



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx CSA 14.0006X** Page 1 of 6 [Certificate history:](#)

Status: **Current** Issue No: 0

Date of Issue: 2016-05-20

Applicant: **BARTEC Benke GmbH**
Schulstrasse 30, Gotteszell 94239
Germany

Equipment: **Hygrophil F Humidity Measurement System**

Optional accessory:

Type of Protection: **[Ex nA [ia] for Hygrophil F 5673-xx; Ex nAc [ia] [ic] for Hygrophil F basic 5673-30; Ex d [ia] for Hygrophil Power Supply HCDT 1510-100; Ex d for Hygrophil Power Supply HCDT 1510-101 / 102; Ex d [ia] for Peltier Controller Ex 1510-104 / -105; Ex ia for Hygrophil DT/DTP/HCDT 1510-1x and Ex ia for Humidity sensor L166x**

Marking: Ex nA [ia Ga] IIC T4 for Hygrophil F 5673-xx
Ex nAc [ia Ga] [ic] IIC T4 Gc for Hygrophil F basic 5673-30
Ex d [ia Ga] IIC T4 Gb for Hygrophil Power Supply HCDT 1510-100
Ex d IIC T4 Gb for Hygrophil Power Supply HCDT 1510-101/102
Ex d [ia Ga] IIC T4 Gb for Peltier Controller Ex 1510-104/-105
Ex ia IIC T3 Ga/Gb for Hygrophil DT/DTP/HCDT 1510-1x
Ex ia IIC T6 Ga/Gb for Humidity sensor L166x

Approved for issue on behalf of the IECEx
Certification Body:

Dorin Stochitoiu, P. Eng.

Position:

Technical Advisor

Signature:
(for printed version)

Date:
(for printed version)

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Certificate issued by:

CSA Group
178 Rexdale Boulevard
Toronto, Ontario M9W 1R3
Canada





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Manufacturer: **BARTEC Benke GmbH**
Schulstrasse 30, Gotteszell 94239
Germany

Additional manufacturing locations: **BARTEC Benke GmbH**
Borsigstraße 10, Reinbek 21465
Germany

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

[IEC 60079-0:2011](#) Explosive atmospheres - Part 0: General requirements
Edition:6.0

[IEC 60079-1:2007-04](#) Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:6

[IEC 60079-11:2011](#) Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

[IEC 60079-15:2010](#) Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
Edition:4

[IEC 60079-26:2006](#) Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga
Edition:2

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[CA/CSA/ExTR14.0006/00](#)

Quality Assessment Reports:

[DE/TUN/QAR12.0008/03](#)

[DE/TUN/QAR12.0009/03](#)



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The Hygrophil F Humidity Measurement System is a moisture analyzer which consists either of the analyzer Hygrophil F 5673-xx or the Hygrophil F basic 5673-30. Both are with humidity sensor L166x and/or sensor Hygrophil DT/DTP/HCDT 1510-1x with optional associated Hygrophil Power Supply 1510-100.

Hygrophil F 5673-xx:

The Hygrophil F 5673 with humidity sensor L166x and/or Hygrophil DT/DTP/HCDT series humidity sensors 1510-1x is a moisture analyzer designated for installations in suitable enclosure located in hazardous locations.

Complete description of the product is given by the manufacturer's documents which include applicable drawings and components list and a Bartec detailed presentation of the internal parts, protection principles, internal separations criteria and compliance supporting calculations.

The electronic circuitry is enclosed in a 433mm x 160mm x 178mm painted metallic enclosure. The front face incorporates the touch screen display, while the user terminals and connector are located on the back side.

The unit incorporates electronic modules inserted in internal backplane and each module is secured to the assembly with screws: Interface Unit for external touch 5673-105, Interface Unit for HCDT 5673-106, Power Supply Module 5673-108 (for dc versions) or 5673-109 (for ac versions), Interface Unit Module 5673-110, CPU Unit Module 5673-113, Interface I/O Exi Module 5673-114, Relay-Interface 5673-115, Polychromatic Analyzer Module 5673-302.

Markings: Hygrophil F 5673-xx:Ex nA [ia Ga] IIC T4 Gc

Ta: -20°C ... +60°C

See Installation Drawing Fs5673 for Intrinsically Safe entity parameters

Warnings:

- Separate only in a Non-Hazardous Area (appears on the power supply module)
- Use USB connectors only in a Non-Hazardous Area - For service only (appears only on 5673-110 module)

Hygrophil F basic 5673-30:

Hygrophil F basic 5673-30 with humidity sensor L166x is a moisture analyzer designated for installations in hazardous locations and provides intrinsically safe circuits to sensors located in hazardous locations Zone 0. The electronic circuitry is enclosed in a 400mm x 230mm x 110mm metallic enclosure rated IP66 and Type 4X. The overall assembly is detailed in Bartec drawing 5673-30.

Markings:

Hygrophil F basic 5673-30:

Ex nAc [ia] [ic] IIC T4 for

Ta: -20°C ... +60°C

Electrical ratings: 10-36Vdc, 15W

See Installation Drawing Fs5673basic for Intrinsically Safe entity parameters

Warnings:

- Do not remove or replace fuse when energized (appears only on PCB)



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- Do not separate connectors when energized (appears only on PCB)

Hygrophil Power Supply HCDT 1510-100:

The explosion proof Hygrophil Power Supply HCDT 1510-100 incorporates electronics mirroring the power supply part of the intrinsically safe interface module 5673-106, but enclosed in the Adalet enclosure model XIHLDCX, which is flameproof certified by IECEx UL 08.0005U.

Markings:

Hygrophil Power Supply HCDT 1510-100:

Ex d [ia Ga] IIC T4 Gb

Ta: -20°C ... +60°C

Electrical ratings : 24 Vdc, 7.2W

See Installation Drawing Fs5673 and Fs1510 for Intrinsically Safe entity parameters

Warnings:

- Keep cover tight while circuits are alive
- Do not open when energized
- For installation using conduit: All seals shall be installed immediately adjacent to the enclosure.

Hygrophil HCDT power supply 1510-101, and 1510-102, Peltier Controller Ex 1510-104 and 1510-105:

Hygrophil HCDT power supply 1510-101 and Peltier Controller Ex 1510-104 (AC Version) and Hygrophil HCDT 1510-102 power supply and Peltier Controller Ex 1510-105 (DC Version) is based on the concept of model 1510-100, but is designed to supply the Peltier cooler. Models 1510-104 and 1510-105 incorporate an intrinsically safe associated circuit. The enclosure Adalet model XIHLX, which is flameproof certified by IECEx UL 08.0005U. The models 1510-101 / -104 incorporates plate mounted power supply model TXL060-12S and Peltier Controller board 1510-410. The model 1510-102 / -105 incorporates power supply board 1500-409 with DC/DC-Converter TEN 60-2413 and temperature control module P/N TR12PI-K.

