 112 | EWATT: G(E)> / B(E)> SS GFDSS: G(N)> / B(N)> BS | on | 0.01 ... 0.05 ... 1.00 | YE, nom YN, nom | |
| 016 113 | EWATT: Y(E)> GFDSS: Y(N)> | on | 0.01 ... 0.50 ... 2.00 | YE, nom YN, nom | |
| 016 110 | EWATT: Korrekturwinkel GFDSS: Correction angle | on | -30 ... 0 ... 30 | ° | |
| 016 114 | EWATT: Ansprechverz. Y(E)> GFDSS: Operate delay Y(N)> | on | 0.00 ... 0.10 ... 100.00 blockiert / Blocked | S | |

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Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|--|--|-----------------------|
| 016 115 | EWATT: Rückfallverz. Y(E)> GFDSS: Release delay Y(N)> | on | 0.00 ... 10.00 | s | |
| 017 059 | MS: eingeschaltet BED MP: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 022 050 | THERM: eingeschaltet BED THERM: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 022 063 | THERM: Betriebsart THERM: Operating mode | on | 1 2 | absolutes Abbild Absolute replica relatives Abbild Relative replica | |
| 018 090 | I2>: eingeschaltet BED I2>: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 023 030 | U<>: eingeschaltet BED V<>: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 023 031 | f<>: eingeschaltet BED f<>: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 018 202 | f<>: Meßspannungsauswahl f<>: Selection meas. volt | on | 1 2 3 4 5 6 | Spannung U1E Voltage A-G Spannung U2E Voltage B-G Spannung U3E Voltage C-G Spannung U12 Voltage A-B Spannung U23 Voltage B-C Spannung U31 Voltage C-A | |
| 018 201 | f<>: Auswertzeit f<>: Evaluation time | on | 3 ... 4 ... 6 | Perioden Periods | |
| 018 200 | f<>: Unterspgs.block.U< f<>: Undervolt. block. V< | on | 0.20 ... 0.65 ... 1.00 | Unom(/f3) Vnom(/f3) | |
| 014 220 | P<>: eingeschaltet BED P<>: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 022 080 | LSV: eingeschaltet BED CBF: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 011 067 | LSV: tLSV CBF: tCBF | on | 0.00 ... 1.00 ... 10.00 blockiert / Blocked | s s | |

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Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--------------------------------|--|-----------------------|
| 014 001 | MKÜ: eingeschaltet BED MCNON: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 017 028 | MKÜ: Betriebsart Idiff> MCNON: Op. mode Idiff> | on | 0 | ohne Without | |
| | | | 1 | IL, I3 | |
| | | | 2 | IA, IC | |
| | | | | IL, I2, I3 | |
| | | | | IA, IB, IC | |
| 017 024 | MKÜ: Idiff> MCNON: Idiff> | on | 0.25 ... 0.30 ... 0.50 | IL, max IP, max | |
| 018 079 | MKÜ: Betr. art Umin< Überw MCNON: Op. mode Vmin< monit | on | 1 | Umin< Vmin< | |
| | | | 2 | Umin< m. I-Freigabe Vmin< with I enable | |
| | | | 3 | Umin< m. LSHK-Freig. Vmin< w. CB cont. enab | |
| 017 022 | MKÜ: Umin< MCNON: Vmin< | on | 0.40 ... 0.90 | Unom Vnom | |
| 017 023 | MKÜ: Ansprechverzögerung MCNON: Operate delay | on | 0.50 ... 5.00 ... 10.00 | s | |
| 018 019 | MKÜ: Phasenfolgeüberw. MCNON: Phase sequ. monitor. | on | 0 / 1 | nein / ja No / Yes | |
| 014 010 | GRENZ: eingeschaltet BED LIMIT: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 014 004 | GRENZ: I> LIMIT: I> | on | 0.10 ... 1.10 ... 2.40 | Inom | |
| 014 020 | GRENZ: I>> LIMIT: I>> | on | 0.10 ... 1.20 ... 2.40 | Inom | |
| 014 031 | GRENZ: ti> LIMIT: ti> | on | 1 ... 1000 | s | |
| 014 032 | GRENZ: ti>> LIMIT: ti>> | on | 1 ... 1000 | s | |
| 014 021 | GRENZ: I< LIMIT: I< | on | 0.10 ... 0.90 ... 2.40 | Inom | |
| 014 022 | GRENZ: I<< LIMIT: I<< | on | 0.10 ... 0.80 ... 2.40 | Inom | |
| 014 033 | GRENZ: ti< LIMIT: ti< | on | 1 ... 1000 | s | |
| | | | | | |

