

# **Application Descriptions**

### **Common Functional Blocks**

# **System Clock**

#### Summary

This document specifies the mechanism to synchronise local clocks in the system by one single master clock.

The Functional Block 'System Clock' can be configured as:

- clock master that provides system clock information to the system
- clock slave that receives clock information from the master and synchronises its local clock
- autonomous clock

This Functional Block is common for different application domains.

Version 01.04.03 is a KNX Approved Standard.

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# **Document updates**

Version	Date	Modifications
0.8	01.11.2001	resolution of comments by TFI; Release for Final Voting
1.0	2002.03.25	Preparation of the Approved Standard.
1.1	2007.03.19	Editorial update  - Interpretation of value 0 for field DayOfWeek in DPT_DateTime changed from "any day" to "no day".  - Specification of DPT_SCLOMode (20.001) removed: is meanwhile integrated in Chapter 3/7/2 "Datapoint Types".
1.2	2008.09.08	<ol> <li>AN106 "Phasing out TP0" integrated.</li> <li>AN107 "Phasing out LT-R" integrated.</li> <li>AN108 "Phasing out LT-S" integrated.</li> <li>AN109 "Phasing out PL132" integrated.</li> <li>AN110 "Phasing out A-Mode" integrated.</li> </ol>
1.2	2009.04.20	Editorial update in preparation of inclusion in KNX Specifications v2.0.
1.3	2010.11.23	Definition of RelToGMT and GMTimeOffsetRefClock corrected
1.3.00	2011.02.22	Publication of the Approved Standard.
01.04.01	2013.09.04	AN150 "FB Profiles for existing FBs" integrated.
01.04.02	2013.10.29	Editorial updates for the publication of KNX Specifications 2.1.
01.04.03	2013.11.29	Editorial updates.

### References

[01] Chapter 6/30/1 "Runtime Profiles"

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### 1 Functional Block 'System Clock' (SCLO)

#### 1.1 Aims and objectives

One device in the system may be assigned to provide accurate system time & date information and synchronise the local clocks of other devices in the system.

The system clock information is generated and distributed by the Functional Block 'System Clock' (SCLO) that is configured as master clock.

On the other hand SCLO Functional Block may be configured as slave clock. In this case system clock information from the master clock is received and the local clock of the SCLO is synchronised. It is important to note that also the slave clocks are real clocks: they shall contain an internal clock to keep the time (using some oscillator, crystal, mains signal ...)!

System clock information from a master clock may also be input to other Functional Blocks.

There must be a possibility to run the clock in the SCLO autonomously i.e. no system clock information is sent and reception of system clock information is disabled. In this case the SCLO Functional Block is configured as autonomous clock.

SCLO mode may be activated automatically or by configuration. Normally the device containing a SCLO with the most accurate clock will be configured as master. Whereas SCLOs in other devices are configured as slaves or autonomous clocks.

The "System Clock" application provides mechanisms to enable plug & play operation of master and slave clocks.

The "System Clock" application provides mechanisms to detect / avoid the presence of more than one master clock in the system.

System Clock functionality is not restricted to one application domain. Therefore the Functional Block SCLO is common for multiple applications.

As for every Functional Block, the SCLO may be part of a complex device (e.g. an apartment controller) or may be located in an "intelligent" clock device connected to the bus.

### 1.2 Functional specification

#### 1.2.1 Common Clock functionality

The main functionality of SCLO can be configured by the parameter SCLOMode as a:

- master clock,
- slave clock or
- autonomous clock

Depending on SCLOMode parameter setting, DPs in the SCLO become mandatory or optional and alternative flowcharts are activated in the device.

The parameter SCLOMode is always mandatory. It is allowed to have this parameter only as 'read only'. It can be set at factory and is not changeable because SCLO may have a fixed functionality (e.g. a DCF77 Radio Clock will be always a master clock)

The Functional Block SCLO has to maintain its own-standing local clock using e.g. crystal oscillator, DCF77, videotext etc. which may be set or synchronised from outside. Generation of the local clock information in the SCLO is device/company specific and not part of this specification.

Not all types of SCLO may provide full calendar information. Therefore the local clock of the SCLO may be a:

- Year clock (supporting full calendar functionality, daylight saving time, leap year etc.)
- Weekly clock (supporting only weekday and time)
- Daily clock (supporting only time)

Other flavours of clock information are not allowed!

Faults in the local clock of the SCLO data must be detected and the corresponding 'Fault' attribute must be set in the clock information (e.g. corrupted time after installation or a long power down).

#### 1.2.2 Master Clock functionality

The Functional Block SCLO configured as master clock shall derive system clock information from its local clock and provide the signal 'SystemClock' periodically for the system (heartbeat).

The heartbeat period is fixed for "Automatic" or "Easy" systems to 10 minutes. This is a compromise between busload and maximum waiting time for the installer to get a 'SystemClock' update after installation of e.g. a new device\*. For engineered systems the heartbeat period can be set by an optional parameter 'SystemClockHeartbeat' with the default value of 10 minutes.

\*) Optional slave feature: read out of the 'SystemClock' Output is also possible. This is, a newly installed slave may ask for 'SystemClock' information in order to get immediate master clock information.

Depending on the capabilities of SCLO, Year clock or Weekly clock or Daily clock information may be provided. In order to have only one type of 'SystemClock' message, empty data fields shall be marked as 'void' (flexible, scalable Datapoint type DPT\_DateTime).

#### Backwards compatibility with existing slave clock devices

Existing products do not support the new DPT\_DateTime. In order to guarantee Interworking with existing products, the SCLO master clock shall provide 'Time' and optionally 'Date' Output information (2 DPs) in addition. Details see clause 1.4.1.

#### **Optional System Clock Master Setting feature**

The local clock of the master SCLO may be set/adjusted locally or via bus. The SCLO has a corresponding data Input 'SystemClockSetting' that is directly written to the local clock of the SCLO. With an optional parameter 'EnableSystemClockSetting' the SCLO can be configured during runtime, that it will not react on reception of the 'SystemClockSetting' Input.

After setting of the local clock of SCLO, the new 'SystemClock' / 'Date' / 'Time' information is either immediately provided for the system (COV) or sent after expiration of the normal heartbeat period (manufacturer specific behaviour)

#### **1.2.3** Slave Clock functionality

The local clock of slave SCLO shall be synchronised by reception of a 'SystemClock' information from the master SCLO. Generation of the local clock information in the slave SCLO is device/company specific and not part of this specification.

#### Backwards compatibility with existing master clock devices

Existing products do not support the new DPT\_DateTime. In order to guarantee Interworking with existing products, the SCLO slave clock shall support 'Time' and optionally 'Date' Inputs (2 DPs) in addition. Details see clause 1.4.2.

#### Handling of 'SystemClock' input

Not all types of master or slave SCLO may support full calendar information. This leads to the situation that the 'SystemClock' message from master SCLO may contain more or less information than required for synchronisation of the local clock in the slave SCLO. Usually the system will be configured in a way that 'SystemClock' information from a master SCLO will be "richer" or same as in slave SCLO.

Slave SCLO is "poorer": fields in the 'SystemClock' message not used by slave SCLO are ignored.

Slave SCLO is "richer": The slave SCLO will extract the valid fields in the 'SystemClock' message

and update only part of its local clock information (e.g. hh:mm:ss only). Allowed combinations of fields and test criteria are defined in the

DPT\_DateTime specification.

If the Fault attribute in the 'SystemClock' message is set, the local clock of the slave SCLO is unchanged.

If SCLO is configured as a slave, presence of an external master SCLO is monitored by checking the periodical 'SystemClock' update.

Timeout Condition: during normal operation, the 'SystemClock' message is provided periodically.

Therefore valid 'SystemClock' messages should be received within a timeout

period

standard timeout =  $2 \times \text{heartbeat} + 1 \text{ min} = 21 \text{ min}$ 

The timeout is fixed for "Automatic" or "Easy" systems to 21 minutes. For engineered systems the timeout can be set by an optional parameter 'SystemClockTimeout' with the default value of 21 minutes.

Error Handling: If Timeout Condition or Fault in 'SystemClock' occurs, the master SCLO is

either removed or defective or bus communication is seriously disturbed or

e.g. a Radio clock has no proper reception of the DCF77 signal.

⇒ use free-running local clock in SCLO

⇒ optional manufacturer specific error handling

In some applications it is necessary to know if the local clock in the slave SCLO was just synchronised by 'SystemClock' within  $\pm$  N seconds (e.g. N < 30 s) or master clock information was changed due to user settings (e.g. clock dependent HVAC optimisation functions are temporarily disabled due to clock setting).

This detection of time "hops" is part of the slave SCLO and manufacturer specific.

#### 1.2.4 Autonomous Clock functionality

The Functional Block SCLO configured as autonomous clock maintains its local clock but ignores 'SystemClock' or 'SystemClockSetting' signals. The local clock can be set locally or remotely via bus setting the 'LocalClock' property using individual addressing.

Autonomous SCLO shall not provide 'SystemClock' / 'Date' / 'Time' output signal.

#### 1.3 Constraints

Only one master SCLO is allowed per system in order to avoid time "hops" on the slaves.