Markings:

Hygrophil Power Supply HCDT 1510-101 / 102Ex d IIC T4 Gb

Ta: -20°C ... +60°C

Electrical ratings: 100-240Vac, 50/60Hz, 140W max (Hygrophil Power Supply HCDT 1510-101)

18-36Vdc, 70W max (Hygrophil Power Supply HCDT 1510-102)

Warnings:

- Keep cover tight while circuits are alive
- Do not open when energized
- For installation using conduit: All seals shall be installed immediately adjacent to the enclosure.

Markings:

Peltier Controller Ex 1510-104 / 105

Ex d [ia Ga] IIC T4 Gb

Ta: -20°C ... +60°C

Electrical ratings: 100-240Vac, 50/60Hz, 140W max (Peltier Controller Ex 1510-104)

18-36Vdc, 70W max (Peltier Controller Ex 1510-105)



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See Installation Drawing Fs1510 for Intrinsically Safe entity parameters

Warnings:

- Keep cover tight while circuits are alive
- Do not open when energized
- Seals shall be installed within 18 inches (0.45 m) of the conduit entries.

Hygrophil DT/DTP/HCDT 1510-1x:

The Hygrophil DT/DTP/HCDT humidity sensor operate based on dew point temperature determination. The sensor equipment consists of a humidity sensor attached to the measuring unit which incorporates electronics for signal conditioning and interface with the associated equipment. The sensor is connected to the intrinsically safe circuitry through a permanently connected by shielded cable having a length of 0.7m. The cable enters the sensor through a cable gland installed on the top of the sensor body. The sensor shaft consists of a copper tube with an outer diameter of 22 mm. The sensor internal board 1500-404 in model 1510-10 or 1500-408 in model 1510-11 is located. The probe is terminated with a stainless steel sensor tip isolated from the probe body through the PET insert. The measuring unit enclosure is 80mm x 175mm x 57mm. It incorporates the measuring board 1500-405 and the full unit is encapsulated. Cables exit the enclosure through M12x1.5 or M16x1.5 cable glands.

Markings: Ex ia IIC T3 Ga/Gb

Ta: -20°C ... +60°C

Electrical ratings : 9 to 11 Vdc, 3.6W

See Installation Drawing Fs1510 for Intrinsically Safe entity parameters

L166x humidity sensor enclosure:

The L166x humidity sensor enclosure is of stainless steel metallic construction having 1mm minimum wall thickness and consists of a terminal compartment attached to the sensor shank.

The Pt100-terminals and the fibre connectors are of plastic material construction and provided with a warning label against electrostatic discharge.

The sensor assembly is detailed in descriptive documents. The sensing elements are the PT100 element which is encapsulated inside of the seal and the humidity sensitive optical layer in contact with the encapsulated fibre optic assembly for transmitting the light based process measurement information.

Markings:

Ex ia IIC T6 Ga/Gb

Ta: -30°C ... +60°C

Electrical ratings :

I.S. Pt100 circuit (terminals 1, 2, 3, 4)

Ex ia IIC

Ui = 10 V, Ii = n/a

Pi = 62 mW, temperature class T6

Ci = 0 nF

Li = 0 μH

The Hygrophil F Humidity Measurement System is assessed to the intend for use in Group II locations where the source of hazard is Group IIC gas when provided with type Ex d, Ex ia, Ex nA [ia Ga] and Ex d [ia] protections.



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SPECIFIC CONDITIONS OF USE: YES as shown below:

Hygrophil F 5673-xx: • The equipment has to be completed by an enclosure rated minimum IP54 according to IEC 60079-0 and IEC 60079-15.

Hygrophil DT/DTP/HCDT, Models 1510-1x: • The sensor cable between the sensor and the measuring unit (transmitter) has to be installed fixed. It has to be protected against mechanical damage. • The sensor with the cable is connected permanently to the measuring unit. The cable between the sensor and the measuring unit may be dismantled and replaced by the manufacturer only. At this, one has to pay attention that the pink wire is to be connected to terminal 10 and the grey wire to terminal 11. • In those cases, where the enclosure of the sensor cannot be connected to the local equipotential bonding (electrically insulated installation), it has to be connected over the shield of the cable with the measuring unit and the enclosure of the measuring unit has to be included in the equipotential bonding.

Hygrophil Power Supply HCDT, Models 1510-100, 1510-101, 1510-102, 1510-104 and 1510-105: • The designed clearance and width of joints (i.e. the thread between the cover and the base) may be better than the requirements of IEC 60079-1:2007. Any repair at the flameproof joints must be carried out on the base of the design specifications of the manufacturer. Repair according to the values of the table 1 resp. 2 of the IEC 60079-1:2007 is not permissible. • Suitable cable entries and sealing plugs shall be used, which meet the requirements of IEC 60079-1, and for which a separate IECEx certificate has been issued. • Cable entries and sealing plugs of simple design shall not be used. • For the Model 1510-100, the isolation of the cable or single wire within the enclosure must not have a thickness lower than 1 mm. • Apply lubricant at the cover thread before mounting it to prevent corrosion (see IEC 60079-1:2007, Clause 10.3). The lubricant shall be of high quality, that doesn't age and harden. • The Models Type 1510-104 / -105 have to be connected to earth / grounded. Make earth connection either to terminal "PE", the internal ground screw or external ground screw. • At Models Type 1510-104 / -105 the total insulation of all external cables or wires connected to the device has to have a thickness of 1 mm at least. Cables shall only be dismantled up to a maximum length of 50 mm. This is to provide safe insulation between I.S. and non-I.S. circuits.

