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Model Implementation Conformance Statement (MICS) for the IEC 61850 interface in AQ250

Version 2.5.7

Based upon UCAIUG MICS Template version 1.2

In Vaasa, Finland, March 22, 2022
Arcteq Relays Ltd.

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1. General

This model implementation conformance statement is applicable for AQ250, with firmware version 2.5.7.

This MICS document specifies the modelling extensions compared to IEC 61850 edition 2. For the exact details on the standardized model please compare the ICD substation configuration file: “AQ250_ED2.ICD”, version 1.6.

The following chapters describe the list of implemented logical nodes and the new and extended logical nodes.

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2. Logical nodes list

The following table contains the list of logical nodes implemented in the device.

Table 1 – Implemented logical nodes

A: Logical nodes for automatic control
AVCO (Voltage control)
C: Logical nodes for control
CILO (Interlocking)
CSWI (Switch controller)
CSYN (Synchronizer controller)
G: Logical nodes for generic references
GAPC (Generic automatic process control)
GGIO (Generic process I/O)
L: System logical nodes
LCCH (Physical communication channel supervision)
LGOS (GOOSE subscription)
LLN0 (Logical device)
LPHD (Physical device)
LTMS (Time master supervision)
M: Logical nodes for metering and measurement
MHAI (Harmonics or inter-harmonics)
MMTR (Metering 3 phase)
MMXN (Non-phase-related AC measurement)
MMXU (Measurement)
P: Logical nodes for protection functions
PDIF (Differential)
PDIS (Distance)
PDOP (Directional overpower)
PDUP (Directional underpower)
PFRC (Rate of change of frequency)
PHAR (Harmonic restraint)
PHIZ (Ground detector)
PMRI (Motor restart inhibition)

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PMSS (Motor starting time supervision)
PTOC (Time overcurrent)
PTOF (Over-frequency)
PTOV (Overvoltage)
PTRC (Protection trip conditioning)
PTTR (Thermal overload)
PTUC (Undercurrent)
PTUF (Underfrequency)
PTUV (Undervoltage)
PUPF (Underpower factor)
PVPH (Volts per Hz)
R: Logical nodes for protection related functions
RBRF (Breaker failure)
RDRE (Disturbance recorder function)
RFLO (Fault locator)
RREC (Auto reclosing)
RSYN (Synchronism check)
S: Logical nodes for supervision and monitoring
SCBR (Circuit breaker supervision)
X: Logical nodes for switchgear
XCBR (Circuit breaker)
XSWI (Circuit switch)

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3. Logical node extensions

The following tables use

- M Data is mandatory in the IEC 61850-7-4 Ed.2.
- O Data is optional in the IEC 61850-7-4 Ed.2 and is used in the device.
- E Data is an extension to the IEC 61850-7-4 Ed.2.

The following logical nodes have been extended with extra data. All extra data has been highlighted in the tables and marked as “E” (Extended).

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3.1. CSYN_0 - Synchronizer controller

Table 2 – Extended CSYN for synchronizer controller

CSYN class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
SCTL1CSYN1	CSYN	Synchronizer controller	O	CSYN_0
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
AngInd	SPS	Phase-angle difference outside limits	O	
Blk	SPS	Dynamically blocked by another function	O	
Cmd	SPS	Breaker closing command needs issuing	O	
HzInd	SPS	Frequency difference outside limits	O	
LHz	SPS	Lowering the frequency initiated	O	
LV	SPS	Lowering the voltage initiated	O	
Rel	SPS	Breaker closing command released	O	
RHz	SPS	Raising the frequency initiated	O	
RV	SPS	Raising the voltage initiated	O	
VInd	SPS	Voltage difference outside limits	O	
LgSyncTme	SPS	GSYN Long Sync Time	E	
NDept	SPS	GSYN Nets Departing	E	
NEncl	SPS	GSYN Nets Enclosing	E	
NStand	SPS	GSYN Nets Standstill	E	
Running	SPS	Motor running	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
DifAngClc	MV	Phase angle difference	O	