#### **Optional 'Multiple Master Detection' Feature**

Master SCLO is optionally able to receive 'SystemClock' input message from another device in order to detect multiple SCLO masters. If the source individual address in the received 'SystemClock' message is different from the own individual address, there is a SCLO master conflict in the system. This means that two or more master SCLO are present in the system.

This conflict can be resolved automatically:

- 1<sup>st</sup> criterion:
  - if a master SCLO sends its output with CLQ  $^{1)}$  = 0 and receives 'SystemClock' with CLQ = 1 from another device, it deactivates its own 'SystemClock' output. If a master SCLO sends its output with CLQ = 1 and receives 'SystemClock' with CLQ = 0 from another device, its own 'SystemClock' output remains active.
- 2<sup>nd</sup> criterion:
  - if two (or more) master SCLO send and receive 'SystemClock' with the same value in CLQ bit, the SCLO with the higher Individual Address deactivates its own 'SystemClock' output.
- 'SystemClock' output of a deactivated SCLO remains deactivated as long as the external 'SystemClock' message is received (from the same device!). Reception is checked by timeout ('SystemClockTimeout'). Timeout Timer is retriggered with each reception of 'SystemClock' input.
- A master SCLO with deactivated 'SystemClock' output changes <u>not</u> its local date & time to the value received with 'SystemClock' input.
- If timeout condition occurs, the 'SystemClock' output is activated again.
- This mechanism leads to a racing situation after start-up.
- If an active master SCLO is changed to a slave or an autonomous SCLO, timeout condition will occur in the deactivated SCLO(s). Then, the remaining (deactivated) master SCLO will become the active master SCLO. If there are still more than one master SCLO, one of these remaining master SCLOs will become the only new active master SCLO after a racing situation (1<sup>st</sup> and then 2<sup>nd</sup> criterion have to be considered).
- In case of SCLO master conflict detection, additional company specific exception handling may be executed, e.g. generate an error indication etc.

This mechanism is only possible if:

- the received system clock message causes an update of 'system clock' data in the application.
- the 'source address' in the received system clock message (= individual address of the source device) is given upwards to the application.

If a multiple SCLO master conflict is detected in a plant and if not all of the involved SCLOs support automatic resolution of the conflict, resolution must be done manually, e.g. by use of an installation tool.

The possibility to set/adjust the local clock of the SCLO locally or via bus is optional and e.g. not necessary in DCF77 or videotext controlled clocks.

Besides slave SCLO also other Functional Blocks may receive 'SystemClock' information. These Functional Blocks have to maintain a local free-running clock because of the slow heartbeat period of the synchronisation message. 'SystemClock' information is not suitable to be displayed directly on an MMI etc.

<sup>1)</sup> CLQ: "Quality of Clock" information bit in Datapoint type "Date & Time"; 0 = clock without external synchronisation, 1 = clock with external synchronisation, e.g. a DCF77 or videotext controlled clock.

### 1.4 Functional Block diagram

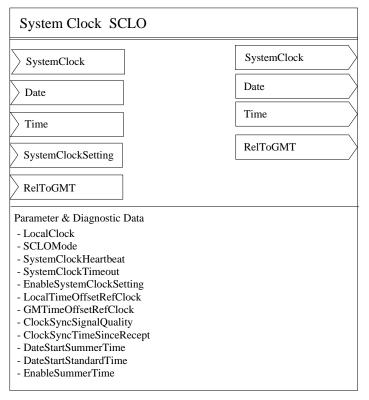


Figure 1 - SCLO FB diagram: superset of Datapoints for all SCLO modes

The SCLO FB diagram shows the superset of all possible inputs, outputs, parameters and diagnostic data. For each SCLO mode only a subset of these Datapoints is reasonable or allowed. This means that depending on parameter settings, DPs become mandatory or optional or are not allowed and alternative data interfaces are activated in the device. This behaviour is specified by the following clauses.

### **Datapoint overview:**

Datapoint	Description	DPT_Name	DPT_ID
Outputs			
SystemClock	provided by master SCLO for time & date synchronisation of other clocks in the system	DPT_DateTime	19.001
Time	provided by master SCLO for time synchronisation of clocks in the system	DPT_Time	10.001
Date	provided by master SCLO for date synchronisation of clocks in the system	DPT_Date	11.001
RelToGMT	Relation between UTC *) / GMT (Greenwich Mean Time) and the SystemClock time.  Range: -13 hours+13 hours	DPT_DeltaTimeMin	8.006
	e.g. Germany RelToGMT=+2 hours (summer time) RelToGMT=+1 hour (winter time)		
	e.g. Los Angeles RelToGMT = -8 hours		
	The value may change twice a year, if summertime differs from standard time.		
	RelToGMT may be useful for e.g. sunblind control applications		
	*) in the context of KNX systems GMT can be considered equivalent to UTC (Universal Time Coordinated)		
Inputs			
SystemClock	received SystemClock information from master SCLO	DPT_DateTime	19.001
Time	input for time synchronisation of clocks in the system	DPT_Time	10.001
Date	input for date synchronisation of clocks in the system	DPT_Date	11.001
SystemClockSetting	used for remote setting of the local clock in the master SCLO. The source of the signal may be "any" FB which supports SystemClockSetting, e.g. user interface, management station.	DPT_DateTime	19.001
RelToGMT	received RelToGMT information from the master SCLO	DPT_DeltaTimeMin	8.006
Parameters			
SCLOMode	System Clock Mode: autonomous / slave / master	DPT_SCLOMode	20.001
SystemClockHeartbeat	Heartbeat period [min] for master SCLO	DPT_TimePeriodMin	7.006
SystemClockTimeout	Receiver timeout [min] for slave SCLO	DPT_TimePeriodMin	7.006

EnableSystemClockSetting	enable/disable SystemClockSetting input in master SCLO	DPT_Enable	1.003
LocalTimeOffsetRefClock	Time zone Offset between Local Political Time to the reference clock (e.g. external clock sync signal like DCF77 signal)) (referencing to standard time, see below)	DPT_DeltaTimeMin	8.006
GMTimeOffsetRefClock	Time zone relation between GMT (Greenwich Mean Time) and the local clock/ system clock	DPT_DeltaTimeMin	8.006
DateStartSummerTime	first possible date for standard ⇒ summer time switching	DPT_DateTime	19.001
DateStartStandardTime	first possible date for summer ⇒ standard time switching	DPT_DateTime	19.001
EnableSummerTime	summer ↔ standard time switching enabled/disabled	DPT_Enable	1.003
Diagnostic Data			
LocalClock	local own standing clock	DPT_DateTime	19.001
ClockSyncSignQual	actual signal quality of external clock sync signal like DCF77 etc.	DPT_RelValue_Z	202.001
ClockSyncTimeSinceRecept	time since last proper reception of external clock sync signal like DCF77 etc.	DPT_TimePeriodMin_ Z	203.006

### 1.4.1 Master Clock: data interface 2)

		Standard Mode
Features and options	Basic FB	FB profile 1 = System Clock Master
// Inputs		
Input SystemClock	0	(GO)
Input SystemClockSetting	0	(GO)
Input Date	0	(GO)
Input Time	0	(GO)
Input RelToGMT	Χ	Χ
// Outputs		
Output SystemClock	0	(GO)
IF time information is available {		
Output Time	M	GO
}		
IF date information is available {		
Output Date	М	GO
}		
Output RelToGMT	0	(GO)

**Table 1 - Master Clock: FB Flavours for Configuration Modes** 

# Properties (of Interface Objects or memory mapped)

Parameter	SCLOMode	М
	SystemClockHeartbeat	0
	SystemClockTimeout	0
	<b>EnableSystemClockSetting</b>	0
	LocalTimeOffsetRefClock	0
	GMTimeOffsetRefClock	0
	<b>DateStartSummerTime</b>	0
	<b>DateStartStandardTime</b>	0
	EnableSummerTime	0
Diagnostic Data	LocalClock	0
	ClockSyncSignQual	0
	ClockSyncTimeSinceRecept	0

<sup>&</sup>lt;sup>2)</sup> Please refer to [28] for the definition of the syntax and symbols used in this FB Profile definition.

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### 1.4.2 Slave Clock: data interface 3)

		Standard Mode
Features and options	Basic FB	FB profile 1 = System Clock Slave
// Inputs		
Input SystemClock	0	(GO)
Input SystemClockSetting	Χ	X
IF time information is supported {		
Input Time	М	GO
}		
IF date information is supported {		
Input Date	М	GO
}		
Input RelToGMT	0	(GO)
// Outputs		
Output SystemClock	Χ	X
Output Date	Х	X
Output Time	Х	X
Output RelToGMT	Χ	Χ

**Table 2 - Slave Clock: FB Flavours for Configuration Modes** 

# Properties (of Interface Objects or memory mapped)

Parameter	SCLOMode	М
	SystemClockHeartbeat	NA
	SystemClockTimeout	0
	EnableSystemClockSetting	NA
	LocalTimeOffsetRefClock	NA
	GMTimeOffsetRefClock	0
	<b>DateStartSummerTime</b>	0
	<b>DateStartStandardTime</b>	0
	EnableSummerTime	0
Diagnostic Data	LocalClock	0
	ClockSyncSignQual	NA
	ClockSyncTimeSinceRecept	NA

<sup>&</sup>lt;sup>3)</sup> Please refer to [28] for the definition of the syntax and symbols used in this FB Profile definition.