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Par/Funk/Haupt // Par/Funk/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--------------------------------|-----------------|--|--|-----------------------|
| 014 034 | GRENZ: tI<< LIMIT: tI<< | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 023 | GRENZ: ULE> LIMIT: VPG> | on | 0.10 ... 1.10 ... 2.50 blockiert / Blocked | Unom//3 Vnom//3 | |
| 014 024 | GRENZ: ULE>> LIMIT: VPG>> | on | 0.10 ... 1.20 ... 2.50 blockiert / Blocked | Unom//3 Vnom//3 | |
| 014 035 | GRENZ: tULE> LIMIT: tVPG> | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 036 | GRENZ: tULE>> LIMIT: tVPG>> | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 025 | GRENZ: ULE< LIMIT: VPG< | on | 0.10 ... 0.90 ... 2.50 blockiert / Blocked | Unom//3 Vnom//3 | |
| 014 026 | GRENZ: ULE<< LIMIT: VPG<< | on | 0.10 ... 0.80 ... 2.50 blockiert / Blocked | Unom//3 Vnom//3 | |
| 014 037 | GRENZ: tULE< LIMIT: tVPG< | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 038 | GRENZ: tULE<< LIMIT: tVPG<< | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 027 | GRENZ: ULL> LIMIT: VPP> | on | 0.10 ... 1.10 ... 1.50 blockiert / Blocked | Unom Vnom | |
| 014 028 | GRENZ: ULL>> LIMIT: VPP>> | on | 0.10 ... 1.20 ... 1.50 blockiert / Blocked | Unom Vnom | |
| 014 039 | GRENZ: tULL> LIMIT: tVPP> | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 040 | GRENZ: tULL>> LIMIT: tVPP>> | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 029 | GRENZ: ULL< LIMIT: VPP< | on | 0.10 ... 0.90 ... 1.50 blockiert / Blocked | Unom Vnom | |
| 014 030 | GRENZ: ULL<< LIMIT: VPP<< | on | 0.10 ... 0.80 ... 1.50 blockiert / Blocked | Unom Vnom | |
| 014 041 | GRENZ: tULL< LIMIT: tVPP< | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 042 | GRENZ: tULL<< LIMIT: tVPP<< | on | 1 ... 1000 blockiert / Blocked | S | |
| 014 043 | GRENZ: UNE> LIMIT: VNG> | on | 0.010 ... 0.050 ... 1.000 blockiert / Blocked | Unom Vnom | |
| 014 044 | GRENZ: UNE>> LIMIT: VNG>> | on | 0.010 ... 0.100 ... 1.000 blockiert / Blocked | Unom Vnom | |