DifHzClc	MV	Frequency difference	O	
DifVClc	MV	Voltage magnitude difference	O	
Hz1Clc	MV	Average frequency at side 1	O	
Hz2Clc	MV	Average frequency at side 2	O	
V1Clc	MV	Average voltage at side 1	O	
V2Clc	MV	Average voltage at side 2	O	

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3.2. GAPC_1 - Inadvertent energizing

Table 3 – Extended GAPC for inadvertent energizing

GAPC class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
IAEGAPC1	GAPC	Inadvertent energizing	O	GAPC_1
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Str	ACD	Fault detected	O	
Op	ACT	Protection function decided to trip	O	
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
OpCntRs	INC	Operations count	O	
StrCntRs	INC	I>U< I.A.E. starts	E	
Description information				
NamPlt	LPL	Name plate	O	

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3.3. GGIO_3 - Auto-recloser [79] signals

Table 4 – Extended GGIO for auto-recloser [79] signals

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
AR1SIGGGIO1	GGIO	Auto-recloser [79] signals	O	GGIO_3
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
ArcT	SPS	ARC time on	E	
FinalTrip	SPS	AR Final Trip	E	
Inh	SPS	AR Operation Inhibit	E	
InProgress	SPS	AR In Progress	E	
LO	SPS	AR Lockout after successfull sequence	E	
Lok	SPS	AR Locked	E	
RecIT	SPS	Reclaim time on	E	
ReqOn1	SPS	AR1 Request on	E	
ReqOn2	SPS	AR2 Request on	E	
ReqOn3	SPS	AR3 Request on	E	
ReqOn4	SPS	AR4 Request on	E	
ReqOn5	SPS	AR5 Request on	E	
SeqFin	SPS	AR Sequence finished	E	
Shot1	SPS	AR Shot 1 Running	E	
Shot2	SPS	AR Shot 2 Running	E	
Shot3	SPS	AR Shot 3 Running	E	
Shot4	SPS	AR Shot 4 Running	E	
Shot5	SPS	AR Shot 5 Running	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				

NamPlt	LPL	Name plate	O	

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3.4. GGIO_4 - Arc fault protection [50Arc/50NArc]

Table 5 – Extended GGIO for arc fault protection [50Arc/50NArc]

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
ARC1GGIO1	GGIO	Arc fault protection [50Arc/50NArc]	O	GGIO_4
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
PhCStr	SPS	I/I0 Arc> Ph.Curr.START	E	
ResCStr	SPS	I/I0 Arc> Res.Curr.START	E	
S1Light	SPS	Channel1 Light In	E	
S1Pres	SPS	Channel1 Pressure In	E	
S2Light	SPS	Channel2 Light In	E	
S2Pres	SPS	Channel2 Pressure In	E	
S3Light	SPS	Channel3 Light In	E	
S3Pres	SPS	Channel3 Pressure In	E	
S4Light	SPS	Channel4 Light In	E	
S4Pres	SPS	Channel4 Pressure In	E	
Zn1	SPS	I/I0 Arc> Zone1 TRIP	E	
Zn2	SPS	I/I0 Arc> Zone2 TRIP	E	
Zn3	SPS	I/I0 Arc> Zone3 TRIP	E	
Zn4	SPS	I/I0 Arc> Zone4 TRIP	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.5. GGIO_5 - Scaled analog inputs

Table 6 – Extended GGIO for scaled analog inputs

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
ASCGGIO1	GGIO	Scaled analog inputs	O	GGIO_5
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
Curve1	MV	Curve1 Output	E	
Curve2	MV	Curve2 Output	E	
Curve3	MV	Curve3 Output	E	
Curve4	MV	Curve4 Output	E	

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3.6. GGIO_7 - Circuit breaker wear data

Table 7 – Extended GGIO for circuit breaker wear data

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
CBWDATGGIO1	GGIO	Circuit breaker wear data	O	GGIO_7
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
BreakerOps	INS	Breaker operations	E	
L1OpsLeft	INS	L1 Operations Left	E	
L2OpsLeft	INS	L2 Operations Left	E	
L3OpsLeft	INS	L3 Operations Left	E	
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.7. GGIO_11 - E monitoring functions