# **1.4.3** Autonomous Clock: runtime Interworking data interface Runtime Interworking:

None of the 'SystemClock', 'Time', 'Date' inputs/outputs or 'SystemClockSetting' input are available in any configuration mode.

Table 3 - Autonomous Clock: FB Flavours for Configuration Modes

# Properties (of Interface Objects or memory mapped)

Parameter	SCLOMode	М
	SystemClockHeartbeat	NA
	SystemClockTimeout	NA
	<b>EnableSystemClockSetting</b>	NA
	LocalTimeOffsetRefClock	0
	GMTimeOffsetRefClock	0
	<b>DateStartSummerTime</b>	0
	<b>DateStartStandardTime</b>	0
	EnableSummerTime	0
Diagnostic Data	LocalClock	0
	ClockSyncSignQual	0
	ClockSyncTimeSinceRecept	0

# 1.5 Datapoints

# 1.5.1 Output SystemClock

#### Standard mode

DP Name:	SystemClock (Output)	Abbr.:		Mandatory			
FB Name:	SystemClock (SCLO)		Can be internal				
Description							
The SystemC	lock signal is provided to synchr	ronise the cl	ocks of other F	unctional Blocks li	ke slave SCLO		
in the system.	At time of transmission, it conta	ains the loca	I clock of the n	naster SCLO.			
<b>Datapoint Ty</b>	pe						
DPT_Name:	DPT_DateTime						
DPT Format:	8 octet structured format			OPT_ID: 19.00	)1		
Field	Description	Sup		Unit	Default		
Year		0		Year	2)		
Month		0		Month	2)		
Day of Month		0		day of month	2)		
Day of Week	0 = no day; 1 = Mon, , 7 = Sun	0	0 to 7	day of week	2)		
hours		M	0 to 23	hour of day	2)		
minutes		M	0 to 59	minutes	2)		
seconds		M		seconds	2)		
Attributes 3)		3)			2), 3)		
- F	fault / normal (no fault)	0		Boolean	normal		
- WD	Bank day / Working day	0		Boolean	Bank Day (0)		
- NWD	WD field valid / not valid	M	{0,1}	Boolean	no WD		
- NY	Year field valid / not valid	M	{0,1}	Boolean	no year		
- ND	Month and Day of Month field valid / not valid	ds M	{0,1}	Boolean	no date		
- NDoW	Day of week field valid / not	valid M	{0,1}	Boolean	no weekday		
- NT	Hour of day, Minutes and	M	{0,1}	Boolean	no time		
	Seconds fields valid / not	t					
	valid						
- SUTI	Summertime	0	• • •	Boolean	stand. Time		
- CLQ	Clock quality bit (without/with		{0,1}	Boolean	without		
_	external synchronisation)	)			6)		
Access Type							
◆ Output							
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$							
Spontaneo		∆-Value:		RepTime:			
	Cyclic	Period:	10 min. 4)				
Request							

continued on next page

	DP Name: SystemClock (Output)					Abbr.:			Continu	ed	
Co	mmunicati	on Ty	ре								
•	Group Obj	ject Da	atap	oint					Manda	atory:	
	Default Gro	oup Ac	ddre	ss:	F3FEh						
•	Interface Object Property Datapoint								Manda	atory:	
			Object_	type:	1001d (S	CLO)	PID:		51d		
	Start_in			dex:	1		Nr_of_eleme	nts:	1		
Dy	namics										
	Power dow	n:	Sav	e:							
	Power up:	,	Valu	ie:	No initialisa	_		Default value:			
					Saved value			Actual value (no			
				nsmit on	bus (only for	output):	∑ <sup>5)</sup>	Read from bus	s (only f	or input	t):
	ception Ha										
			О: є	exception	handling se	e clause 1.	3.				
Sp	ecial Featu								<del></del>		
1)								of LTE-Devices	includii	ng SCL	0
2)								e 1.4.1 - 1.4.3	/  -	-116	001.0
,	master SCLO sends 'void' as long as there was no setting of the system clock (local clock of SCLO master device) by external synchronisation, with signal SystemClockSetting from the bus or by local										
										bus or t	by local
		setting of the local clock, actual value of local clock after setting of the system clock;									
		value 'void': date and time info shall be set to '0' for supported fields;									
3)	fields not supported are always set to '0'. Attributes: 'valid' bits must be supported; default values for 'valid bits' see note <sup>2</sup> .										
	Allowed flavours of time (depending on implemented clock):										
	- daily clock (supporting only time: NY = not valid, ND = not valid, NDoW = not valid)										
	<ul> <li>weekly clock (supporting only weekday and time; NY = not valid, ND = not valid)</li> <li>Year clock (supporting full calendar functionality, all fields valid)</li> </ul>										
4)	standard h	eartbe	at 1	0 min; ca	an be change	ed with (op	tional) par	rameter			
	IMPORTAI	NT: Pe	erioc	dical hea	rtbeat transm	ission sha	l always b	oe triggered at s	econd s	ss=253	30 to
	avoid time	"hops'	". 'S	ystemCl	ock' transmis	sion is mai	ntained if	clock information	n is coi	rrupted	(Fault
E)	attribute se	,									
5)					nsmission at						
6)								ation (e.g. DCF7			
	sends CLC	Q = Q	with	out sync	hronisation) ۱	until the firs	st reception	on of the externa	I synch	ronisati	on signal.

#### LTE-mode:

Not available as LTE-process Datapoint.

## 1.5.2 Output Time

#### Standard mode

DP Name:	Tim	ne (Output)		Abbr.:	Mandatory $\boxtimes$			□ □ ¹)	
FB Name:	Sys	stemClock (SC	CLO)		Can be internal				
Description									
The Time sign	al is	provided to sy	nchronise the	e clocks of	other Fu	ncti	onal Blocks	like slave SCLO	in the
system. It con	tains	time of day in	formation of t	he local cl	ock of the	e m	aster SCLC	at time of transn	nission.
<b>Datapoint Ty</b>									
DPT_Name:		PT_TimeOfDa							
DPT Format:		octet structure	ed format				DPT_ID:		
Field					Range	Unit	Default		
Day of Week	0	= no day; 1 =	Mon, , 7 =	Sun	0		0 to 7	day of week	2)
hours					M		0 to 23	hour of day	2)
minutes					M		0 to 59	minutes	2)
seconds					M		0 to 59	seconds	2)
Access Type									
♦ Output									
this $\rightarrow$ M		<b>⊠</b> .	this $\rightarrow$ 1						
Spontaneo	us	☐ COV:		Δ-Value:		Λ	/linRepTime	e:	
		Cyclic		Period:	10 mi	n. <sup>3)</sup>		•	
Request									
Communicat	ion 1	Гуре							
♦ Group Ob	ject l	Datapoint						Mandatory:	$\boxtimes$
Default Gr	oup /	Address:						•	
Dynamics									
Power dov	n:	Save:							
Power up:		Value:	No initialisat	ion:		De	fault value:		
			Saved value	):		Ac	tual value (	not for input):	$\boxtimes$
		Transmit on	bus (only for	output):	<b>A</b> 4)	Re	ad from bu	s (only for input):	
<b>Exception Ha</b>	ndli	ng							
Special Feat	ıres								
nandatory	in S	CLO master;	not present in	slave or a	utonomo	us S	SCLO, see	clause 1.4.1 - 1.4	.3
								ock (local clock of	
								from the bus or b	y local
		ocal clock, actu						n clock;	
		beat 10 min; c							
								second ss=253	
		os". 'SystemCl	ock' transmis:	sion is mai	ntained i	f clo	ock informat	tion is corrupted (	Fault
attribute s			_						
4) Power-Up	Power-Up: start heartbeat transmission at second 25 30								

#### LTE-mode:

Not available as LTE- process Datapoint.

# 1.5.3 Output Date

#### Standard mode

DP Name:	DP Name:   Date (Output)   Abbr.:   Mandatory   📙 ''										
FB Name:	SystemClock (SCLO)				Can be internal						
Description						<u> </u>					
	al is provided to synchronise the				s like slave. It con	tains					
	on of the local clock of the maste	er SCLO at	time of t	ransmission.							
Datapoint Ty											
DPT_Name:	DPT_Date										
DPT Format:	3 octet structured format			DPT_ID							
Field	Description		Supp.	Range	Unit	Default					
Day of Month			М	1 to 31	day of month	2)					
Month			М	1 to 12	month	2)					
Year	Encoding: see specification o DPT Date	f	M	0 to 99	year	2)					
Access Type											
♦ Output											
this $\rightarrow$ M	$\boxtimes$ this $\rightarrow$ 1	П									
Spontaneo				MinRepTim	ie.						
Opermanee	Cyclic	Period:	10 min	<u> </u>	.0.						
Request	T Cyclic   D	i ciioa.	1 10 11111	1.							
Communicati	on Type										
	ect Datapoint				Mandatory:						
Default Gro	oup Address:										
Dynamics											
Power dow	n: Save:										
Power up:	Value: No initialisat	ion:		Default value	):						
·	Saved value				(not for input):	$\overline{\square}$					
	Transmit on bus (only for	output):			us (only for input):						
<b>Exception Ha</b>		1 /									
Special Featu	ires										
1) optional in	SCLO master (mandatory on the	e S-Mode I	nterface	of LTE-Device	es including SCLC	)					
master); no	t present in slave or autonomou	is SCLO, se	ee clause	e 1.4.1 - 1.4.3	,						
2) master SC	LO shall send '0' as long as ther	e was no s	etting of	the system cl	ock (local clock of	SCLO					
master dev	ice) by external synchronisation	, with signa	l System	ClockSetting	from the bus or b	y local					
setting of th	setting of the local clock, actual value of local clock after setting of the system clock;										
3) standard h	eartbeat 10 min; can be change	d with (option	onal) par	ameter							
	NT: Periodical heartbeat transmi				t second ss=253	0 to					
	"hops". 'SystemClock' transmiss										
attribute se					. ,						
4) Power-Up:	start heartbeat transmission at s	second 25	3								

#### LTE-mode:

Not available as LTE-process Datapoint.

