Product information

Periphery module E-Mess UI

E-Mess UI (3 voltage- and 4 current transformer inputs for L1-3 and N)

Qualified personnel

All devices described in this manual may only be used, built up and operated together with this documentation. Installation, initiation and operation of these devices might only be done by instructed personnel with certified skills, who can prove their ability to install and initiate electrical and mechanical devices, systems and current circuits in a generally accepted and admitted standard.

(valid from 12/2015)

Changes to older versions of this document

Changed in Rev. 02: CAN-process-image added
Changed in Rev. 03: CAN SDO description added, topology image replaced
Changed in Rev. 04: Offset 16-26: W → kW, VA → kVA, current transformer: "I" and "k" were mixed
Changed in Rev. 05: Hint for grounding prohibition ref. to DIN VDE 0100-557:2014-10
Changed in Rev. 06: Chapter Diagnostic-LEDs added
Changed in Rev. 07: Information for disposal of old equipment

General wiring of E-Mess UI

- compact periphery module for measurement of current, voltage and calculation power and energy for L1, L2, L3

- Measurement of current in neutral wire

- **4 current transformer-pins** (in/out) ($I_{L1}, I_{L2}, I_{L3}, I_N$, max. 5A

- **Current transformers must be potential separated and may not be grounded. *)**

- **Current transformers may not be wired in idle mode**

- including 8-pin connector with a bolt flange on each side cage clamp contact technology with 2,5mm^2

- **4x voltage contacts** (in- and out) for each of L1, L2, L3. N

- With compact and contact protected 4x2-pin connector with cage clamp 4mm^2(2 pins per wire to combine wiring of multiple modules)

- 4x red / green **Diagnostic LEDs** (see chapter "Diagnostic LEDs")
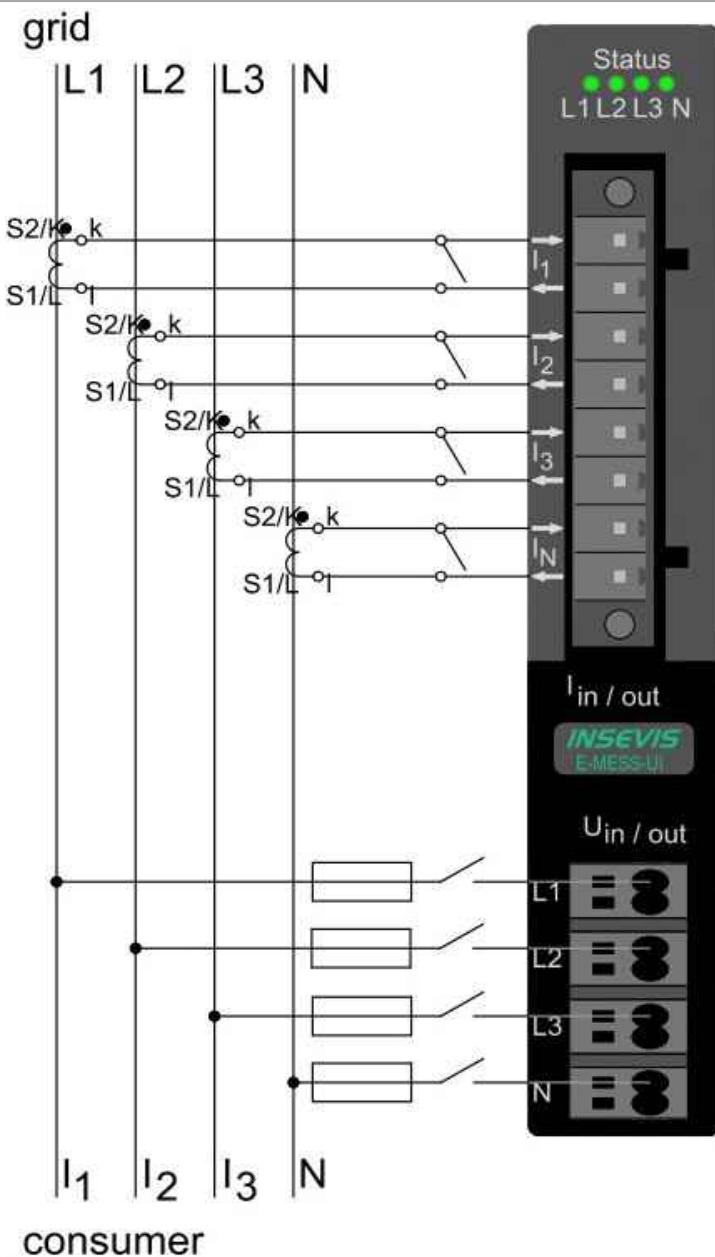
Figure above: Description and wiring of all connections of E-MESS-UI-modules