Table 8 – Extended GGIO for E monitoring functions

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
EMONGGIO1	GGIO	E monitoring functions	O	GGIO_11
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
DEFAlm	SPS	I0dir> (67N) Alarm	E	
DOCAlm	SPS	Idir> (67) Alarm	E	
FLXAlm	SPS	FL (21FL) Triggered	E	
INTFwdAlm	SPS	I0int> (67NT) Alarm FWD	E	
INTRevAlm	SPS	I0int> (67NT) Alarm REV	E	
NEFAlm	SPS	I0> (50N) Alarm	E	
NOCAlm	SPS	I> (50) Alarm	E	
NOVAlm	SPS	U0> (59N) Alarm	E	
UVAlm	SPS	U< (27) Alarm	E	
UVNoVltAlm	SPS	U< (27) No voltage	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

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3.8. GGIO_12 - General fault registers

Table 9 – Extended GGIO for general fault registers

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
FLTGGIO1	GGIO	General fault registers	O	GGIO_12
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
Flt1	MV	Recorded fault value 1	E	
Flt2	MV	Recorded fault value 2	E	
Flt3	MV	Recorded fault value 3	E	
Flt4	MV	Recorded fault value 4	E	
Flt5	MV	Recorded fault value 5	E	
Flt6	MV	Recorded fault value 6	E	
Flt7	MV	Recorded fault value 7	E	
Flt8	MV	Recorded fault value 8	E	
Flt9	MV	Recorded fault value 9	E	
Flt10	MV	Recorded fault value 10	E	
Flt11	MV	Recorded fault value 11	E	
Flt12	MV	Recorded fault value 12	E	

3.9. GGIO_13 - FLX last fault currents

Table 10 – Extended GGIO for FLX last fault currents

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
FLXCGGIO1	GGIO	FLX last fault currents	O	GGIO_13
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
FaultIL1	MV	Latest fault IL1	E	
FaultIL1A	MV	Latest fault IL1	E	
FaultIL2	MV	Latest fault IL2	E	
FaultIL2A	MV	Latest fault IL2	E	
FaultIL3	MV	Latest fault IL3	E	
FaultIL3A	MV	Latest fault IL3	E	

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3.10. GGIO_14 - GMAG alarms

Table 11 – Extended GGIO for GMAG alarms

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GMAGAGGIO1	GGIO	GMAG alarms	O	GGIO_14
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
AVRrfHiLmt	SPS	GMAG AVR ref on high limit	E	
AVRrfLoLmt	SPS	GMAG AVR ref on low limit	E	
DisturbMod	SPS	GMAG Disturbed mode	E	
DstbModPls	SPS	GMAG Disturbed mode pulse	E	
FCRrfHiLmt	SPS	GMAG FCR ref on high limit	E	
FCRrfLoLmt	SPS	GMAG FCR ref on low limit	E	
FieldFlash	SPS	GMAG Field flashing	E	
FldBrkNOpn	SPS	GMAG Field breaker does not open	E	
FldCLmt	SPS	GMAG Field current limiter active	E	
HighActCur	SPS	GMAG High active current	E	
InsFldCLmt	SPS	GMAG Instantaneous field current limiter	E	
LgFldFlash	SPS	GMAG Long field flashing	E	
LowMeasVol	SPS	GMAG Low measured voltage	E	
LowQErr	SPS	GMAG Low Q Error	E	
MVRrfHiLmt	SPS	GMAG Mvar ref on highlimit	E	
MVRrfLoLmt	SPS	GMAG Mvar ref on lowlimit	E	
OverCurr	SPS	GMAG Overcurrent	E	
PFrfHiLmt	SPS	GMAG PF ref on highlimit	E	
PFrfLoLmt	SPS	GMAG PF ref on lowlimit	E	
PhsRetard	SPS	GMAG Phase retard	E	
RstExctOff	SPS	GMAG Reset and excitation off	E	