# 1.5.4 Output RelToGMT

#### Standard mode

DP Name: RelToGMT (Output) Abbr.: Mandatory											
FB Name:	Syst	emC	Clock (SC	LO)	•		(	Can be	internal		
Description			·								
							between local s				
							s to the west of				
							alues. The valu				
		r, if s	summerti	me is differer	nt from star	ndard tim	e. The signal is	e.g. us	sed for sur	nblind	
control applica											
Datapoint Typ											
DPT_Name:			eltaTime	<u>Min</u>							
DPT Format:	V <sub>16</sub>					_	DPT_ID:		8.006		
Field	_	scrip				Supp.	Range		Unit	Default	
Minutes	De	lta T	ime in m	inutes, max.	± 13 h	M	[-780 to 78	0]	1 min.	CS	
Access Type											
◆ Output											
this $\rightarrow$ M $\square$ this $\rightarrow$ 1 $\square$											
Spontaneo	us		COV:		∆-Value:	1 min	. MinRepTim	ie:			
			Cyclic	;	Period:						
Request											
Communicati	on Ty	ype						_			
♦ Group Ob								Mar	ndatory:	$\boxtimes$	
Default Gro								•			
♦ Interface 0	Objec	t Pro						Mar	ndatory:		
<ul> <li>Server</li> </ul>			Object_	7.	1001d (S	CLO)	PID:		53d		
			Start_in	dex:	1		Nr_of_eleme	ents:	1		
Dynamics											
Power dow	n:	Sav	_								
Power up:		Valu	ue:	No initialisa			Default value:				
				Saved value	_		Actual value (r				
	Transmit on bus (only for output): Read from bus (only for input):										
Exception Ha	ndlin	g									
Special Featu											
1) optional in	mast	er S	CLO, not	present in sl	ave or auto	nomous	SCLO, see cla	use 1.4	4.1 – 1.4.3		

#### LTE-mode:

FB:	SCLC	)	LTE Serv	ver	Output Name:	RelToGMT						Manda Option	atory $\square$
Desc	ription	:										<u> </u>	
			ates the r	num	ber of minutes (-7	30 tc	+780)	offset b	etwe	en local st	andard	time con	tained
in Sys	stemCl	ock	and Univ	ersa	al Time Coordinate	₃d. T	he time	zones	to the	e west of the	he zero	degree r	neridian
					I those to the east								
				ımm	ertime is different	fron	n stand	ard time	e. The	signal is	e.g. use	d for sur	blind
	ol appli		_									1	
DPT:	Nar	_		elta	TimeMin	DP	PT ID	8.006		Datatype for		V <sub>16</sub>	
Field			scription				Sup.		Rang		Unit	COV	Default
Minut				n m	inutes, max. $\pm$ 13	h	М	[-7	780 to	780]	min	1 min	
Communication: Binding Group:													
		rou	ıp:										
Clas					Туре					Default			
	eograp												
			Specific					_					
	nassign				Broadcast 🛚								
	Addre					IO Type(ID): 1001 (SCLO) Property ID: 53							
			(event):		COV 🛛		nRepTi			sec	Heartb		
Inf	oRepo	rt		$\boxtimes$	Output per defau			cating L	E	Binding Gr		dcard all	owed 🔃
			_		Tx Prio:		High [			Normal 2	$\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!$	Lo	w 📙
			Response	:									
			output		Transm after Pov	veru	p: Stor	ed Valu	ле 🖂	Act Val	ue 🏻	Default '	Value □
	all alwa	•	be							7.01 70.			
	pporte		.!										
	perty-				Read only	$\boxtimes$		Read	d/Writ	е 🗌			
			cess):		•						0	1 D	
Exce	ption F	ıan	aling:								Save a	t Power	iown
0	:-I F:-	4											
	ial Fea			\					001.0	\	1 1	4 4 4 0	
′ op	tional i	n n	naster SC	،LU,	not present in sla	ve o	r auton	omous	SCLC	י, see clau	ıse 1.4.	1 - 1.4.3	

# 1.5.5 Input SystemClock

## Standard mode

DF	P Name:		temClock (Inp		Abb	r.:		Mandatory			<u></u> ''	
FB	3 Name:	Sys	temClock (SC	CLO)				Can be int	ernal			
De	escription											
		al is	used by SCL	O slave	to synchro	nise its lo	cal clock: i.e.	. SystemClock inf	formation	is		
	pied to Loca				,			.,				
				the mas	ster SCLO	to detect r	nultiple insta	ances of master S	SCLO in th	ne		
	stem.		,									
	tapoint Typ	эe										
	PT Name:		PT DateTime									
	PT Format:		octet structure		at		D	PT_ID: 19.00	)1			
Fie			escription	00 1011110	4.	Supp.	Range	Unit	Defa	ul	t	
Ye			Somption			О	0 to 255	Year	2)	u		
	onth					0	1 to 12	Month	2)			
	ay of Month					0	1 to 31	day of month	2)			
		_	no dou 1	Man	7 Cun			•	2)			
Day of week $0 = 100 \text{ day}$ , $1 = 100 \text{ in}$ ,, $7 = 3011$												
riodis W 0 to 25 Hour or day												
	nutes					M	0 to 59	minutes	2)			
	conds					M 3)	0 to 59	seconds	3)			
	แบบแอง	١,	1. /				(0.4)	5 .				
- [			ult / normal (r			0	{0,1}	Boolean	norm			
	WD		ank day / Wor			0	{0,1}	Boolean	Bank Da			
	NWD		D field valid /			M	{0,1}	Boolean	no V			
	NY		ear field valid			M	{0,1}	Boolean	no ye			
- [	ND	M	onth and Day		h fields	М	{0,1}	Boolean	no da	ate	е	
	ND W		valid / not va		, ,		(0.4)	5 .				
	NDoW		ay of week fie			M	{0,1}	Boolean	no wee		-	
- [	NT	H	our of day, Mi			s M	{0,1}	Boolean	no tir	ne	Э	
	o <del></del> .		fields valid /	not valid	d		(0.4)					
	SUTI		ummertime			0	{0,1}	Boolean	stand.			
- (	CLQ	CI	ock quality bi			0	{0,1}	Boolean	witho	ou	t	
			external syr	nchronisa	ation)							
Ac	cess Type											
<b>♦</b>	Output											
	$N \rightarrow this$			$1 \rightarrow this$								
	Spontaneo	us		(	Cyclically:			Time-out:	21 m	in	1. <sup>4)</sup>	
	Request			F	Polling:			Period:				
DF	P Name:	Sys	temClock (Inp	out)	Abb	r.:		Continue	ed			
Co	mmunicati											
•	Group Obj							Manda	tory:	1		
Ť	Default Gro			F3FEh				11101110	y ·   <u> </u>			
•		_	t Property Da					Manda	tory:	7		
	• Client	Jojec	Object_		1001	d (SCLO)	PID:		51d			
	• Client			_ , ,		u (SCLO)						
<b>L</b>	mamica		Start_ir	idex:	1		INI_O	f_elements:	1			
υy	namics		0									
	Power dow	/n:	Save:		' - I'		<b>D</b> ,	. 1	1 5	7	2)	
	Power up:		Value:		ialisation:	<del>      -   -   -   -   -   -   -   -   -</del>	Default		0		2)	
				Saved				value (not for inp		<u> </u>	-,	
	Transmit on bus (only for output): Read from bus (only for input):											
	ception Ha											
Mι	ultiple Maste	er SC	LO: exception	n handlir	ng see clau	se 1.3.						

DP Name:	SystemClock (Input)	Abbr.:		Mandatory	
FB Name:	SystemClock (SCLO)			Can be internal	
Special Featu	ıres				
not presen initialisatio specific, us	on the S-Mode Interface of LTE to in autonomous SCLO, see clau n value is 'void' until first reception sually set to '0', attributes see no	use 1.4.1 - on of 'Syst	1.4.3	•	
3) Attributes:	supported are always set to '0' until first reception of a 'valid' Sy imeout 21 min: can be changed y			are set to 'not valid'	

#### LTE-mode

Not available as LTE-process Datapoint.