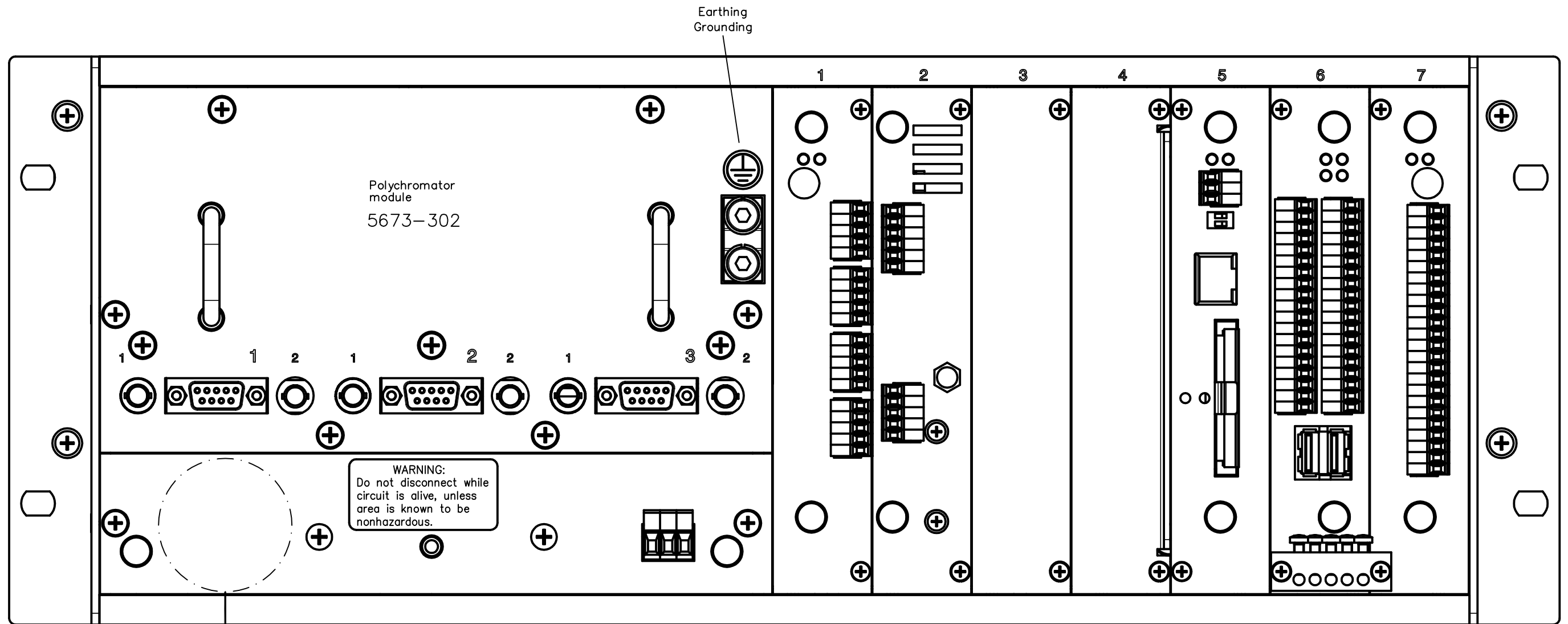
Humidity sensor L166x: • In order to avoid potential electrostatic charging hazard, see Installation Manual.

Annexes:

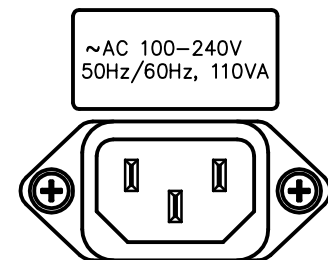
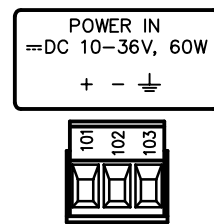
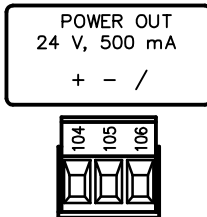
[Appendix A Control drawing Fs5673 20110127 Rev h.pdf](#)

[Appendix B Control drawing Fs1510 20130919 Rev e.pdf](#)

[Appendix C Control drawing Fs5673 basic 20130107 Rev 3.pdf](#)



Power supply modules
5673-108 / 5673-109



Interface unit HCDT sensor 5673-114
free
free
CPU module incl. Ethernet 5673-113
Interface module 5673-110
Relay-Interface module 5673-115

Notes:

- Maximum voltage in control room (nonhazardous) area shall not exceed 250V
- Substitution of components may impair safety
- Install according to CEC in Canada and NEC in US
- Each intrinsically safe circuit is galvanically isolated
- Intrinsically safe outputs shall be connected to certified intrinsically safe devices with entity parameters meeting the equations $V_{max} > V_{oc}$, $I_{max} > I_{sc}$, $P_{max} > P_o$, $L_i + L_{cable} < L_a$, $C_i + C_{cable} < C_a$
- Each intrinsically safe circuit can be individually shielded at the adjacent terminals 205, 208, 211, 215, 218, 222, 311, S designated "shield". They are galvanically isolated from chassis and from intrinsic safe signal circuits
- Indoor or control room use only, or installation in a suitable enclosure
- WARNING: Do not disconnect non-I.S circuits while they are alive, unless area is known to be nonhazardous
- Cross reference for EU (ATEX) entity parameters nomenclature:
 $U_o = V_{oc}$, $I_o = I_{sc}$, $P_o = P_a$, $C_o = C_a$, $L_o = L_a$, $U_i = V_{max}$, $I_i = I_{max}$, $P_i = P_{max}$, $C_i = C_i$, $L_i = L_i$
- C_a (C_o) and L_a (L_o) entity parameters have to be considered to be present at the same time, if the I.S. circuit is applied to an Ex ia category-1-circuit according to directive 94/9/EC (ATEX)

Revision history:

a	02.11.06	Sch.	
b	29.11.06	Sch.	
c	01.12.06	Sch.	
d	03.04.07	Sch.	page 2
e	16.10.07	Sch.	page 3
f	18.11.08		page 2+3
g	02.12.08		page 2+4
h	27.01.11	Sch.	page 3

Revision c: Initial issue
Revision d: Changes due to ATEX issues
Revision e: Amendment page 3
Revision f: Substitution Power supplies 5673-108/109 and interface module 5673-110 synchronization with ATEX entity parameters
Revision g: Addendum of modules 5673-113, 5673-114, 5673-115
Revision h: Module 5673-106 (Terminals 307-310) and Power supply 1510-100 (terminals +-)
row $L_{max} < 0.15 \mu H/m$ deleted, max. cable length limited to 20m



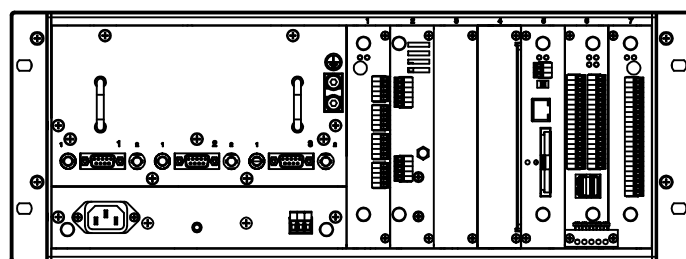
BARTEC GmbH

CAD-Nr.: bs\bs567301

Control drawing Hygrophil F

gez.	04.10.06	Sch.
gepr.		
Fs	5673	
		Bl.1 v. 4

Hygrophil F 5673



Interface I/O Exi

5673-114

Entity parameters
Groups A, B, C, D [Ex ia]
II (1) G, [Ex ia] IIC

Terminals 201-205

$V_{oc} = 6.7 \text{ V}$ $C_i = 2.5 \mu\text{F}$
 $R = 230 \text{ Ohm}$ $L_i = 0.3 \text{ mH}$
 $I_{sc} = 30 \text{ mA}$ $C_a = 15.4 \mu\text{F}$
 $P_a = 50 \text{ mW}$ $L_a = 38 \text{ mH}$
 C_a and L_a are present at the same time:
 $C_a = 0.3 \mu\text{F} @ L_a = 0.01 \text{ mH}$
 $C_a = 0.2 \mu\text{F} @ L_a = 0.1 \text{ mH}$
 $C_a = 0.1 \mu\text{F} @ L_a = 0.15 \text{ mH}$