StatCOvLmt	SPS	GMAG Stator current limiter overexcited active	E	
StatCUnLmt	SPS	GMAG Stator current limiter underexcited active	E	
UndExctLmt	SPS	GMAG Under excitation limiter active	E	
VHZLimit	SPS	GMAG VHZ limit active	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

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3.11. GGIO_15 - GMAG control status

Table 12 – Extended GGIO for GMAG control status

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GMAGCGGIO1	GGIO	GMAG control status	O	GGIO_15
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
AVRbus	SPS	GMAG AVR Bus	E	
CmdAVR	SPS	GMAG Command AVR	E	
CmdFCR	SPS	GMAG Command FCR	E	
CmdMVAR	SPS	GMAG Command MVar	E	
CmdPF	SPS	GMAG Command PF	E	
Decrease	SPS	GMAG Decrease	E	
FCRbus	SPS	GMAG FCR Bus	E	
Increase	SPS	GMAG Increase	E	
LocCtrlAct	SPS	GMAG ProcessPanel activated	E	
MVARbus	SPS	GMAG MVAR Bus	E	
OrdCloseFB	SPS	GMAG Order close FB	E	
OrdOpenFB	SPS	GMAG Order open FB	E	
ParCtrlAct	SPS	GMAG Parameters activated	E	
PFbus	SPS	GMAG PF Bus	E	
Controllable status information				
Mod	ENC	Mode	O	
RmtCtrlAct	SPC	GMAG Bus activated	E	
Description information				
NamPlt	LPL	Name plate	O	
Analogue settings				
GridVolts	ASG	Grid voltage (remote)	E	

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3.12. GGIO_16 - GMAG PWM

Table 13 – Extended GGIO for GMAG PWM

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GMAGMGGIO1	GGIO	GMAG PWM	O	GGIO_16
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Brdg1TmpHi	SPS	GMAG Bridge1 temperature high	E	
Brdg2TmpHi	SPS	GMAG Bridge2 temperature high	E	
DiodeFault	SPS	GMAG Diode fault	E	
IGBTshrted	SPS	GMAG IGBT shorted	E	
LoSplyVolt	SPS	GMAG Low supply voltage	E	
PWMDI1	SPS	GMAG Bridge 1 DI1 Signal	E	
PWMDI2	SPS	GMAG Bridge 1 DI2 Signal	E	
PWMDI3	SPS	GMAG Bridge 1 DI3 Signal	E	
PWMDI4	SPS	GMAG Bridge 1 DI4 Signal	E	
PWMDI5	SPS	GMAG Bridge 1 DI5 Signal	E	
PWMDI6	SPS	GMAG Bridge 1 DI6 Signal	E	
PWMDI7	SPS	GMAG Bridge 1 DI7 Signal	E	
PWMDI8	SPS	GMAG Bridge 1 DI8 Signal	E	
PWMDO1On	SPS	GMAG PWM AC1 On	E	
PWMDO2On	SPS	GMAG PWM DC1 On	E	
PWMenabled	SPS	GMAG PWM Enabled	E	
RectTrp	SPS	GMAG Rectifier trip	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.13. GGIO_17 - Magnetizer control

Table 14 – Extended GGIO for magnetizer control

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GMAGOGGIO1	GGIO	Magnetizer control	O	GGIO_17
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
DO3	SPS	Local Bridge DO3	E	
DO4	SPS	Local Bridge DO4	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
ContSig	MV	PWM control signal	E	