## 1.5.6 Input Time

#### Standard mode

DP Name:	DP Name: Time (Input) Abbr.: Mandatory \( \sum \frac{1}{2} \)										
FB Name:	Sys	temClock (SC	CLO)				Can	be internal			
Description											
			ynchronise the								
system. It con		time of day ir	nformation of t	he local clo	ck of the	e master So	CLO a	at time of trans	smiss	ion.	
Datapoint Ty											
DPT_Name:		PT_TimeOfDa									
DPT Format:	3	octet structure	ed format		_	DPT_		10.001			
Field		escription			Supp.	Range		Unit	De	efault	
Day of Week	0	= no day; 1 =	Mon, , 7 =	Sun	0	0 to 7		day of week		2)	
hours				M	0 to 23		nour of day		2)		
minutes M 0 to 59 minutes 2)											
seconds M 0 to 59 seconds 2)											
Access Type											
♦ Input											
$N \rightarrow this$			$1 \rightarrow \text{this}$	$\boxtimes$							
Spontaneo	us		Cyclic	ally:	$\boxtimes$		Time	-out:	21 mi	n. <sup>3)</sup>	
Request			Polling	g:			Perio	d:			
Communicat	ion T	уре									
♦ Group Ob	ject [	Datapoint						Mandatory:			
Default Gr	oup A	Address:									
Dynamics											
Power dov	vn:	Save:									
Power up:		Value:	No initialisat	ion:		Default va	lue:		$\boxtimes$	2)	
			Saved value	e:		Actual value	ue (no	ot for input):			
		Transmit on	bus (only for	output):		Read from	bus (	(only for input	):		
<b>Exception Ha</b>	ndlir	ng									
Special Featu	ıres										
1) mandatory	≀in S	CLO slave; o	otional in mas	ter SCLO, i	not pres	ent in autor	nomou	ıs SCLO,			
see clause		_									
			til first reception				e set t	to '0'			
3) standard t											

#### LTE-mode

Not available as LTE-process Datapoint.

# 1.5.7 Input Date

#### Standard mode

DF	P Name:	Date (Input)  Abbr.:  Mandatory											
FB	Name:	Syst	emClock (S	SCLO)						Can be inter	nal		
De	scription												
				synchronise the						like slave. It	conta	ains	
			the local clo	ock of the maste	er SCLO at	time	of trar	nsmissi	on.				
	tapoint Typ	е											
	PT_Name:		PT_Date										
	PT Format:		octet structu	red format					_ID:	11.001			
	eld	De	escription				Supp.	Range		Unit		Default	
	y of Month						M	1 to 3		day of month	า	2)	
	onth						M	1 to 1		month		2)	
Ye		Encoding: see specification of DPT_Date M 0 to 99 year 2)											
Ac	cess Type												
<b>♦</b>	Input		_										
	$N \rightarrow this$			1 → this									
	Spontaneo	us		Cyclic		$\boxtimes$				e-out:	21	min. <sup>3)</sup>	
	Request			Polling	g:				Per	iod:			
Co	mmunicati									_			
<b>♦</b>	Group Obj									Mandatory	:	$\boxtimes$	
	Default Gro	oup A	ddress:										
Dy	namics												
	Power dow	n:	Save:										
ļ	Power up:		Value:	No initialisat				efault v				∑ <sup>2)</sup>	
ļ				Saved value						not for input):		Ц	
	-			n bus (only for	output):	<u>Ц</u>	Re	ead fror	n bus	(only for inp	ut):		
Ex	ception Ha	ndlin	ıg										
Sp	pecial Features optional in SCLO slave (mandatory on the S-Mode Interface of LTE-Devices including SCLO slave);												
')											_O s	lave);	
2)				ot present in au									
3)				ntil first reception					e set	: to '0'			
٠,	standard til	meou	<u>ıt 21 mın; ca</u>	an be changed v	with (optior	nal) p	parame	ter					

#### LTE-mode

Not available as LTE-process Datapoint.

# 1.5.8 Input SystemClockSetting

### Standard mode

DP Name:	,	br.:			Mandatory	1)					
FB Name:	SystemClock (SCLO)				Can be inte	rnal					
Description											
	lockSetting' input signal is used to s			e local clock	of the master SCI	LO via bus:					
	ockSetting information is copied to L										
	the signal may be "any" FB which s	upport	s Sys	temClockSe	tting, e.g. user int	erface,					
management:											
Datapoint Typ											
DPT_Name:	DPT_DateTime										
DPT Format:	8 octet structured format				PT_ID: 19.001						
Field	Description		лрр.	Range	Unit	Default					
Year			0	0 to 255	Year	2)					
Month			0	1 to 12	Month	2)					
Day of Month			0	1 to 31	day of month	2)					
Day of Week	0 = no day; 1 = Mon,, 7 = Sur		0	0 to 7	day of week	2)					
hours			M	0 to 23	hour of day	2)					
minutes			M	0 to 59	minutes	2)					
seconds			M	0 to 59	seconds	2)					
Attributes 3)			3)			3)					
- F	fault		0	{0,1}	Boolean	normal					
- WD	Bank day / Working day		0	{0,1}	Boolean	Bank Day					
A DAVE	N/D ( 11   11 / /   11			(0.4)	5 .	(0)					
- NWD	WD field valid / not valid		M	{0,1}	Boolean	no WD					
- NY	Year field valid / not valid		M	{0,1}	Boolean	no year					
- ND	Month and Day of Month fields valid / not valid		M	{0,1}	Boolean	no date					
- NDoW	Day of week field valid / not valid		M	{0,1}	Boolean	no weekday					
- NT	Hour of day, Minutes and Second fields valid / not valid	ds	M	{0,1}	Boolean	no time					
- SUTI	Summertime		0	{0,1}	Boolean	stand. time					
- CLQ	Clock quality bit (without/with		۸A	{0,1}	Boolean	without					
	external synchronisation)										
Access Type											
♦ Input											
$N \rightarrow this$	$\square$ 1 $\rightarrow$ this $\square$										
Spontaneo	us Cyclically			4)	Time-out:	4)					
Request	Request Polling: Period:										
						1					

continued on next page

	P Name:	_	ClockSett	ting	Abbr.:		-	Continu	red			
C	ommunicati	ion Type	<b>)</b>									
•	Group Ob	ject Data	point					Mand	latory:			
	Default Gro	oup Addı	ress:									
•	Interface (	Object Pi	roperty Da	atapoint				Mand	latory:			
	<ul> <li>Server</li> </ul>		Object_	_type:	1001d (S	CLO)	PID:		52d			
			Start_ir	ndex:	1		Nr_of_eleme	nts:	1			
Dy	namics											
	Power dow	vn: Sa	ave:									
Power up: Value: No initialisation: Default value:												
				Saved value	e:		Actual value (no	ot for in	put):			
			ansmit on	bus (only for	output):		Read from bus	(only fo	or input):			
	ception Ha											
							an the local clo			r SCLO		
							weekly clock or	nly whe	ereas			
				ıll Year clock								
							ck in the maste	r SCLC	) is supp	orting,		
				on is copied t								
			neter Ena	ibleSystemCl	ockSetting	this Syster	mClockSetting	input ca	an be dis	sabled		
	ring runtime											
_Sp	pecial Featu		001.0		1 4		2010		4 4 4 6			
2)						onomous 3	SCLO, see clau	ise 1.4.	.1 - 1.4.3	5		
				elds shall be		Clast Catt	a					
				vith reception					otom old	o ole")		
							ster device (as i					
							g' becomes 'vo /oid' value is si					
	attributes;	erver by	receiving	SCLO maste	i Fullcuona	ii biock). v	volu value is si	grialise	u with th	E		
	,	unnorto	d are alwa	rys set to '0'								
3)					alid' excen	t hetween i	reception of the	lennia e	and cor	ning new		
		Attributes: all date & time fields are 'not valid', except between reception of the signal and coping new values to local clock										
4)				al has no hea	rtbeat							

#### LTE-mode:

FB: SCLO	LTE Server Input Name:	SystemClo	ckSetting			Mandatory ☐ Optional <sup>1)</sup> ⊠
Description:	-					. —
	lockSetting input signal is use	ed to set/adju	ust the loca	I clock of	the master	SCLO via bus:
	ockSetting information is copie					
	the signal may be "any" FB w	hich support	ts SystemC	lockSettin	g, e.g. user	r interface,
management	station.					
<b>DPT:</b> Name	DPT_DateTime	DPT ID	19.001	Datatype	e format	8 octet
Field	Description			Sup.	Unit	Default
Year	Date.Year information			0		2)
	valid if NY=0 and Fault=0					
Month	Date.Month information			0		2)
	valid if ND=0 and Fault=0					
DayofMonth	Date.DayofMonth information	on		0		2)
	valid if ND=0 and Fault=0					0)
DayofWeek	Day of Week information			0		2)
	valid if NdoW=0 and Fault=0	)				3)
Hour	Time.Hour, valid if Fault=0			M	h	2)
Minutes	Time.Minutes, valid if Fault=			M	min	2)
Seconds	Time.Seconds, valid if Fault	=0		M	S	2)
Attributes	Bitset containing status info					3)
<ul><li>Fault</li></ul>	local clock information Norm		ırbed {1}	M	Boolean	normal
-WD	bank day {0} / working day {			0	Boolean	Bank Day (0)
– NWD	validity of WD field invalid {1			0	Boolean	no WD
– NY	validity of Year field invalid			M	Boolean	no year
– ND	validity of Month and Dayofl valid {0}	Vionth fields	invalid {1} /	M	Boolean	no date
- NdoW	validity of DoW field invalid			M	Boolean	no weekday
– NT	validity of Hour, Minutes, Se valid {0}	econds fields	invalid {1}	/ M	Boolean	no time
- SUTI	summertime {1} / standard t	ime {0} flag		M	Boolean	stand. time
- CLQ	clock quality bit: with {1} / with synchronisation	ithout {0} ext	ernal	0	Boolean	without