Design.	Signal
201	I_OUT_Pt100
202	IN+_Pt100
203	IN-_Pt100
204	GND_Pt100
205	Shield

Terminals 206, 208, 209, 210

$V_{oc} = 28 \text{ V}$ $C_i \approx 0 \text{ nF}$ (between I.S wires)
 $R = 300 \text{ Ohm}$ $C_i = 6 \text{ nF}$ (I.S wires to ground)
 $I_{sc} = 93 \text{ mA}$ $L_i \approx 0 \text{ mH}$
 $P_a = 650 \text{ mW}$ $C_a = 83 \text{ nF}$
 $L_a = 3 \text{ mH}$
 C_a and L_a are present at the same time:
 $C_a = 83 \text{ nF} @ L_a = 0.2 \text{ mH}$

206	V+_1
207	n.c.
208	AIN+_1
209	AIN-_1
210	Shield

Terminals 208, 209, 210

$V_{max} = 30 \text{ V}$ $C_i \approx 0 \text{ nF}$ (between I.S wires)
 $I_{max} = 120 \text{ mA}$ $C_i = 6 \text{ nF}$ (I.S wires to ground)
 $V_{oc} = 28 \text{ V}$ $L_i \approx 0 \text{ mH}$
 $I_{sc} \approx 0 \text{ mA}$ $C_a = 83 \text{ nF}$

Terminals 211, 213, 214, 215

$V_{oc} = 28 \text{ V}$ $C_i \approx 0 \text{ nF}$ (between I.S wires)
 $R = 300 \text{ Ohm}$ $C_i = 6 \text{ nF}$ (I.S wires to ground)
 $I_{sc} = 93 \text{ mA}$ $L_i \approx 0 \text{ mH}$
 $P_a = 650 \text{ mW}$ $C_a = 83 \text{ nF}$
 $L_a = 3 \text{ mH}$
 C_a and L_a are present at the same time:
 $C_a = 83 \text{ nF} @ L_a = 0.2 \text{ mH}$

211	V+_2
212	n.c.
213	AIN+_2
214	AIN-_2
215	Shield

Terminals 216, 218, 219, 220

$V_{oc} = 28 \text{ V}$ $C_i \approx 0 \text{ nF}$ (between I.S wires)
 $R = 300 \text{ Ohm}$ $C_i = 6 \text{ nF}$ (I.S wires to ground)
 $I_{sc} = 93 \text{ mA}$ $L_i \approx 0 \text{ mH}$
 $P_a = 650 \text{ mW}$ $C_a = 83 \text{ nF}$
 $L_a = 3 \text{ mH}$
 C_a and L_a are present at the same time:
 $C_a = 83 \text{ nF} @ L_a = 0.2 \text{ mH}$

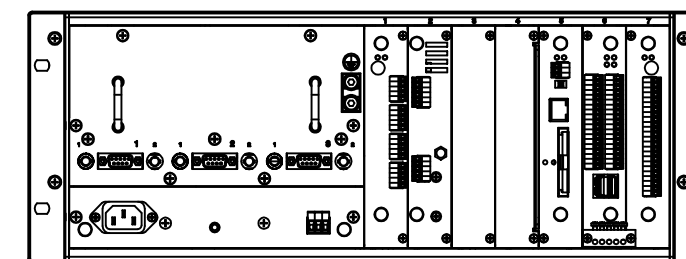
216	OUT Source
217	n.c.
218	OUT Sink
219	OUT COM
220	Shield

Terminals 218, 219, 220

$V_{max} = 30 \text{ V}$
 $I_{max} = 120 \text{ mA}$
 $C_i \approx 0 \text{ nF}$ (between I.S. wires)
 $C_i = 6 \text{ nF}$ (I.S. wires to ground/earth)
 $L_i \approx 0 \text{ mH}$
 $V_{oc} = 28 \text{ V}$
 $I_{sc} \approx 0 \text{ mA}$
 $C_a = 83 \text{ nF}$

Intrinsically safe circuits

Hygrophil F 5673



Interface module

5673-110

Modbus
RS485, +24V,
max 50mA

Design.	Signal	Design.	Signal
401	OUT 1+	404	OUT 2+
402	OUT 1-	405	OUT 2-
403	Shield	406	Shield
407	OUT 3+	410	free
408	OUT 3-	411	free
409	Shield	412	free
413	+24V	417	+24V
414	A1	418	A2
415	B1	419	B2
416	GND	420	GND
421	+24V	424	GND
422	RxD 1	425	TxD 1
423	CTS 1	426	RTS 1
427	+24V	430	GND
428	RxD 2	431	TxD 2
429	CTS 2	432	RTS 2
433	+5V	436	GND
434	PB_A	437	Shield
435	PB_B	438	Shield

Analog Outputs
0...20mA

RS485, +24V,
max 50mA

RS232, +24V,
max 50mA

Profibus, +5V
max 50mA

USB 1	USB 2
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USB for
servicing only



BARTEC GmbH

CAD-Nr.: bs\bs567301

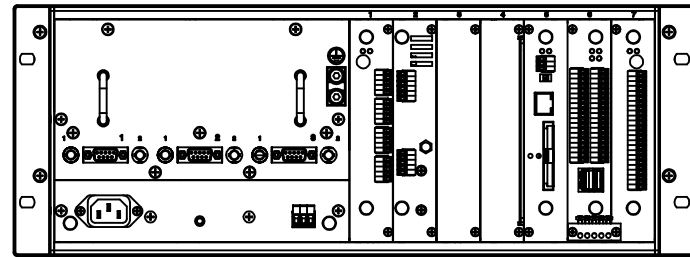
Control drawing Hygrophil F

gez. 03.04.07 Sch.

gepr.