3.14. GGIO_18 - GMAG status

Table 15 – Extended GGIO for GMAG status

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GMAGSGGIO1	GGIO	GMAG status	O	GGIO_18
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
AVRStartRf	SPS	GMAG AVR Start Ref	E	
DecMVARPF	SPS	GMAG Decrease MVar PF	E	
ExcitOff	SPS	GMAG Excitation Off	E	
ExcitOn	SPS	GMAG Excitation On	E	
ExctRunOrd	SPS	GMAG Excitation run order	E	
FBopnGBcls	SPS	GMAG Field breaker is open Gen breaker is Closed	E	
FCRStartRf	SPS	GMAG FCR Start Ref	E	
IncMVARPF	SPS	GMAG Increase MVar PF	E	
NewRfStart	SPS	GMAG New reference start	E	
OvrdCtrl	SPS	GMAG Overriding control	E	
Synced	SPS	GMAG Synchronised	E	
TestMode	SPS	GMAG Test mode on	E	
TestSqrEna	SPS	GMAG Test square enabled	E	
Controllable status information				
Mod	ENC	Mode	O	
AVRmode	SPC	GMAG AVR Mode	E	
AvrSpd90	SPC	AVR speed 90 (remote)	E	
FBclosed	SPC	GMAG Field Breaker is closed	E	
FBopen	SPC	GMAG Field Breaker is open	E	
FCRmode	SPC	GMAG FCR Mode	E	
FllwingLV	SPC	GMAG Following line volt	E	

GBclosed	SPC	GMAG GB is closed	E	
IslandMode	SPC	GMAG Islandmode	E	
MVARmode	SPC	GMAG MVAR Mode	E	
PFmode	SPC	GMAG PF Mode	E	
ReactPUnld	SPC	GMAG Reactive power unloaded	E	
ResetOn	SPC	GMAG Reset On	E	
Description information				
NamPlt	LPL	Name plate	O	

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3.15. GGIO_19 - GMAG variables

Table 16 – Extended GGIO for GMAG variables

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GMAGVGGIO1	GGIO	GMAG variables	O	GGIO_19
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
AVRsetExec	SPC	AVR Ref execute (remote)	E	
FCRsetExec	SPC	FCR Ref execute (remote)	E	
MVRsetExec	SPC	MVar Ref execute (remote)	E	
PFsetExec	SPC	PF Ref execute (remote)	E	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
AVRref	MV	AVR Ref actual (remote)	E	
AVRRefMax	MV	Maximum AVR Reference allowed	E	
AVRRefMin	MV	Minimum AVR Reference allowed	E	
ExcitMeas	MV	Local Excit Curr measurement	E	
FCRref	MV	FCR Ref actual (remote)	E	
FCRRefMax	MV	Maximum FCR Reference allowed	E	
FCRRefMin	MV	Minimum FCR Reference allowed	E	
FieldCurr	MV	Field current (remote)	E	
IntgrStat	MV	Local integrator status	E	
MVRref	MV	Reference MVar	E	
MVRrefMax	MV	Maximum MVAR Reference allowed	E	
MVRrefMin	MV	Minimum MVAR Reference allowed	E	

PFref	MV	PF Ref actual (remote)	E	
PFRefMax	MV	Maximum PF Reference allowed	E	
PFRefMin	MV	Minimum PF Reference allowed	E	
Analogue settings				
AVRrefSet	ASG	AVR Ref value (remote)	E	
FCRrefSet	ASG	FCR Ref value (remote)	E	
MVRrefSet	ASG	MVar Ref value (MVar) (remote)	E	
PFrefSet	ASG	PF Ref value (remote)	E	

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3.16. GGIO_22 - Modbus gateway imported double bits

Table 17 – Extended GGIO for Modbus gateway imported double bits

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
GWDBITGGIO1	GGIO	Modbus gateway imported double bits	O	GGIO_22
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
DBit1	DPS	Imported double bit signal 1	E	
DBit2	DPS	Imported double bit signal 2	E	
DBit3	DPS	Imported double bit signal 3	E	
DBit4	DPS	Imported double bit signal 4	E	
DBit5	DPS	Imported double bit signal 5	E	
DBit6	DPS	Imported double bit signal 6	E	
DBit7	DPS	Imported double bit signal 7	E	
DBit8	DPS	Imported double bit signal 8	E	
DBit9	DPS	Imported double bit signal 9	E	
DBit10	DPS	Imported double bit signal 10	E	
DBit11	DPS	Imported double bit signal 11	E	
DBit12	DPS	Imported double bit signal 12	E	
DBit13	DPS	Imported double bit signal 13	E	
DBit14	DPS	Imported double bit signal 14	E	
DBit15	DPS	Imported double bit signal 15	E	
DBit16	DPS	Imported double bit signal 16	E	
DBit17	DPS	Imported double bit signal 17	E	
DBit18	DPS	Imported double bit signal 18	E	
DBit19	DPS	Imported double bit signal 19	E	
DBit20	DPS	Imported double bit signal 20	E	
DBit21	DPS	Imported double bit signal 21	E	
DBit22	DPS	Imported double bit signal 22	E	
DBit23	DPS	Imported double bit signal 23	E	