*) At the connecting of measurement equipment via current transformer to the power circuit following instructions must be followed:
- Secondary circuits of current transformers in low voltage systems may <u>not</u> be grounded, unless the measurement can be done by connecting to ground only.
- In secondary circuits of current transformers interrupting safety guards may not be used.
- Secondary conductors of transformers must be wired in that way, that no active parts can be touched by their isolation or cover, such as no contact with busbars.
- For connecting temporary measurements disconnecting terminals or shortcut clamps shall be provided.
- At the selection of current transformers the load by the secondary conductors (conductor cross section and length) must be considered.

Note:
- To reduce the influence of power resistors to the result of the measurement particularly transformer with a secondary rated current of …/1A shall be used.
- The voltage contact must be protected by short circuit protection equipment.
- The respective DIN VDE 0100-557:2014-10 contains the hint, that secondary circuits of current transformers may not be grounded in the low voltage facilities.

Technical data PM E-Mess UI

Technical data E-Mess-UI	
Operating temperature range Storage temperature range Dimensions W x H x D (mm) Weight	-20°C ... +60°C (without condens.) -30°C ... +80°C 20 x 108 x 70 mm ca. 150 g
Connection technology	connector with cage clamp for cross sections up to 2,5mm^2 (current) connector with cage clamp for cross sections up to 4mm^2 (voltage)
Load voltage L+	24V DC (10V ... 30V DC, connected by device supply)
Protection class	I
Degree of pollution	2
Power frequency	50 Hz, 60Hz switchable

Voltage measurement	
3-Phase 4-Wire systems with rating voltage (L -N)	Up to 230V eff.
Overvoltage category	300V CAT III
Rated impulse voltage	4kV
Measurement range L-N	Up to max. 350V eff.
Impedance	1 MΩ / Phase
Resolution	0,1 V
Measurement precision (typ.)	0,5%
Sampling frequency	8 kHz

Curren measurement	
Rated current	1 / 5 A
Measurement range	0 - 6 A eff.
Impedance	14 mΩ
Resolution	0,1 A
Measurement precision (typ.)	0,5%
Sampling frequency	8 kHz