Fs 5673
Bl.2 v. 4

OPTION 1



Hygrophil F 5673

non hazardous area or Cl. I, Div. 2

Entity parameters Groups A, B, C, D [Ex ia]

II (1) G, [Ex ia] IIC

Terminals 301–306

$V_{oc} = 8\text{ V}$	$I_{sc} = 444\text{ mA}$	
$R = 18\text{ Ohm}$	$P_a = 888\text{ mW}$	
linear characteristic		
$C_i = 5\text{ nF}$	$C_a = 3.1\text{ }\mu\text{F}$	
$L_i = 2\text{ }\mu\text{H}$	$L_a = 50\text{ }\mu\text{H}$	
C_a and L_a are present at the same time:		
Group A, B	Group C	Group D
ATEX IIC	ATEX IIB	ATEX IIA
$C_a=3.1\mu\text{F} @$	$C_a=20\mu\text{F} @$	$C_a=28\mu\text{F} @$
$L_a=50\mu\text{H}$	$L_a=50\mu\text{H}$	$L_a=50\mu\text{H}$
$C_a=1.6\mu\text{F} @$	$C_a=12\mu\text{F} @$	$C_a=17\mu\text{F} @$
$L_a=200\mu\text{H}$	$L_a=200\mu\text{H}$	$L_a=200\mu\text{H}$

For ATEX/EU only: Terminals 307–311

$U_o = 11.6\text{ V}$	$I_o = 2.1\text{ A}$	
$P_o = 7.2\text{ W}$	$R_s = 6.5\text{ Ohm}$	
trapezoidal characteristic		
$C_i = 0.6\text{ }\mu\text{F}$	$L_i \approx 0\text{ mH}$	
C_o and L_o are present at the same time:		
Group IIC	Group IIB	Group IIA
$C_o=1.0\mu\text{F} @$	$C_o=5.7\mu\text{F} @$	$C_o=6.6\mu\text{F} @$
$L_o=10\mu\text{H}$	$L_o=55\mu\text{H}$	$L_o=80\mu\text{H}$
max. ext. inductance to resistance ratio		
$L_o/R_o=4.4\mu\text{s}$	$L_o/R_o=20\mu\text{s}$	$L_o/R_o=30\mu\text{s}$
(i.e. $\mu\text{s} = \mu\text{H}/\text{Ohm}$)		

Interface unit
HCDT sensor

5673–106

Design.	Signal
301	+U
302	-GND
303	T_A
304	T_B
305	R_A
306	R_B

307	+ (9–11V)
308	+ (9–11V)
309	- (9–11V)
310	- (9–11V)
311	Shield

Intrinsically
safe circuits

or alternative

Cable parameters	max. length of cable [m]		
	15	20	20
$C'_{max} < 0.20\text{ nF/m}$			
$L'_{max} < 0.65\text{ }\mu\text{H/m}$			
$L'_{max} < 0.50\text{ }\mu\text{H/m}$			

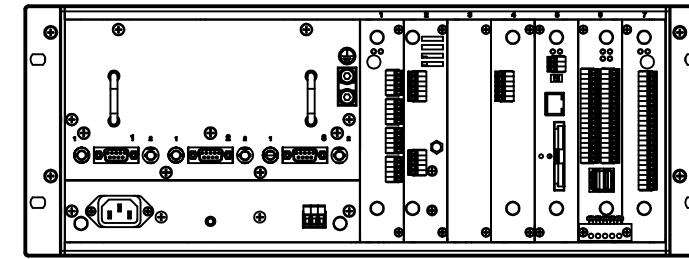
Groups	max. L'/R' ratio [$\mu\text{H}/\text{Ohm}$]		
	A, B	C	D
A, B	10	55	80
C	10	55	80
D	10	55	80

connected to Hygrophil DT/DTP/HCDT
type 1510 Series, terminals 1...4
see control drawing Fs 1510

4	-	Power supply
3	-	
2	+	
1	+	

zone 1 or Cl. I, Div. 1

OPTION 2

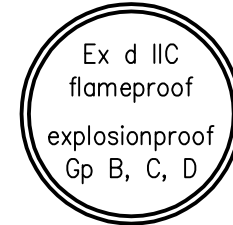


Hygrophil F 5673

DC 24V

Design.	Signal
PE	Ground
24V	DC 24V
0V	0V

Hygrophil
Power supply
HCDT Ex
Type 1510–100



Design.	Signal
+	+ (9–11V)
-	- (9–11V)
S	Shield

For ATEX/EU only: Terminals +, -

$U_o = 11.6\text{ V}$	$I_o = 2.1\text{ A}$	
$P_o = 7.2\text{ W}$	$R_s = 6.5\text{ Ohm}$	
trapezoidal characteristic		
$C_i = 0.6\text{ }\mu\text{F}$	$L_i \approx 0\text{ mH}$	
C_o and L_o are present at the same time:		
Group IIC	Group IIB	Group IIA
$C_o=1.0\mu\text{F} @$	$C_o=5.7\mu\text{F} @$	$C_o=6.6\mu\text{F} @$
$L_o=10\mu\text{H}$	$L_o=55\mu\text{H}$	$L_o=80\mu\text{H}$
max. ext. inductance to resistance ratio		
$L_o/R_o=4.4\mu\text{s}$	$L_o/R_o=20\mu\text{s}$	$L_o/R_o=30\mu\text{s}$
(i.e. $\mu\text{s} = \mu\text{H}/\text{Ohm}$)		

Entity parameters
Groups A, B, C, D [Ex ia]
II (1) G, [Ex ia] IIC

Terminals 301–306

$V_{oc} = 8\text{ V}$	$I_{sc} = 444\text{ mA}$	
$R = 18\text{ Ohm}$	$P_a = 888\text{ mW}$	
linear characteristic		
$C_i = 5\text{ nF}$	$C_a = 3.1\text{ }\mu\text{F}$	
$L_i = 2\text{ }\mu\text{H}$	$L_a = 50\text{ }\mu\text{H}$	
C_a and L_a are present at the same time:		
Group A, B	Group C	Group D
ATEX IIC	ATEX IIB	ATEX IIA
$C_a=3.1\mu\text{F} @$	$C_a=20\mu\text{F} @$	$C_a=28\mu\text{F} @$
$L_a=50\mu\text{H}$	$L_a=50\mu\text{H}$	$L_a=50\mu\text{H}$
$C_a=1.6\mu\text{F} @$	$C_a=12\mu\text{F} @$	$C_a=17\mu\text{F} @$
$L_a=200\mu\text{H}$	$L_a=200\mu\text{H}$	$L_a=200\mu\text{H}$

Interface unit for
external touch

5673–105

Design.	Signal
301	+U
302	-GND
303	T_A
304	T_B
305	R_A
306	R_B

Intrinsically safe circuits

or alternative

Cable parameters	max. length of cable [m]		
	15	20	20
$C'_{max} < 0.20\text{ nF/m}$			
$L'_{max} < 0.65\text{ }\mu\text{H/m}$			
$L'_{max} < 0.50\text{ }\mu\text{H/m}$			

Groups	max. L'/R' ratio [$\mu\text{H}/\text{Ohm}$]		
	A, B	C	D
A, B	10	55	80
C	10	55	80
D	10	55	80

connected to Hygrophil DT/DTP/HCDT
type 1510 Series, terminals 1...4
see control drawing Fs 1510

4	-	Power supply
3	-	
2	+	
1	+	

NOTES:

- Max. length of cable [m] is limited by max. total loop inductance to Group A,B: 10 μH , Group B: 55 μH and Group D: 80 μH
- Max. L'/R' ratio [$\mu\text{H}/\text{Ohm}$] is according to appendix F6.9, CEC
- Max. total cable capacitance [μF] is according to appendix F6.10, CEC, circuit voltage 0–15V, reduced by $C_i = 0.6\mu\text{F}$

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CAD-Nr.: bs\bs567301

Control drawing Hygrophil F

gez. 18.11.08 Sch.

gepr.