DBit24	DPS	Imported double bit signal 24	E	
DBit25	DPS	Imported double bit signal 25	E	
DBit26	DPS	Imported double bit signal 26	E	
DBit27	DPS	Imported double bit signal 27	E	
DBit28	DPS	Imported double bit signal 28	E	
DBit29	DPS	Imported double bit signal 29	E	
DBit30	DPS	Imported double bit signal 30	E	
DBit31	DPS	Imported double bit signal 31	E	
DBit32	DPS	Imported double bit signal 32	E	
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

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3.17. GGIO_25 - Current component measurements

Table 18 – Extended GGIO for current component measurements

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
ICGGIO1	GGIO	Current component measurements	O	GGIO_25
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
I01R	MV	I01 Residual Resistive Current Pri.	E	
I01RS	MV	I01 Residual Resistive Current Sec.	E	
I01X	MV	I01 Residual Reactive Current Pri.	E	
I01XS	MV	I01 Residual Reactive Current Sec.	E	
I1R	MV	Positive sequence Resistive Current Pri.	E	
I1X	MV	Positive sequence Reactive Current Pri.	E	
I02R	MV	I02 Residual Resistive Current Pri.	E	
I02RS	MV	I02 Residual Resistive Current Sec.	E	
I02X	MV	I02 Residual Reactive Current Pri.	E	
I02XS	MV	I02 Residual Reactive Current Sec.	E	
IL1R	MV	IL1 Resistive Current Pri.	E	
IL1X	MV	IL1 Reactive Current Pri.	E	
IL2R	MV	IL2 Resistive Current Pri.	E	
IL2X	MV	IL2 Reactive Current Pri.	E	
IL3R	MV	IL3 Resistive Current Pri.	E	
IL3X	MV	IL3 Reactive Current Pri.	E	

3.18. GGIO_30 - Metering values

Table 19 – Extended GGIO for metering values

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
MeterGGIO1	GGIO	Metering values	O	GGIO_30
MeterGGIO2	GGIO	Metering values	O	GGIO_30
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
ESExP	BCR	Apparent Energy (S) while Export (P) kVAh	E	
ESImP	BCR	Apparent Energy (S) while Import (P) kVAh	E	
ExEP	BCR	Export Active Energy (P) kWh	E	
ExEQExP	BCR	Exported (Q) while Export (P) kVarh	E	
ExEQImP	BCR	Exported (Q) while Import (P) kVarh	E	
ExImEP	BCR	Active Energy (P) Export/Import balance kWh	E	
ExImEQExP	BCR	Reactive Energy (Q) balance while Export (P) kVarh	E	
ExImEQImP	BCR	Reactive Energy (Q) balance while Import (P) kVarh	E	
ImEP	BCR	Import Active Energy (P) kWh	E	
ImEQExP	BCR	Imported (Q) while Export (P) kVarh	E	
ImEQImP	BCR	Imported (Q) while Import (P) kVarh	E	
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.19. GGIO_31 - Motor status monitoring (MST)

Table 20 – Extended GGIO for motor status monitoring (MST)

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
MSTGGIO1	GGIO	Motor status monitoring (MST)	O	GGIO_31
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
HighOC	SPS	High overcurrent	E	
LoadNormal	SPS	Load normal	E	
LoadNotSym	SPS	Missing phase	E	
Overload	SPS	Overloading	E	
Running	SPS	Motor running	E	
Stalled	SPS	Motor stalled	E	
Started	SPS	Motor starting	E	
Stopped	SPS	Motor stopped	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.20. GGIO_32 - Object command fail