continued on next page

FB: SCLO	LTE Server	Input Name:	SystemClockS	ettin	g	Continued					
Communication	on:										
Binding Gro	up:										
Class		Туре			Default						
Geographic	al 🗌										
Application	Specific										
Unassigned		Broadcast 🖂	Configurable								
DP Address:		IO Type(ID):	1001 (SCLO)		Propert	y ID:	52	_			
LTE-Service Write	(event):	Timeout:		4)	Min						
Property-Ser (individual a		Read only	☐ R	lead/	Write	$\boxtimes$					
Value after Po		Default	t Value 🛛				Stored Value				
Exception Har	ndling:					Save at	t Powerdown				
If 'SystemClock	Setting' is "ri	cher" i.e. contain	s more information	on th	an the loc	al clock in	n the master SCLO				
is providing, the	e unused field	ds are ignored. E	.g. master SCLO	has	weekly cl	lock only	whereas				
		ns full Year clock									
							CLO is supporting,				
			to the local clock								
		EnableSystemC	lockSetting this S	Syste	mClockS	etting inpu	ut can be disabled				
during runtime.											
Special Featur											
see clause 1.	_										
		d'; fields shall be		_							
			of 'SystemClock			,	,				
							v "system clock").				
	Immediately after this action, input value of 'SystemClockSetting' becomes 'void' again (→ set in the										
property server by receiving SCLO master Functional Block). 'Void' value is signalised with the											
attributes;		-l t t - (O)									
		always set to '0'	olidi oveest beter	100.	roomtis-	of the et	anal and assiss see				
values to lo		e neids are not v	aliu, except betw	/een	reception	or the sig	gnal and coping new	1			
43		signal has no hea	arthoat								
no uneout t	because life s	olyniai nas no nea	ม เม <del>เ</del> สเ								

# 1.5.9 Input RelToGMT

### **Standard mode**

DP Name: RelToGMT (Input) Abbr.: Mandatory 📙 '														
FE	3 Name:	Sys	temClock (S	CLO)						C	an be	internal		
	escription													
	ne signal indi													
	SystemCloc													
	all be negati													
	ange twice a			time is	differe	nt from star	ndard ti	ime	. The sign	al is e	e.g. us	sed for su	ınbli	nd
	ntrol applica		5											
	atapoint Typ													
	PT_Name:		PT_DeltaTin	<u>neMin</u>										
	PT Format:	V <sub>1</sub>	•						DPT_ID	:		8.006		
	eld	_	escription				Supp		Range			Unit	D	efault
Mi	Minutes Delta Time in minutes, max. ± 13 h M [-780 to 780] 1 min. cs													
<b>♦</b>	Input													
	$N \rightarrow this$			$1 \rightarrow th$										
	Spontaneo	us				ically:				Time				
	Request				Polli	ng:				Perio	d:			
Č	ommunicati	on T	уре											
•	Group Obj										Man	datory:		1
	Default Gro	oup A	Address:											
•	Interface C	Objec	t Property D	atapoir	nt						Man	datory:		
	<ul> <li>Client</li> </ul>		Object_typ	e (serve	er):	1001 (SCL	.O)	PI	ID (proper	ty ser	ver):	53		
			Start_index	<b>(</b> :		1		Nı	r_of_elem	ents:		1		
Ď	namics													
	Power dow	n:	Save:											
	Power up:		Value:	No ir	nitialisa	ation:			efault valu					
					ed valu			Ac	ctual value	e (not	for in	put):		
			Transmit o	n bus (d	only fo	r output):		Re	ead from I	bus (c	nly fo	r input):		Z <sup>2)</sup>
E	ception Ha	ndlir	ng											
	pecial Featu													
1) 2)	optional in slave SCLO, not present in master of autonomous SCLO, see clause 1.4.1 - 1.4.5													
۷)	after powe	rup: י	wait a few m	inutes,	then r	ead value fr	om the	bu:	s if not ye	t rece	ived.			

#### LTE-mode

FB: SCLO LTE Clien	t Input Name:	RelToGMT				atory 🗌
<u> </u>		-	-		Optioi	iai '/ 🔼
Description:						
see 1.5.4					1	
<b>DPT</b> : Name DPT_D	eltaTimeMin	DPT ID   8.006	Datatype		V <sub>16</sub>	
Field	Description			Sup.	Unit	Default
Minutes	Minutes Offset			M	min	
Communication:						
Binding Group:						
Class	Туре		Default			
Geographical						
Application Specific						
Unassigned	Broadcast 🖂	Configurable				
DP Address:	IO Type(ID):	1001 (SCLO)	Property ID	:	53	
LTE-Service (event):		niffer on Binding Group		-		
InfoReport 🗵	Timeout:		Min			
LTE-Service (polling): Read – Response⊠	Read Wildcard	d / Resp Sniffer on Bind	ing Group:			
Value after Powerup: 1)	Defa	ult Value 🗌		S	tored Valu	ue 🗌
Exception Handling:			Sa	ve at Po	werdown	
Special Features:						
optional in slave SCLO after powerup: wait a fe	•				1 - 1.4.3	

## 1.5.10 Diagnostic Data LocalClock

FB:	SCLO	Property	y Name ( <u>Server</u> ):	LocalClock	(			Manda	tory <sup>1)</sup>
								Optio	onal <sup>1)</sup>
Desc	ription:			<del>-</del>		<del>-</del>			
Value	of the lo	cal own st	anding clock in SCL	.0					
DPT:	Name	DPT_D	)ateTime	DPT ID	19.001	Datat	ype format	8 octet	t
Field			Description			Sup.	Range	Unit	Default
same	as Syste	mClock							
fields according to the features of the									
local clock									
Com	munication	on:							
DP	Address:		IO Type(ID):	1001 (SC	LO)	Property	/ ID:	120	
(in	the serve	r)	Start-Index:	1		N° of ele	ements	1	
Pro	perty acc	ess:	Read only	$\boxtimes$	Read/W	rite	$\square$ 3)		
Exce	ption Hai	ndling:	Value after Poweru	up: Stored \	/alue 🗌	Act Valu	e 🔲 De	fault Value	
Corru	ipted cloc	k informat	ion e.g. due to powe	er down must	be detec	ted and th	ne Fault att	tribute mus	st be set.
Special Features:									
1) Se	1) See clause 1.4.1 - 1.4.3.								
2) Ba	ackup of c	lock infor	mation during power	down and re	covery at	fter powei	up is man	ufacturer s	specific.
	3) Write access is optional. If LocalClock property is written in master SCLO the same mechanisms apply								
as	as for reception of SystemClockSetting								

# 1.5.11 Parameter SCLOMode

FB:	SCLO	Property	Name ( <u>Server</u> ):	S	CLOMode						tory <sup>1)</sup> 🖂 otional 🗌
Desc	ription:							-			
Mode	of the SC	CLO, see	clause 1.2.1								
DPT:	Name	DPT_S	CLOMode		DPT ID	20.00	1	Da	tatype format	enum	N <sub>8</sub>
Field			Description				Sup	ο.	Range	Unit	Default
								{02}		0	
			0 = autonomous								
			1 = slave								
			2 = master								
Comi	municatio	on:									
DP	Address:		IO Type(ID):		1001 (SCL	.O)	Pi	rope	erty ID:	110	
(in t	he serve	r)	Start-Index:		1		N'	° of	elements	1	
Pro	perty acc	ess:	Read only	$\boxtimes$		Read/	Write	)	$\boxtimes$ 1)		
Exce	Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐										
Spec	ial Featu	res:									
1) It i											

1.5.12 Parameter SystemClockHeartbeat

1.5.1	FD: CCI O Brancota Name (Company) Contam Clock Hearth act											
FB:	SCLO	Property	Name ( <u>Server</u> ):	S	ystemClo	ckHea	rtbea	at			Mandatory	
										Optio	nal 1) 🖂	
Desc	ription:		-									
Heart	beat perio	od for Syste	mClock, Time and	da	ate output :	signals						
DPT:	Nam	DPT_Tim	nePeriodMin		DPT ID	7.006		Da	tatype	U <sub>16</sub>		
	е							for	mat			
Field												
SystemClockHeartbeat repetition period M 1 to 1 440 min 10												
Com	munication	on:					-		-			
DP	Address:	:	IO Type(ID):		1001 (SC	LO)	F	rope	erty ID:	111		
(in t	he serve	r)	Start-Index:		1		١	√of	elements	1		
Pro	perty acc	ess:	Read only	$\boxtimes$		Read/	Writ	Э	⊠ 2)			
Exce	ption Har	ndling:	Value after Poweru	ıp:	Stored \	/alue 🏻		ct Va	alue 🔲 Def	ault Value	e 🔲	
Special Features:												
1) O	1) Optional parameter in master SCLO only, see clause 1.2.2 and 1.4.1 - 1.4.3.											
2) <sub>It</sub>	is allowed	d to have th	is parameter as rea	ad	only (set a	at facto	ry).					