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Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|---|-----------------|--|---|-----------------------|
| 014 045 | GRENZ: TUNE> LIMIT: TUNG> | on | 1 ... 1000 blockiert / Blocked | s | |
| 014 046 | GRENZ: TUNE>> LIMIT: TUNG>> | on | 1 ... 1000 blockiert / Blocked | s | |
| 031 099 | LOGIK: eingeschaltet BED LOGIC: General enable USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 030 | LOGIK: Setzen 1 BED LOGIC: Set 1 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 031 | LOGIK: Setzen 2 BED LOGIC: Set 2 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 032 | LOGIK: Setzen 3 BED LOGIC: Set 3 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 033 | LOGIK: Setzen 4 BED LOGIC: Set 4 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 034 | LOGIK: Setzen 5 BED LOGIC: Set 5 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 035 | LOGIK: Setzen 6 BED LOGIC: Set 6 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 036 | LOGIK: Setzen 7 BED LOGIC: Set 7 USER | on | 0 / 1 | nein / ja No / Yes | |
| 034 037 | LOGIK: Setzen 8 BED LOGIC: Set 8 USER | on | 0 / 1 | nein / ja No / Yes | |
| 030 000 | LOGIK: Fkt.zuord. Ausg. 1 LOGIC: Fct. assignm. outp. 1 | off | s. Auswahltable bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND: ohne Funktion MAIN: Without function | 32 aus/of n |
| 030 001 | LOGIK: Betr.art t Ausgang 1 LOGIC: Op. mode t output 1 | on | 0 1 2 3 4 5 | ohne Zeitstufe Without timer stage Anspr.-/Rückf.-verz. Oper./releas.delay Anspr.verz/Imp.dauer Oper.del./puls.dur. Anspr.vz/Rückf.vz,rt Op./rel.delay retrig Anspr.vz/Impulsd.,rt Op.del./puls.dur.,rt Mindestzeit Minimum time | |

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Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 030 002 | LOGIK: Zeit t1 Ausgang 1 LOGIC: Time t1 output 1 | on | 0.00 ... 600.00 | s s | |
| 030 003 | LOGIK: Zeit t2 Ausgang 1 LOGIC: Time t2 output 1 | on | 0.00 ... 600.00 | s s | |
| 044 000 | LOGIK: Sign.zuo. Ausg. 1 LOGIC: Sig.assig. outp. 1 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 044 001 | LOGIK: Sign.zuo. Ausg. 1(t) LOGIC: Sig.assig.outp. 1(t) | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 030 004 | LOGIK: Pkt.zuord. Ausg. 2 LOGIC: Fct.assigmn. outp. 2 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 32 aus/of n |
| 030 005 | LOGIK: Betr.art t Ausgang 2 LOGIC: Op. mode t output 2 | on | 0 1 2 3 4 5 | ohne Zeitstufe Without timer stage Anspr.-/Rückf.-verz. Oper./releas.delay Anspr.verz/Imp.dauer Oper.del./puls.dur. Anspr.vz/Rückf.vz,rt Op./rel.delay, retrig Anspr.vz/Impulsd.,rt Op.del./puls.dur.,rt Mindestzeit Minimum time | |
| 030 006 | LOGIK: Zeit t1 Ausgang 2 LOGIC: Time t1 output 2 | on | 0.00 ... 600.00 | s s | |
| 030 007 | LOGIK: Zeit t2 Ausgang 2 LOGIC: Time t2 output 2 | on | 0.00 ... 600.00 | s s | |
| 044 002 | LOGIK: Sign.zuo. Ausg. 2 LOGIC: Sig.assig. outp. 2 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 044 003 | LOGIK: Sign.zuo. Ausg. 2(t) LOGIC: Sig.assig.outp. 2(t) | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |

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Par/Funk/Haupt // Par/Func/Gen

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[illegible]

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Par/Funk/Haupt // Par/Func/Gen