Table 21 – Extended GGIO for object command fail

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
OCF1GGIO1	GGIO	Object 1 command fail	O	GGIO_32
OCF2GGIO2	GGIO	Object 2 command fail	O	GGIO_32
OCF3GGIO3	GGIO	Object 3 command fail	O	GGIO_32
OCF4GGIO4	GGIO	Object 4 command fail	O	GGIO_32
OCF5GGIO5	GGIO	Object 5 command fail	O	GGIO_32
OCF6GGIO6	GGIO	Object 6 command fail	O	GGIO_32
OCF7GGIO7	GGIO	Object 7 command fail	O	GGIO_32
OCF8GGIO8	GGIO	Object 8 command fail	O	GGIO_32
OCF9GGIO9	GGIO	Object 9 command fail	O	GGIO_32
OCF10GGIO10	GGIO	Object 10 command fail	O	GGIO_32
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
CloseFail	SPS	Always False	E	
OpenFail	SPS	Always False	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.21. GGIO_33 - Programmable control switch [PCS]

Table 22 – Extended GGIO for programmable control switch [PCS]

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
PCSGGIO1	GGIO	Programmable control switch [PCS]	O	GGIO_33
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
Mod	ENC	Mode	O	
Sw1	SPC	PCS1 Switch Status	E	
Sw2	SPC	PCS2 Switch Status	E	
Sw3	SPC	PCS3 Switch Status	E	
Sw4	SPC	PCS4 Switch Status	E	
Sw5	SPC	PCS5 Switch Status	E	
Description information				
NamPlt	LPL	Name plate	O	

3.22. GGIO_35 - RTD

Table 23 – Extended GGIO for RTD

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
RS1GGIO1	GGIO	RTD 1	O	GGIO_35
RS2GGIO2	GGIO	RTD 2	O	GGIO_35
RS3GGIO3	GGIO	RTD 3	O	GGIO_35
RS4GGIO4	GGIO	RTD 4	O	GGIO_35
RS5GGIO5	GGIO	RTD 5	O	GGIO_35
RS6GGIO6	GGIO	RTD 6	O	GGIO_35
RS7GGIO7	GGIO	RTD 7	O	GGIO_35
RS8GGIO8	GGIO	RTD 8	O	GGIO_35
RS9GGIO9	GGIO	RTD 9	O	GGIO_35
RS10GGIO10	GGIO	RTD 10	O	GGIO_35
RS11GGIO11	GGIO	RTD 11	O	GGIO_35
RS12GGIO12	GGIO	RTD 12	O	GGIO_35
RS13GGIO13	GGIO	RTD 13	O	GGIO_35
RS14GGIO14	GGIO	RTD 14	O	GGIO_35
RS15GGIO15	GGIO	RTD 15	O	GGIO_35
RS16GGIO16	GGIO	RTD 16	O	GGIO_35
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Alm1	SPS	Alarm trigger status 1	O	
Alm2	SPS	Alarm trigger status 2	O	
Inv	SPS	S1 MEAS INVALID	E	Inv
Controllable status information				
Mod	ENC	Mode	O	

Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
Meas	MV	S1 Measurement (Protection)	E	

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3.23. GGIO_36 - Voltage memory

Table 24 – Extended GGIO for voltage memory

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
VMEMGGIO1	GGIO	Voltage memory	O	GGIO_36
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
VoltMemOn	SPS	Voltage memory on	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.24. GGIO_37 - Fault value recorder

Table 25 – Extended GGIO for fault value recorder

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
VRECGGIO1	GGIO	Fault value recorder	O	GGIO_37
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
OCFltType	INS	Overcurrent fault type	E	
TripdStage	INS	Tripped stage	E	
VFltType	INS	Voltage fault type	E	
Trigger	SPS	Trigger register to memory	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
Magnitude1	MV	VREC Magnitude 1	E	
Magnitude2	MV	VREC Magnitude 2	E	
Magnitude3	MV	VREC Magnitude 3	E	
Magnitude4	MV	VREC Magnitude 4	E	
Magnitude5	MV	VREC Magnitude 5	E	
Magnitude6	MV	VREC Magnitude 6	E	
Magnitude7	MV	VREC Magnitude 7	E	
Magnitude8	MV	VREC Magnitude 8	E	