E-Mess topology – E-Mess- module integration
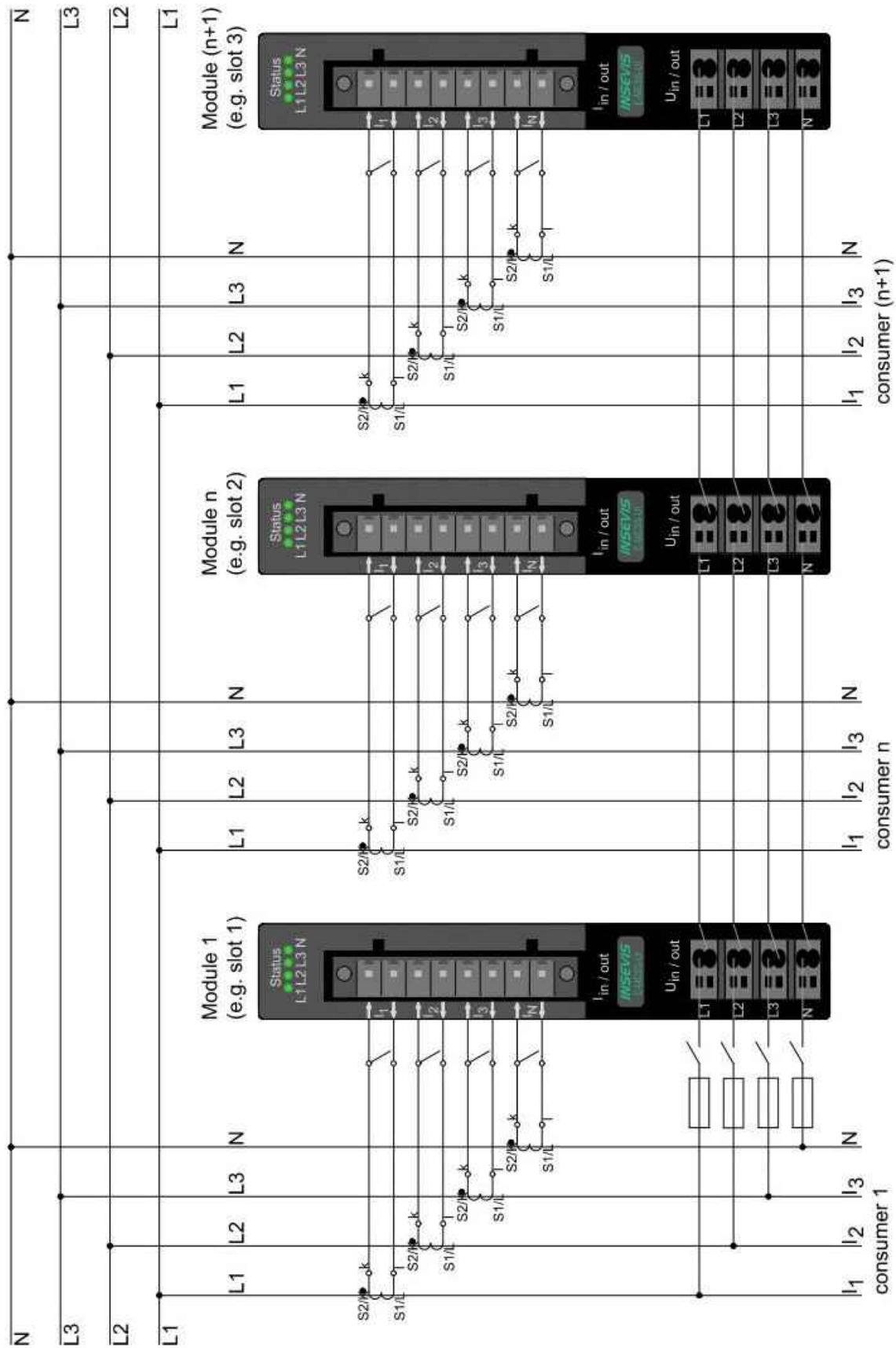
E-Mess sample topology – system net

e.g. CC311V with max. 11x E-Mess-UI

S7-Main-CPU
with n x E-Mess UI
(each for 1 consumer)
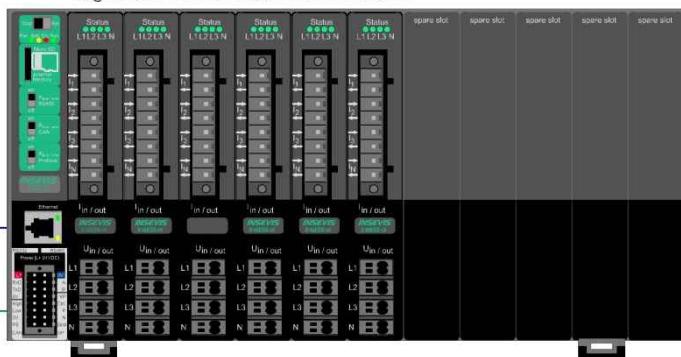
Ethernet

CANopen

e.g. 8x E-Mess-UI (e.g. on a 2nd power rail)

Extension 1
with n x E-Mess UI
(each for 1 consumer)