# 1.5.13 Parameter SystemClockTimeout

FB:	SCLO	Property	/ Name ( <u>Server</u> ):	Syste	mClo	kTime	eout			Man	datory 🗌
										Optio	nal 1) 🖂
Desc	ription:										
Time	out period	for Syste	mClock, Time and D	Date inp	out sigr	nals					
DPT:	Nam	DPT_Ti	mePeriodMin	DP	T ID	7.006		Da	tatype format	U <sub>16</sub>	
	е										
Field			Description				Sup	).	Range	Unit	Default
SystemClockTimeout timeout period M 3 to 1 445 min								21			
Comi	municatio	on:				·			-		=
DP	Address:		IO Type(ID):	100	1 (SCL	.O)	Pı	оре	erty ID:	112	
(in t	he serve	r)	Start-Index:	1			N'	° of	elements	1	
Pro	perty acc	ess:	Read only	$\boxtimes$		Read/	Write				
Exce	ption Har	ndling:	Value after Poweru	ıp: S	tored V	/alue 🏻	Ac     Ac	t Va	alue 🗌 Def	ault Value	e 🗌
Spec	ial Featu	res:									
1) O	otional pa	rameter in	master and slave S	SCLO o	nly, se	e claus	se 1.2	2.2,	1.2.3 and 1.4	.1 - 1.4.3	
2) <sub>It i</sub>											

# 1.5.14 Parameter EnableSystemClockSetting

FB:	SCLO	Prope	erty	Name ( <u>Server</u> ):	Setting			Mar	ndatory 🔲			
											Opti	onal <sup>1)</sup> 🛛
Desc	ription:											
				n on SystemClock				r SCLO. I	f enabled,	set	ting c	of local
clock	in the ma	ster S0	CLO	via SystemClockS	ett	ting input is	allowed					
DPT:	DPT:   Name   DPT_Enable   DPT ID   1.003   Datatype format   Boolean											
Field Description Sup. Range Unit Default												
bit Enable/Disable if enabled, SystemClockSetting input is M {0,1} enabled											enabled	
			acc	epted								
Com	municatio	on:						•	=			
DP	Address:			IO Type(ID):		1001 (SCL	O)	Property	ID:	11	3	
(in t	the serve	r)		Start-Index:		1		N° of eler	nents	1		
Pro	perty acc	ess:		Read only	X		Read/Wr	ite	$\leq$			
Exce	Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐											
Spec	Special Features:											
1) Op	tional para	ameter	in m	aster SCLO only,	se	e clause 1.2	2.2, and	1.4.1 - 1.4	.3			

## 1.5.15 Parameter LocalTimeOffsetRefClock

FB:	SCLO	Property	y Name ( <u>Server</u> ):	RefClock	Man	datory 🗌				
							Optio	nal 1) 🖂		
Desc	ription:			_						
			external clock sync s	signal like	DCF77 sig	gnal etc. (MEZ, Su	mmerMEZ) Fo	or radio		
clock	s etc. only	1								
DPT:	Name	DPT_D	DeltaTimeMin	DPT I	D 8.006	Datatype for	mat V <sub>16</sub>			
Field			Description		Sup.	Range	Unit	Default		
TimeOffset see above M -720 to 720 minutes 0										
Com	municatio	on:	-							
DP	Address:		IO Type(ID):	1001 (	SCLO)	Property ID:	114			
(in t	the serve	r)	Start-Index:	1		N° of elements	1			
Pro	perty acc	ess:	Read only	$\boxtimes$	Read/	Write $\boxtimes$ $^2$ )				
Exce	ption Har	ndling:	Value after Poweru	ıp: Store	ed Value 🏻	Act Value	Default Value	e 🗌		
Spec	ial Featu	res:								
1) O	1) Optional parameter in master or autonomous SCLO, see clause 1.2.2 and 1.4.1 - 1.4.3									
	ad only if EPROM	local settii	ng by jumper/dip-sw	ritch or	read/wri	te if stored in non	volatile RAM o	or		

## 1.5.16 Parameter GMTimeOffsetRefClock

FB:	SCLO	Pro	perty l	Name ( <u>Server</u> ):	GMTimeOf	fsetRefC	lock		Mano	datory 🗌	
									Option	nal 1) 🖂	
Desc	ription:							-			
zones	s to the w	est of	f the ze	n GMT (Greenwichero degree meridial	n shall be ne	gative va	alues, ar	nd those to th			
Example for Hong Kong: UTC+8 hours => GMTimeOffsetRefClock = + 480 minutes  DPT: Name DPT_DeltaTimeMin DPT ID 8.006 Datatype format V <sub>16</sub>											
Field	I			ription	<u> </u>	Sup.		lange	Unit	Default	
Time	Offset		see a	bove		M	-780	0 to 780	minutes	0	
Com	munication	on:				-	-				
DP	Address:			IO Type(ID):	1001 (SC	LO)	Prope	rty ID:	118		
(in t	the serve	r)		Start-Index:	1		N° of	elements	1		
Pro	perty acc	ess:		Read only	$\leq$	Read/W	/rite	$\boxtimes$			
Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐											
Spec	ial Featu	res:			·				_		
1) O											

# 1.5.17 Parameter DateStartSummerTime

FB:	SCLO	Pr	operty l	Name ( <u>Server</u> ):	D	ateStartS	umm	erTim	е				Mandatory ☐ Optional ⊠
Desc	ription:	<u>.</u>			_						<u></u>		optional <u>M</u>
First place is summ 25 <sup>th</sup> ) this fl	possible is equal on ertime. to switch	or lat This to s atap	ter than t Sunday ummer t oint are s	dard ⇒ summer the DateStartSum, which is given bime. This DateStasupported the bet	nme y th artS	erTime and is conditio SummerTin	the on, is the character that character the character the character the character than character the character	day is a the first anges	a Su t pos at p	nday, the ossible date oliticians v	clock (E.g vill. T	sha . in he r	all switch to EU March nore fields of
DPT:				PateTime		DPT ID	19.0	001		itatype mat		8 00	ctet
Field		De	escriptio	n				Sup		Range	Uni	t	Default
Year		Tr	ne field "	Year" shall be inv				NA					
Montl	h		ate.Mont ault=0	h information, val	id if	f ND=0 and	b	М		1 to 12			03
Dayo	fMonth		ate.Dayo nd Fault=	fMonth information	on, '	valid if ND:	=0	М		1 to 31			25
DayofWeek information, valid if NdoW=0 O 2 1 to 7 2 - or 7  Hour Time.Hour, valid if NT=0 and Fault=0 O 1 0 to 23 h 1)													
Hour								O 1)		0 to 23	h		<sup>1</sup> ) – or 02
Minutes Time.Minutes, valid if NT=0 and Fault=0 O 1 0 to 59 min 1 - or 00													
Seconds Time.Seconds, valid if NT=0 and Fault=0 O 1 0 to 59 s 1 - or 00													
Attrib				aining status info									*) fixed
– Fau – WD				information Norn 0} / working day {		{0} / fault {	1}	M M		fault/ok true/fals e	boo		normal <sup>*)</sup> bank day <sup>*)</sup>
– NW	'D	va	lidity of	WD field invalid {	1} /	valid {0}		М		true/fals e	boo	ol	no WD *)
– NY		va	lidity of	Year field invalid	{1}	/ valid {0}		М		true/fals e	boo	ol	no year *)
– ND			lidity of I } / valid {	Month & DayofMo	onth	n fields inva	alid	М		true/fals e	bo	ol	date valid *)
– Ndo	Wo			DoW field invalid	{1}	/ valid {0}		М		true/fals e	boo	ol	DoW valid
– NT			•	Hour, Minutes, Se / valid {0}	ecoi	nds fields		М		true/fals e	boo	ol	time valid
- SU	ΤI	SU	ımmertin	ne {1} / standardti	me	{0} flag		M		true/fals e	bo	ol	standard *)
- CLO	2		ock quali nchroniz	ty bit: with {1} / w zation	itho	out {0} exte	rnal	NA		with / without	boo	ol	without *)
	municati												
(in t	Address	er)		IO Type(ID): Start-Index:		1001 (SC 1		Ν	√of	erty ID: elements		115 1	
Property access: Read only ☐ Read/Write ☐													
Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐													
	ial Fast												
	ial Featu			ation is entioned (	214	tohing hav	r moo	, ho fiv	od :-	a the firm:	oro a	and	thic
inf	formation	COL	ıld be hid	ation is optional. Sidden in the Datap	oin	t (i.e. NT=	1)					and	tnis
<sup>2)</sup> St	apport of	Day	OfWeek	t standard ⇒ sum information is op dden in the Datap	tior	al. Switchi	ing da	ay may				ıwar	e and this
				nall be set to Sun				-					