3.25. GGIO_38 - AVR tap changer data [90]

Table 26 – Extended GGIO for AVR tap changer data [90]

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
VRGDATGGIO1	GGIO	AVR tap changer data [90]	O	GGIO_38
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
AbsTaploc	INS	Absolute tap location	E	
Taploc	INS	Tap location now (- 0 +)	E	
HiPos	SPS	AVR Tap in highlimit	E	
LoPos	SPS	AVR Tap in lowlimit	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
VoltDiff	MV	Voltage difference to set target	E	
VoltNow	MV	Voltage now	E	

3.26. GGIO_40 - Zero sequence recloser

Table 27 – Extended GGIO for zero sequence recloser

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
ZSRGGIO1	GGIO	Zero sequence recloser	O	GGIO_40
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Active	SPS	U0> RECL Active	E	
Block	SPS	U0> RECL Blocked	E	
BlockU0	SPS	U0> RECL BLKU0	E	
Close	SPS	U0> RECL CLOSE	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.27. GGIO_41 - Tap changer logical inputs

Table 28 – Extended GGIO for tap changer logical inputs

GGIO class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
LITCGGIO1	GGIO	Tap changer logical inputs	O	GGIO_41
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Controllable status information				
TapChg1	BSC	Logical Tap Changer Input 1	E	
TapChg2	BSC	Logical Tap Changer Input 2	E	
TapChg3	BSC	Logical Tap Changer Input 3	E	
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.28. PTOC_1 - Capacitor bank unbalance protection

Table 29 – Extended PTOC for capacitor bank unbalance protection

PTOC class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
CNU1PTOC1	PTOC	Capacitor bank neutral unbalance protection [50UB]	O	PTOC_1
UICPTOC1	PTOC	Capacitor bank current unbalance protection [46C]	O	PTOC_1
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Str	ACD	Fault detected	M	
Op	ACT	Protection function decided to trip	M	
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Alm1	SPS	CBW Alarm 1 act	E	
StrAlm	SPS	CNU> (50UB) ALARM START	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.29. PTTR _1 - Transformer thermal overload [49T]

Table 30 – Extended PTTR for transformer thermal overload [49T]

PTTR class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
TOLT1PTTR1	PTTR	Transformer thermal overload [49T]	O	PTTR _1
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Op	ACT	Protection function decided to trip	M	
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
Alm1Thm	SPS	TT> Alarm1	E	
Alm2Thm	SPS	TT> Alarm2	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
TmpRl	MV	Name plate	O	

3.30. LTMS_0 - Time master supervision

Table 31 – Extended PTTR for time master supervision

LTMS class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
TMS1LTMS1	LTMS	Time master supervision	O	LTMS_0
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
TmSrc	VSS	Current time source identity	M	
TmChSt1	SPS	Is receiving time messages within time	O	
TmSrcTyp	ENS	Type of the clock source	E	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	

3.31. SCBR_0 - Circuit breaker supervision

Table 32 – Extended SCBR for circuit breaker supervision

SCBR class				
Logical node name	**Logical node class**	**Explanation**	**M/O/E**	**Remarks**
OBJ1SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ2SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ3SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ4SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ5SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ6SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ7SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ8SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ9SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
OBJ10SCBR1	SCBR	Circuit breaker supervision	O	SCBR_0
Data objects				
Data object name	**Common data class**	**Explanation**	**M/O/E**	**Remarks**
Status information				
Health	ENS	Health	O	
Beh	ENS	Behavior	M	
ColOpn	SPS	Coil operated through open command	M	
AbrAlm	SPS	Contact abrasion exceeded setting	O	
OpTmAlm	SPS	Switch operating time exceeded setting	O	
Controllable status information				
Mod	ENC	Mode	O	
Description information				
NamPlt	LPL	Name plate	O	
Measurand information				
OpTmOpn	MV	Operation timing of main contact during open operation	O	
OpTmCls	MV	Operation timing of main contact during close operation	O	
AccmAbr	MV	Cumulated abrasion of parts subject to wear	E	

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