CANopen

e.g. 6x E-Mess-UI (e.g. on a 3rd power rail)
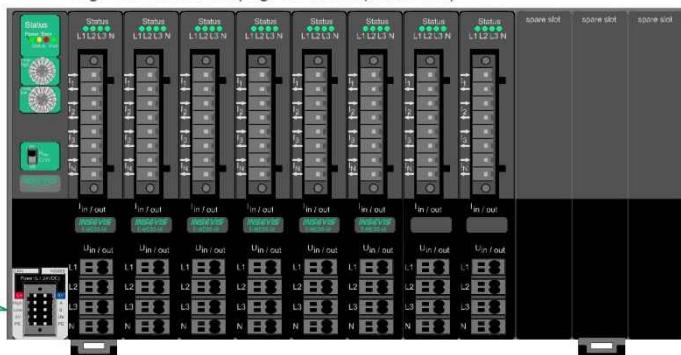
Extension 2
with n x E-Mess UI
(each for 1 consumer)
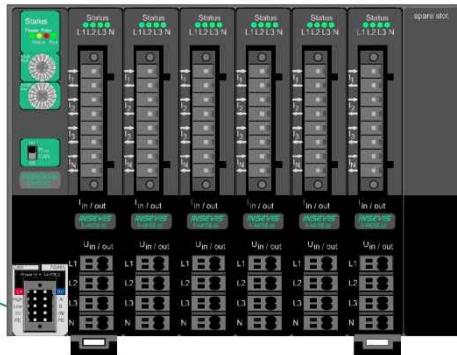
Panel-HMI
7" (optional)
Ethernet

Ethernet

RemoteStage
always possible

(max. length between CPU and extension 30m, no separated potential!)

PM E-Mess-UI process data

The module occupies onboard 128 Byte in- and outputs in process image, only the lower 64 Byte of the input image will be synchronized with the process image at control point. The other process data are respective to the assignment accessable by direct periphery access.

As decentral periphery only the lower 64 Byte of the input process data will be transferred. Use SDO to access output data as well as input data on byte offset 64-128.

Process image inputs

Onboard (CPU CC3xxV):   - in process image as far length of process image is configured properly
Decentral (DP3xxC)   - mapped into TxPDOs

Offset	Function	Format	Unit
0	Voltage L1	uint16	$0,1V_{eff}$
2	Voltage L2	uint16	$0,1V_{eff}$
4	Voltage L3	uint16	$0,1V_{eff}$
6	Net frequenca	uint16	0,01 Hz
8	Current L1	uint16	$0,1 A_{eff}$
10	Current L2	uint16	$0,1 A_{eff}$
12	Current L3	uint16	$0,1 A_{eff}$
14	Current N	uint16	$0,1 A_{eff}$
16	Effective power L1	int16	0,1 kW
18	Effective power L2	int16	0,1 kW
20	Effective power L3	int16	0,1 kW
22	Apparent power L1	int16	0,1 kVA
24	Apparent power L2	int16	0,1 kVA
26	Apparent power L3	int16	0,1 kVA
28	Power factor (cos f) L1	int16	$0,1\% (10^{-3})$
30	Power factor (cos f) L2	int16	$0,1\% (10^{-3})$
32	Power factor (cos f) L3	int16	$0,1\% (10^{-3})$
34	Phase angle L1	int16	0,1°
36	Phase angle L2	int16	0,1°
38	Phase angle L3	int16	0,1°
40	Active energy L1	int32	0,1 kWh
44	Active energy L2	int32	0,1 kWh
48	Active energy L3	int32	0,1 kWh
52	Apparent energy L1	uint32	0,1 kVAh
56	Apparent energy L2	uint32	0,1 kVAh
60	Apparent energy L3	uint32	0,1 kVAh

Process image inputs

Onboard (CPU CC3xxV): only by direct periphery access

Offset	Function	Format	Unit
64...79	Reserved		
80	Tunnel state	uint16	
82	Tunnel ADE-register address	uint16	
84	Tunnel ADE-register data	uint16 / uint32	
88..95	Reserved		

