Operating Instructions

Remote HMI
T-Ex Series

R. STAHL HMI Systems GmbH
Im Gewerbegebiet Pesch 14
D-50767 Köln

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R. STAHL HMI Systems GmbH
Im Gewerbegebiet Pesch 14
D-50767 Köln

Company located at:	Cologne
Court of registration:	District court Cologne, HRB 30512
VAT number:	DE 812 454 820

Telephone:	(switchboard)	+49/(0)221/ 5 98 08	- 200
	(hotline)		- 59
Fax:			- 260
E-mail:	(switchboard)	office@stahl-hmi.de	
	(hotline)	support@stahl-hmi.de	

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Table of contents

	Description	Page
	Disclaimer	2
	Table of contents	3
1	Product names and Ex-certificates	4
2	Technical data	5
2.1	Display unit	5
2.2	Keyboard units	6
2.3	Transmission units	7
2.4	Enclosure	8
2.5	Front panel resistance	9
2.5.1	Materials	9
2.5.2	Material properties	9
2.5.3	Membrane top (Polyester)	9
3	Interfaces and connection details	12
3.1	Display	12
3.2	Keyboard trackball unit	17
3.3	Keyboard mouse unit	17
3.4	Keyboard pad unit	18
3.5	Keyboard joystick unit	18
3.6	Transmission unit	19
4	Safety instructions	20
4.1	General safety instructions	20
4.2	Cautionary note	20
4.3	Installation – safety instructions	20
4.4	Operating instructions	22
5	General instruction	22
5.1	Technology advances	22
6	Maintenance	22
7	Troubleshooting	23
7.1	Repair/hazardous materials	23
8	Disposal	23
8.1.1	ROHS directive 2002/95/EC	23
9	Use of trademarks	23
10	Declaration of EC conformity	24
11	Release notes	26

1 Product names and Ex-certificates

Display unit type: **T-Ex-##*-CAT7* or T-Ex-##*-CAT7*-R2**
T-Ex-##*-MM* or T-Ex-##*-MM*-R2
T-Ex-##*-SM* or T-Ex-##*-SM*-R2

ATEX gas:	II 2(1) G Ex e q [ia op is Ga] IIC T4 Gb	
ATEX dust:	II 2(1) D Ex tb IIIC [ia op is Da] IP64 T110°C Db	for T-Ex-##*
ATEX dust:	II 2(1) D Ex tb IIIC [ia op is Da] IP65 T110°C Db	for T-Ex-##*-R2

IECEx gas:	Ex e q [ia op is Ga] IIC T4 Gb	
IECEx dust:	Ex tb IIIC [ia op is Da] IP64 T110°C Db	for T-Ex-##*
IECEx dust:	Ex tb IIIC [ia op is Da] IP65 T110°C Db	for T-Ex-##*-R2

Ta = -30°C ... +60°C (certification temperature range)

Keyboard Trackball unit type: **T-Ex*-KB-TB***
Keyboard Mouse unit type: **T-Ex*-KB-M***
Keyboard Touchpad unit type: **T-Ex*-KB-P***
Keyboard Joystick unit type: **T-Ex*-KB-J***

ATEX gas:	II 1 G Ex ia IIC T4 Ga
ATEX dust:	II 1 D Ex ia IIIB T110°C Da

IECEx gas:	Ex ia IIC T4 Ga
IECEx dust:	Ex ia IIIB T110°C Da

Ta = -30°C ... +60°C (certification temperature range)

Transmission unit type: **T-Ex-KVM*-MM***
T-Ex-KVM*-SM*

ATEX gas:	II (1) G [Ex op is Ga] IIC (FO version only)
ATEX dust:	II (1) D [Ex op is Da] IIIB (FO version only)

IECEx gas:	[Ex op is Ga] IIC (FO version only)
IECEx dust:	[Ex op is Da] IIIB (FO version only)

Ta = -30°C ... +60°C (certification temperature range)

* = any alphanumeric or symbolic character, without relevance for explosion protection
# = one numeric character, without relevance for explosion protection

For further details, see certificates and technical data !