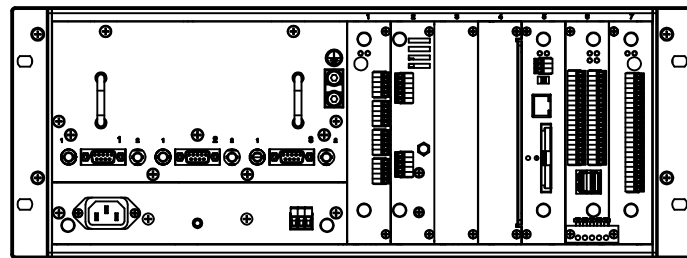
Fs 5673

Bl.3 v. 4

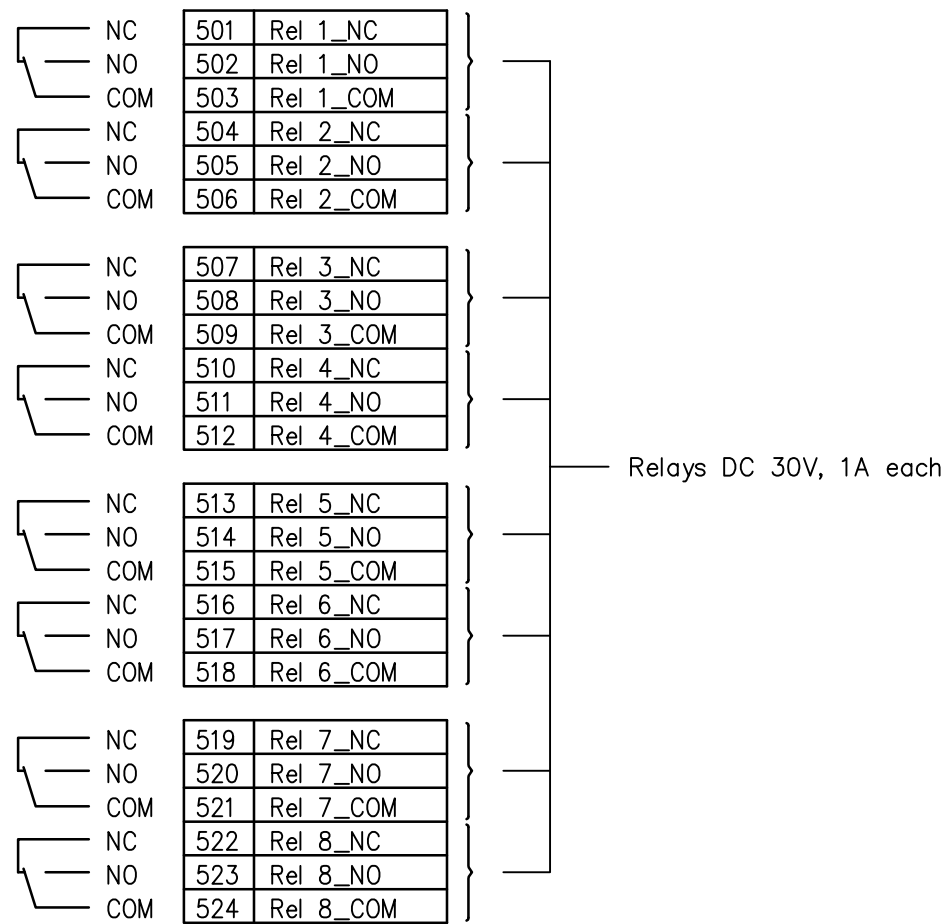


CEC controlled document

Hygrophil F 5673



Relay Interface
5673-115



Intrinsically safe circuits

Type 1510-10

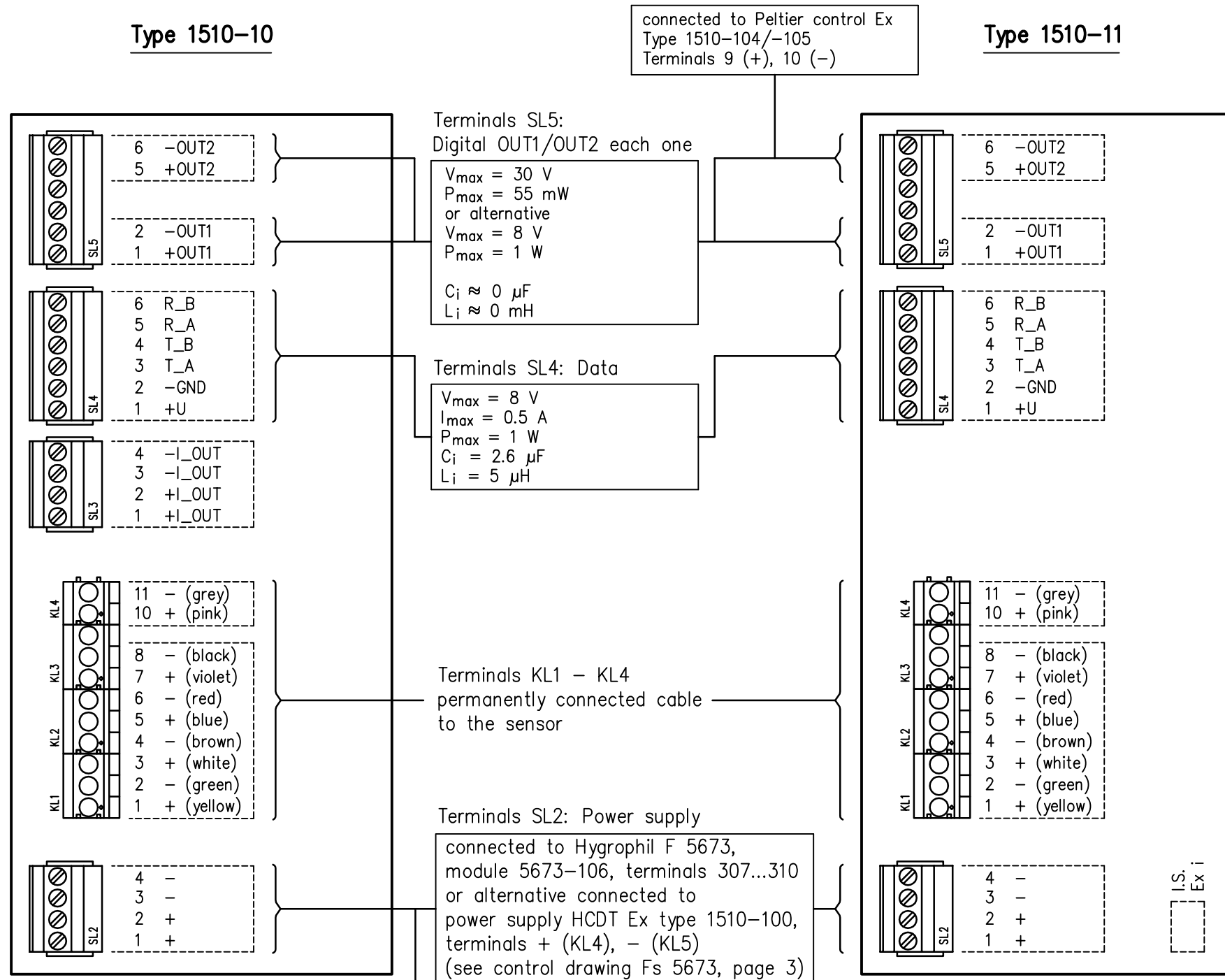
Type 1510-11

Terminals SL3: Analog OUT

$V_{oc} = 12\text{ V}$
 $R = 72\text{ Ohm}$
 $I_{sc} = 167\text{ mA}$
 $P_o = 500\text{ mW}$
 linear characteristic
 $C_i = 0.25\text{ }\mu\text{F}$
 $L_i \approx 0\text{ mH}$

 $C_a = 1.15\text{ }\mu\text{F}$
 $L_a = 1\text{ mH}$
 if capacitance and inductance
 are present at the same time:
 $C_a = 1.15\text{ }\mu\text{F}$
 $L_a = 0.05\text{ mH}$
 or
 $C_a = 1\text{ }\mu\text{F}$
 $L_a = 0.1\text{ mH}$

Entity parameters
 Groups A, B, C, D [Ex ia]
 II (1) G, [Ex ia] IIC



Notes (continued):

10. The cable between the sensor and the measuring unit is connected permanently. Disconnection and replacement of this cable can only be done by the manufacturer. There is a potential danger, when the pink wire of the I.S. peltier circuit at terminal 10+ is swapped with the grey wire at terminal 11-.

11. The shield is connected via the cable gland to the metal enclosure on both sides (sensor and measuring unit). This shield connection will provide an electrostatically discharge of the metal sensor enclosure, if it isn't connected to local conductive parts. Due to shield connection the installation location of sensor and measuring unit have to be at same electrical potential. Locations shall be included in local equipotential bonding.

12. Please note that the colour of the peltier wires have been changed compared to EC-Type-Examination Certificate PTB 07 ATEX 2044 X:
 brown (terminal 10+) -> pink
 white (terminal 11-) -> grey

Revision History:

- (a) 16.10.07 Initial issue
- (b) 22.06.10 Terminals SL3, SL5 removed
- (c) 18.04.11 split type 1510-10 and 1510-11, terminals SL3, SL5 added to type 1510-10, note 12 added