### 1.5.18 Parameter DateStartStandardTime

1.3.10 1 al	ameter De	atestal istallu	ar a riiic							
FB: SCLO Property Name (Server): DateStartStandardTime Mandatory Optional Optional Optional										
Description:										
actual date is e switch to stand October 25 <sup>th</sup> ) t	equal or late dard time. The o switch to s	mer time→ stand r than the DateSt nis Sunday, which standard time. Thi	artStandardTir is given by th is DateStartSta	ne and is cond andard	the da dition, is Time cl	y is a Sunday the first poss hanges at pol	, the clo sible dat iticians v	ock shall e (E.g. in EU will. The		
		Datapoint are sup	ported the bet	ter is ti	ne cnar	nce to adapt a	aevice	to politicians		
will or to use it  DPT: Nam		urope OateTime	DPT ID	19.00	14 F	) atati in a farma	ot 0 o	octet		
Field	Description		טרווט	19.00	Sup.	Datatype formate Range	Unit	Default		
Year		ıı Year" shall be inv	alid (NIV-1)		NA	Range	Offic	Delault		
Month		h information, val			M	1 to 12		10		
DayofMonth	Date.Dayo	ofMonth information=0	on, valid if ND=	<b>=</b> 0	М	1 to 31		25		
DayofWeek Day of Week information, valid if NdoW=0 and O <sup>2</sup> 1 to 7 Fault=0  DayofWeek O <sup>2</sup> 1 to 7 Fault=0										
Hour		, valid if NT=0 an			O 1)	0 to 23	h	1) – or 03		
Minutes		ites, valid if NT=0			O 1)	0 to 59	min	1) – or 00		
Seconds	Time.Seco	onds, valid if NT=0	0 and Fault=0		O 1)	0 to 59	S	1) – or 00		
Attributes – Fault		taining status info information Norn		oed	М	fault/ok	bool	<sup>*)</sup> fixed normal <sup>*)</sup>		
- WD	bank day {	0} / working day {			М	true/false	bool	bank day *)		
– NWD		WD field invalid {			M	true/false	bool	no WD *)		
– NY		Year field invalid		li d	M	true/false	bool	no year *) date valid *)		
– ND	{1} / valid {	Month & DayofMo	onun neius inva	iiu	M	true/false	bool	date valid		
– NdoW		DoW field invalid	{1} / valid {0}		М	true/false	bool	DoW valid		
– NT		Hour, Minutes, Se			M	true/false	bool	time valid		
- SUTI		ne {1} / standardti	me (0) flag		М	true/false	bool	summer *)		
- CLQ		ity bit: with {1} / w		nal	NA	with / without	bool	without *)		
Communicati	,	-						ı		
DP Address		IO Type(ID):	1001 (SCI	O)	Pro	perty ID:	116			
(in the server) Start-Index: 1 N° of elements 1										
Property ac	•	Read only	$\boxtimes$	Read/						
Exception Ha		alue after Power	up: Stored \	/alue [	Act '	Value D	efault V	alue 🗌		
Special Featu	res:									
		ation is optional.	-	,	e fixed	in the firmwa	re and t	his		
		dden in the Datap			ina hai	ır is at 03·00	_ ∩2·∩∩	<b>\</b>		
if supported, the default summer time → standard time switching hour is at 03:00 → 02:00  2) Support of DayOfWeek information is optional. Switching day may be fixed in the firmware and this										

Support of DayOfWeek information is optional. Switching day may be fixed in the firmware and this information could be hidden in the Datapoint (i.e. NDoW=1), if supported, the field shall be set to Sunday per default

## 1.5.19 Parameter EnableSummerTime

FB:	SCLO	Pro	perty N	ame ( <u>Ser</u>	ver):	EnableSu	ummerT	ime				ndatory 🗌 Optional 🛛
Desc	ription:				-				-			
Sumr	mer ↔ sta	andar	d time s	witching f	unction is	disabled	if param	eter En	ableSumm	erT	ime=fals	е
DPT:	Name	e D	PT_Ena	able	DPT ID	1.003	D	atatype	format	В	oolean	
Field			Desc	ription				Sup.	Range		Unit	Default
bit Er	nable/Disa	able	see a	above				M	{0,1}			enabled
Com	municati	on:										
DP	Address	:		IO Type	(ID):	1001 (S	CLO)	Prop	perty ID:		117	
(in	the serve	er)		Start-Inc	lex:	1		N° c	of elements	3	1	
Pro	perty ac	cess:		Read on	ly 🛭		Read	d/Write				
Exce	ption Ha	ndlin	g: V	alue after	Powerup	Stored	d Value 🏻	Act \	/alue 🗌	De	efault Val	ue 🗌
Spec	ial Featu	res:										

# 1.5.20 Diagnostic data ClockSyncSignQual

FB:	SCLO	Property	y Name ( <u>Server</u> ):	ClockSync	SignQ	ual		M	landatory 🗌		
								Ор	itional 1) 🖂		
Desc	ription:		-								
For c	locks with	external	sync. signal only (e.c	g. radio clock	s). This	sproper	ty contains	the actual	relative		
signa	l quality (	% value) o	of e.g. DCF77 signal								
DPT:	Nam	DPT_R	elValue_Z	DPT ID	202.0	001 D	atatype	$U_8Z_8$			
	е					fo	rmat				
Field			Description			Sup.	Range	Unit	Default		
Clock	SyncSign	nQual	actual signal qualit	y of external	clock	M	0100	%	0 %		
	sync signal like DCF77 etc										
Statu	Status Standard Status Z <sub>8</sub>										
- Out	OfService	!	value 'ClockSyncS	•		M	true/false	bool.	true		
			Service' until first re	eception of th	ne						
			ext. sync. signal								
- all o	ther flags		not supported, fixe	d to '0'		NA					
Com	munication	on:									
DP	Address:		IO Type(ID):	1001 (SC	LO)	Prop	perty ID:	121			
(in t	the serve	r)	Start-Index:	1		N° c	of elements	1			
Pro	perty acc	ess:	Read only	$\boxtimes$	Read/	/Write	$\boxtimes$				
Exce	Exception Handling: Value after Powerup: Stored Value  Act Value  Default Value										
	•				•	•	•				
Spec	pecial Features:										
1) Se	e clause	1.4.1 - 1.4	4.3.								

## 1.5.21 Diagnostic data ClockSyncTimeSinceRecept

FB:	SCLO	P	Property Name ( <u>Server</u> ):			ClockSyncTimeSinceRecept				Mandatory ☐ Optional 1) ☒		
Desc	Description:											
For clocks with external sync. signal only (e.g. radio clocks). This property contains the elapsed relative												
time since last proper reception of e.g. DCF77 signal												
DPT:	Name	:	DPT_TimePeriodMin_Z			DPT ID	203.0	03.016 Dataty			$U_{16}Z_{8}$	
								forma				
Field			Description						p.	Range	Unit	Default
TimePeriodMin		ì	see above						1 0	to 65 535	min	<sup>2)</sup>
Status			Standard Status							$Z_8$		0)
<ul> <li>OutOfService</li> </ul>		<del>)</del>	value 'ClockSyncTimeSinceRecept' is 'Out of					N	1   1	true/false	bool.	true 2)
Service				until first reception of the ext. sync.								
			signal									
<ul> <li>all other flags</li> </ul>			not supported, fixed to '0'					N.	A			
Communication:												
DP Address:				IO Type(ID):	1001 (SCLO)		Property ID:		122			
(in the server)				Start-Index: 1			N° of ele			ements 1		
Property access: Read only				Read only	⊠ Read/Write ⊠							
<b>Exception Handling:</b> Value after Powerup: Stored Value  Act V								t Value	alue 🗌 Default Value 🛚			
Special Features:												
<sup>1)</sup> see clause 1.4.1 - 1.4.3												
<sup>2)</sup> Remark:												
Considerations concerning the 'right' default value after power up until first proper reception of the ext.												
sync signal:												
<ul> <li>– 0: not possible ⇒ implies immediate reception after power up</li> </ul>												
	<ul> <li>65 535: better solution, means a very long time but still means there was once a proper reception</li> </ul>											
<ul> <li>OutOfService: best solution, but this means usage of a DPT with standard status field</li> </ul>												

# 2 Appendix

# 2.1 SCLO Property Identifier list

Object Name: SCLO Object Type: 1001

Property Identifier	Datapoint Name	Datapoint Type Name	Datapoint Type Code
LTE-proces	ss data (runtime Interworking, zone	addressing and individual address	ing)
51	SystemClock	DPT_DateTime	19.001
52	SystemClockSetting	DPT_DateTime	19.001
53	RelToGMT	DPT_DeltaTimeMin	8.006
Parameters	s and Diagnostic Data (individual a	nddressing only)	
110	SCLOMode	DPT_SCLOMode	20.001
111	SystemClockHeartbeat	DPT_TimePeriodMin	7.006
112	SystemClockTimeout	DPT_TimePeriodMin	7.006
113	EnableSystemClockSetting	DPT_Enable	1.003
114	LocalTimeOffsetRefClock	DPT_DeltaTimeMin	8.006
115	DateStartSummerTime	DPT_DateTime	19.001
116	DateStartStandardTime	DPT_DateTime	19.001
117	EnableSummerTime	DPT_Enable	1.003
118	GMTimeOffsetRefClock	DPT_DeltaTimeMin	8.006
119			
120	LocalClock	DPT_DateTime	19.001
121	ClockSyncSignQual	DPT_RelValue_Z	202.001
122	ClockSyncTimeSinceRecept	DPT_TimePeriodMin_Z	203.006