96	Diagnostics / Condition bits
	(set by EMESS, cleared by reading L PEW)
	    .0 Overcurrent L1
	    .1 L2
	    .2 L3
	    .3 Overvoltage L1
	    .4 L2
	    .5 L3
	    .6 Undervoltage L1
	    .7 L2
	    .8 L3
	    .9 Res.
	    .10 Res.
	    .11 Net frequency 0: 50Hz / 1:60 Hz
	    .12 Res.
	    .13 Phasing wrong
	    .14 Res.
	    .15 Data invalid:(compare with A96.15:
	          if similar = setup ok
	          if unsimilar = setup running
		uint16	0,1 A_{eff}

98	Threshold overcurrent	uint16	0,1 A_{eff}
100	Threshold overvoltage	uint16	0,1 V_{eff}
102	Threshold undervoltage	int16	0,1 V_{eff}
104	Current transformer- transfer factor primary current	int16	
106	Current transformer- transfer factor secondary current	int16	
108	Current transformer- error correction transfer factor L1	int16	0,1% (10^{-3})
110	Current transformer- error correction transfer factor L2	int16	0,1% (10^{-3})
112	Current transformer- error correction transfer factor L3	int16	0,1% (10^{-3})
114	Current transformer- error correction transfer factor N	int16	0,1% (10^{-3})
116	Current transformer- error correction phase angle L1	int16	°min
118	Current transformer- error correction phase angle L2	int16	°min
120	Current transformer- error correction phase angle L3	int16	°min
122	Reserved (internal use)	uint16	
124	Reserved (internal use)	uint16	
126	Reserved (internal use)	uint16	

Process image outputs

Onboard (CPU CC3xxV): only by direct periphery access

Offset	Function	Format	Unit
0-38	Reserved		
40	Active energy L1	int32	0,1 kWh
44	Active energy L2	int32	0,1 kWh
48	Active energy L3	int32	0,1 kWh
52	Apparent energy L1	uint32	0,1 kVAh
56	Apparent energy L2	uint32	0,1 kVAh
60	Apparent energy L3	uint32	0,1 kVAh
64...79	Reserved		
80	Tunnel Command	uint16	
82	Tunnel ADE-register address	uint16	
84	Tunnel ADE-register data	uint16 / uint32	
88..95	Reserved		
96	Control bits: .0 ... .10 Res. .11 Net frequency 0:50 / 1:60 Hz .12 ... .14 Res. .15 Setup -requirement (Bit toggeling) after writing of setup data in offset 98..120	uint16	
98	Threshold overcurrent	uint16	0,1 A_{eff}
100	Threshold overvoltage	uint16	0,1 V_{eff}
102	Threshold undervoltage	int16	0,1 V_{eff}
104	Current transformer- transfer factor primary current	int16	
106	Current transformer- transfer factor secondary current	int16	
108	Current transformer- error correction transfer factor L1	int16	0,1% (10^{-3})
110	Current transformer- error correction transfer factor L2	int16	0,1% (10^{-3})
112	Current transformer- error correction transfer factor L3	int16	0,1% (10^{-3})
114	Current transformer- error correction transfer factor N	int16	0,1% (10^{-3})
116	Current transformer- error correction phase angle L1	int16	°min
118	Current transformer- error correction phase angle L2	int16	°min
120	Current transformer- error correction phase angle L3	int16	°min
122	Reserved (internal use)	uint16	
124	Reserved (internal use)	uint16	
126	Reserved (internal use)	uint16	

Process data via SDO

Decentral (in DP3xxC)   - via SDO (SFB114)
Every slot mapped to an object index, every parameter inside a slot module gets a subindex.