| Adresse / Address | Bezeichnung / Description | Ändern / Change | Wertebereich / Range of Values | Einheit bzw. Bedeutung / Unit or Meaning | Anmerkungen / Remarks |
|-------------------|--|-----------------|---|--|-----------------------|
| 030 013 | LOGIK: Betr. art t Ausgang 4 LOGIC: Op. mode t output 4 | on | 0 1 2 3 4 5 | ohne Zeitstufe Without timer stage Anspr.-/Rückf.-verz. Oper./releas.delay Anspr.verz/Imp.dauer Oper.del./puls.dur. Anspr.vz/Rückf.vz,rt Op./rel.delay, retrig Anspr.vz/Impulsd.,rt Op.del./puls.dur.,rt Mindestzeit Minimum time | |
| 030 014 | LOGIK: Zeit t1 Ausgang 4 LOGIC: Time t1 output 4 | on | 0.00 ... 600.00 | s s | |
| 030 015 | LOGIK: Zeit t2 Ausgang 4 LOGIC: Time t2 output 4 | on | 0.00 ... 600.00 | s s | |
| 044 006 | LOGIK: Sign.zuo. Ausg. 4 LOGIC: Sig.assig. outp. 4 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 044 007 | LOGIK: Sign.zuo. Ausg. 4 (t) LOGIC: Sig.assig.outp. 4 (t) | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 030 016 | LOGIK: Fkt.zuord. Ausg. 5 LOGIC: Fct.assigmn. outp. 5 | off | s. Auswahltablelle bin. Ausgänge u. LED s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 32 aus/of n |
| 030 017 | LOGIK: Betr. art t Ausgang 5 LOGIC: Op. mode t output 5 | on | 0 1 2 3 4 5 | ohne Zeitstufe Without timer stage Anspr.-/Rückf.-verz. Oper./releas.delay Anspr.verz/Imp.dauer Oper.del./puls.dur. Anspr.vz/Rückf.vz,rt Op./rel.delay, retrig Anspr.vz/Impulsd.,rt Op.del./puls.dur.,rt Mindestzeit Minimum time | |

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Par/Funk/Haupt // Par/Func/Gen

| Adresse | /Address | Bezeichnung Description | Ändern Change | Wertebereich Range of Values | Einheit bzw. Bedeutung Unit or Meaning | Anmerkungen Remarks |
|---------|----------|--|------------------|--|--|------------------------|
| 030 018 | | LOGIK: Zeit t1 Ausgang 5 LOGIC: Time t1 output 5 | on | 0.00 ... 600.00 | S | |
| 030 019 | | LOGIK: Zeit t2 Ausgang 5 LOGIC: Time t2 output 5 | on | 0.00 ... 600.00 | S | |
| 044 008 | | LOGIK: Sign.zuo. Ausg. 5 LOGIC: Sig.assig. outp. 5 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 044 009 | | LOGIK: Sign.zuo. Ausg. 5(t) LOGIC: Sig.assig.outp. 5(t) | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 030 020 | | LOGIK: Pkt.zuord. Ausg. 6 LOGIC: Pct.assigmm. outp. 6 | off | s. Auswahltablelle bin. Ausgänge u. LEDs s. selection table binary outputs & LEDs 060 000 060 000 | GRUND:ohne Funktion MAIN :Without function | 32 aus/of n |
| 030 021 | | LOGIK: Betr.art t Ausgang 6 LOGIC: Op. mode t output 6 | on | 0 | ohne Zeitstufe Without timer stage Anspr. -/Rückf. -verz. Oper./releas.delay Anspr.verz/Imp.dauer Oper.del./puls.dur. Anspr.vz/Rückf.vz,rt Op./rel.delay, retrig Anspr.vz/Impulsd.,rt Op.del./puls.dur.,rt Mindestzeit Minimum time | |
| 030 022 | | LOGIK: Zeit t1 Ausgang 6 LOGIC: Time t1 output 6 | on | 0.00 ... 600.00 | S | |
| 030 023 | | LOGIK: Zeit t2 Ausgang 6 LOGIC: Time t2 output 6 | on | 0.00 ... 600.00 | S | |
| 044 010 | | LOGIK: Sign.zuo. Ausg. 6 LOGIC: Sig.assig. outp. 6 | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |
| 044 011 | | LOGIK: Sign.zuo. Ausg. 6(t) LOGIC: Sig.assig.outp. 6(t) | off | siehe Auswahltablelle binäre Eingänge see selection table binary inputs 061 000 061 000 | GRUND:ohne Funktion MAIN :Without function | 1 aus/of n |

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Par/Funk/Haupt // Par/Func/Gen