- (d) 26.03.13 Terminal SL5 added to type 1510-11
- (e) 19.09.13 Peltier control 1510-104/-105 added

Notes:

1. Substitution of components may impair intrinsic safety
2. Install according to CEC in Canada and NEC in US
3. Power supply circuit has to be connected to an isolated intrinsically safe circuit with appropriate entity parameters
4. Digital OUT1, Digital OUT2 and Data circuit are galvanically isolated from each other and from power supply circuit
5. Analog OUT, internal Sensor and Peltier circuit are galvanically connected with the power supply circuit
6. Intrinsically safe circuits shall be connected to certified intrinsically safe devices with entity parameters meeting the equations $V_{max} > V_{oc}$, $I_{max} > I_{sc}$, $P_{max} > P_o$, $L_i + L_{cable} < L_a$, $C_i + C_{cable} < C_a$
7. Cross reference for EU (ATEX) entity parameters nomenclature:
 $U_o = V_{oc}$, $I_o = I_{sc}$, $P_o = P_a$, $C_o = C_a$, $L_o = L_a$, $U_i = V_{max}$, $I_i = I_{max}$, $P_i = P_{max}$, $C_i = C_i$, $L_i = L_i$
8. C_a (C_o) and L_a (L_o) entity parameters have to be considered to be present at the same time, if the I.S. circuit is applied for Exia category-1-circuits according to directive 94/9/EC (ATEX)
9. The cable between the sensor and the measuring unit has to be installed fixed. The cable shall be protected by final installation against external damage in order to maintain the intrinsic safety protection.

Terminals 9(+), 10 (-):
 Control Input E1

connected to Hygrophil DT/DTP/HCDT
 Type 1510-11
 Terminals SL5: Digital OUT2

$V_{oc} = 8\text{ V}$
 $R = 6.7\text{ Ohm}$
 $I_{sc} = 1.2\text{ A}$
 $P_a = 1\text{ W}$
 linear characteristic
 $C_i = 0\text{ }\mu\text{F}$, $C_a = 8.4\text{ }\mu\text{F}$
 $L_i \approx 0\text{ mH}$, $L_a = 25\text{ }\mu\text{H}$
 if capacitance and inductance
 are present at the same time:
 $C_a = 3.4\text{ }\mu\text{F}$, $L_a = 25\text{ }\mu\text{H}$