Configuration data:

Object index (hex)	Sub-index	Slot	Function	Format	Unit

3010	1	1	Control bits:
			      .0 ...
			      .10 Res.
			      .11 Net frequency 0:50 / 1:60 Hz
			      .12 ...
			      .15 Res.
			Setup requirement automatically after writing of last setup data at subindex 13
				uint16	

3010	2	1	Threshold overcurrent	uint16	0,1 A_{eff}
3010	3	1	Threshold overvoltage	uint16	0,1 V_{eff}
3010	4	1	Threshold undervoltage	int16	0,1 V_{eff}
3010	5	1	Current transformer- transfer factor primary current	int16	
3010	6	1	Current transformer- transfer factor secondary current	int16	
3010	7	1	Current transformer- error correction transfer factor L1	int16	0,1% (10^{-3})
3010	8	1	Current transformer- error correction transfer factor L2	int16	0,1% (10^{-3})
3010	9	1	Current transformer- error correction transfer factor L3	int16	0,1% (10^{-3})
3010	10	1	Current transformer- error correction transfer factor N	int16	0,1% (10^{-3})
3010	11	1	Current transformer- error correction phase angle L1	int16	°min
3010	12	1	Current transformer- error correction phase angle L2	int16	°min
3010	13	1	Current transformer- error correction phase angle L3	int16	°min
3011	1..13	2	s. slot 1		
3012	1...13	3	s. slot 1		
3013	1..13	4	s. slot 1		
3014	1...13	5	s. slot 1		
3015	1..13	6	s. slot 1		
3016	1...13	7	s. slot 1		
3017	1..13	8	s. slot 1		
3018	1..13	9	s. slot 1		
3019	1..13	10	s. slot 1		
301A	1..13	11	s. slot 1		

Energy data:

Object index (hex)	Sub-index	Slot	Function	Format	Unit
3100	1	1	Active energy L1	int32	0,1 kWh
3100	2	1	Active energy L2	int32	0,1 kWh
3100	3	1	Active energy L3	int32	0,1 kWh
3100	4	1	Apparent energy L1	uint32	0,1 kVAh
3100	5	1	Apparent energy L2	uint32	0,1 kVAh
3100	6	1	Apparent energy L3	uint32	0,1 kVAh
3101	1..6	2	s. slot 1		
3102	1..6	3	s. slot 1		
3103	1..6	4	s. slot 1		
3104	1..6	5	s. slot 1		
3105	1..6	6	s. slot 1		
3106	1..6	7	s. slot 1		
3107	1..6	8	s. slot 1		
3108	1..6	9	s. slot 1		
3109	1..6	10	s. slot 1		
310A	1..6	11	s. slot 1		

Diagnostic and status bits:

Object index (hex)	Sub-index	Slot	Function	Format	Unit
3110	0	1	Diagnostics / Condition bits (set by EMESS, cleared by reading) .0 Overcurrent L1 .1 L2 .2 L3 .3 Overvoltage L1 .4 L2 .5 L3 .6 Undervoltage L1 .7 L2 .8 L3 .9 , 10 res. .11 Net frequency 0: 50Hz / 1:60 Hz .12 Res. .13 Phasing wrong .14 Res. .15 Setup activ (communication not allowed)		
3111	0	2	Diagnostic / status bits s slot 1	...	...
3112	0	3	Diagnostic / status bits s slot 1		
3113	0	4	Diagnostic / status bits s slot 1		
3114	0	5	Diagnostic / status bits s slot 1		
3115	0	6	Diagnostic / status bits s slot 1		
3116	0	7	Diagnostic / status bits s slot 1		
3117	0	8	Diagnostic / status bits s slot 1		
3118	0	9	Diagnostic / status bits s slot 1		
3119	0	10	Diagnostic / status bits s slot 1		
311A	0	11	Diagnose / Statusbits s Slot 1		

Diagnostic-LEDs

The diagnostic- and statusbits of process image inputs are mapped onto the diagnostic-LED's for faster error detection.
L1 – L3: one LED each phase

	red:	common error L1 – L3 overvoltage or overcurrent
	green:	all values in valid areas
	off:	no voltage applied or undervoltage

N:	red:	phasing wrong
	yellow:	setup activ
	green:	normal operation („run")

Ordering data module

Identification	Order-no.	Packaging unit
Periphery module **E-Mess UI** (Connectors are included in periphery module)	PM-E-Mess UI-02	PU: 1 piece

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