valid from Ser.B



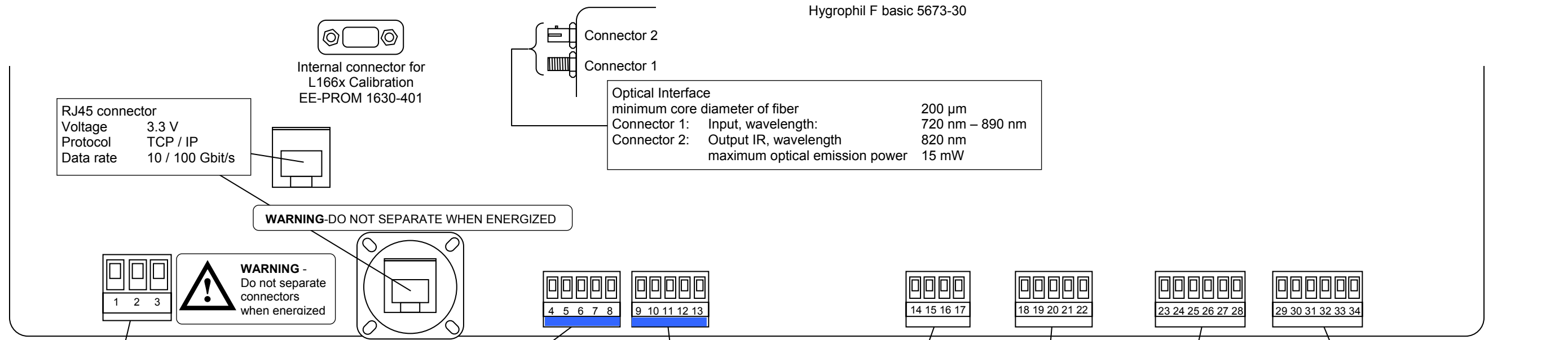
BARTEC GmbH

CAD-Nr.: zu\zu151001

Control / installation drawing
 Hygrophil DT / DTP / HCDT

gez.	01.10.07	Sch.
gepr.		
		Fs 1510

Hygrophil F basic 5673-30



RJ45 connector
 Voltage 3.3 V
 Protocol TCP / IP
 Data rate 10 / 100 Gbit/s

Internal connector for
 L166x Calibration
 EE-PROM 1630-401

Optical Interface
 minimum core diameter of fiber 200 µm
 Connector 1: Input, wavelength: 720 nm – 890 nm
 Connector 2: Output IR, wavelength 820 nm
 maximum optical emission power 15 mW

WARNING-DO NOT SEPARATE WHEN ENERGIZED

WARNING -
 Do not separate
 connectors
 when energized

Terminals (Power Supply)
 1 +10-36V
 2 0V
 3 chassis / enclosure
 supply voltage DC 10 – 36 V
 input power 15 W
 provide
 PELV (protective extra-low voltage) /
 SELV (safety extra-low voltage)
 Wire cross section 0.5 – 2.5 mm²

Terminals (0-20 mA input Ex ia)
 4 I_OUT
 6 IN+
 7 IN-
 8 shield
 Entity parameters
 Groups A, B, C, D [Ex ia]
 II (1) G, [Ex ia] IIC
 Voc = 28 V, R = 300 Ω
 Isc = 93 mA
 Pa = 0.65 W
 Ci = 0 nF (between I.S. wires)
 Ci = 6 nF (I.S. wires to GND)
 Li = 0 mH
 Ca = 83 nF, La = 3 mH
 Ca and La are present at the same time
 Ca = 83 nF @ La = 0.2 mH

Terminals (passive 0-20 mA input Ex ia)
 6 IN+
 7 IN-
 8 shield
 Entity parameters
 Groups A, B, C, D [Ex ia]
 II (1) G, [Ex ia] IIC
 Voc = 28 V, Isc = 0 mA
 Vmax = 30 V, Imax = 120 mA
 Ci = 0 nF (between I.S. wires)
 Ci = 6 nF (I.S. wires to GND)
 Li = 0 mH

Terminals (Pt100 Ex ia)
 9 I_OUT
 10 IN+
 11 IN-
 12 GND
 13 shield
 Entity parameters
 Groups A, B, C, D [Ex ia]
 II (1) G, [Ex ia] IIC
 Voc = 6.7 V, R = 230 Ω
 Isc = 30 mA
 Pa = 50 mW
 Ci = 2.5 µF, Li = 0.3 mH
 Ca and La are present at the same time
 Ca = 0.3 µF @ La = 10 µH
 Ca = 0.2 µF @ La = 100 µH
 Ca = 0.1 µF @ La = 0.15 mH

Terminals (RS485 Interface)
 14 A
 15 B
 16 GND
 17 GND
 Voltage DC 5 V
 Current (A), (B) 50 mA
 Wire cross section 0.14 – 1.5 mm²

Terminals (Analog Outputs)
 18 OUT1+
 19 OUT1-
 20 shield
 21 OUT2+
 22 OUT2-
 Voltage DC 24 V
 Output Current 0 ... 23 mA
 Wire cross section 0.14 – 1.5 mm²

Terminals (Relays)
 23 NC Relay 1
 24 NO Relay 1
 25 COM Relay 1
 26 NC Relay 2
 27 NO Relay 2
 28 COM Relay 2
 Voltage DC 30 V
 Current 1 A
 Nomenclature:
 NC: normally closed (de-energized)
 NO: normally open (make contact)
 COM: common
 Wire cross section 0.25 – 1.5 mm²

Terminals (Display Interface)
 29 +8V
 30 RxD
 31 IN
 32 GND
 33 OUT
 34 TxD
 Entity parameters
 non incandesive Groups A, B, C, D
 II (3) G, [Ex ic] IIC
 Voc = 9.5 V, R = 9.5 Ω
 Isc = 1 A
 Pa = 2.38 W
 Ci = 1 µF, Li = 0 mH
 Ca = 29 µF, La = 70 µH
 Ca and La are present at the same time
 Ca = 29 µF @ La = 1 µH
 Ca = 6.4 µF @ La = 10 µH
 Ca = 2.4 µF @ La = 50 µH

- Notes:
- Maximum voltage of non I.S. circuits shall not exceed 250 V
 - Substitution of components may impair safety
 - Install according to CEC in Canada and NEC in US
 - Each intrinsically safe circuit is galvanically isolated
 - Intrinsically safe outputs shall be connected to certified
 - Each intrinsically safe circuit can be individually shielded at the adjacent terminals 8, 13, designated "shield". They are galvanically isolated from metal enclosure / chassis and from intrinsic safe circuits.
 - WARNING: Do not open when area is known hazardous.
 WARNING: Do not open when an explosive atmosphere is present.
 - Cross reference for EU (ATEX) entity parameter nomenclature:
 Uo = Voc, Io = Isc, Po = Pa, Co = Ca, Lo = La, Ui = Vmax, li = Imax, Pi = Pmax, Ci = Ci, Li = Li
 - Ca (Co) and La (Lo) entity parameter have to be considered to be present ant the same time, if the I.S. circuit is applied to an Ex ia category-1-circuit according directive 94/9/EC (ATEX)

Revision history:
 Initial issue: 07.01.2013
 Revision 1: 08.02.2013 Add entity parameter for terminals 6, 7 (passive 0-20 mA input Ex ia input)
 Add optical interface parameters for polychromatic unit
 Add internal connector for L166x Calibration EE-PROM 1630-401
 Revision 2: 09.04.2013 Update entity parameter for terminals 9 – 12, Pt100 Ex ia circuit
 Revision 3: 29.04.2013 Add cross section information for non intrinsic safe field wiring

BARTEC	Control drawing Hygrophil F basic	gez. 07.01.13
		gepr.
		Fs5673 basic Page 1 of 1