2 Technical data

2.1 Display unit

T-Ex-##*-CAT7* or T-Ex-##*-CAT7*-R2 (type for CAT7 cable)
T-Ex-##*-MM* or T-Ex-##*-MM*-R2 (type for multi mode FO cable)
T-Ex-##*-SM* or T-Ex-##*-SM*-R2 (type for single mode FO cable)

Housing type:	Steel
Protection:	IP64 for T-Ex-##* or IP65 for T-Ex-##*-R2
Resolution:	1280 x 1024 pixel, 4:3 ratio, 19“ display size 1680 x 1050 pixel, 16:10 ratio, 22“ display size 1920 x 1080 pixel, 16:9 ratio, 24“ display size 1920 x 1200 pixel, 16:10 ratio, 24“WU display size (Resolution 1920 x yyyy not for DVI2)
Visualization of resolution:	1:1 (standard for KVM USB) scaling (standard for KVM DVI, optional for KVM USB)
Brightness:	typ. 250 cd/m² @ Ta 20°C (68°F) via LED or CFL backlight (depend of display size)
Touch option:	5-wire resistive touch, foil surface

For transmission technology USB, DVI2, IP and CAM:

Certification temperature:	-30°C to +60°C (-22°F to 140°F)
Cold start temperature:	-10°C to +50°C (-14°F to 122°F)
During operation:	-20°C to +50°C (-4°F to 122°F)
Operation with heater[1)]:	-30°C to +50°C (-22°F to 122°F)
Short term temperature:	-30°C to +60°C (-22°F to 140°F)
Temp. when fixed in enclosure:	-20°C to +50°C (-4°F to 122°F)
Storage temperature:	-20°C to +70°C (-4°F to 158°F) 10 to 90% relative humidity @ 40°C (104°F), non-condensing

For transmission technology DVI1:

Certification temperature:	-30°C to +60°C (-22°F to 140°F)
Cold start temperature:	+5°C to +40°C (41°F to 104°F)
During operation:	+5°C to +40°C (41°F to 104°F)
Operation with heater[1)]:	+5°C to +40°C (41°F to 104°F)
Short term temperature:	+5°C to +40°C (41°F to 104°F)
Temp. when fixed in enclosure:	+5°C to +40°C (41°F to 104°F)
Storage temperature:	-20°C to +70°C (-4°F to 158°F) 20 to 80% relative humidity @ 40°C (104°F), non-condensing

[1)] The used heater must be constructed in the way, that inside of the enclosure the temperature will not fall below -20°C (-4°F).

Ex-certificates:	Zone 1[0], Zone 21[20], EPL Gb[Ga], EPL Db[Da] see certificates
Dimensions:	660 mm x 475 mm x 114 mm (25.98” x 18.70” x 4.49”), see technical drawings in the manual

Weight:	30 kg typ. (66.2 lb), depending on version
Mounting type:	fixed mounting
Power supply:	24 VDC or 100-240 VAC, 50-60 Hz, depending on type 35 W typ. / maximum 150 W (typ. 119BTU / max. 510BTU), recommended protection 5.0 AT
MTBF:	min. / typ. 50,000 h @ Ta 20°C (68°F) and intended use
Data cable length KVM USB CAT7:	up to 150 m (490 ft) via CAT7 installation cable AWG22
Data cable length KVM DVI1 CAT7:	up to 140 m (460 ft) via CAT7 installation cable AWG22
Data cable length KVM DVI2 CAT7:	up to 500 m (1640 ft) via CAT7 installation cable AWG22
Data cable length KVM IP CAT7:	up to 100 m (330 ft) via CAT7 installation cable AWG22
Data cable length FO multi mode: (available for KVM USB)	up to 500 m (1640 ft) via 50/125 µm FO cable up to 300 m (985 ft) via 62,5/125 µm FO cable
Data cable length FO single mode: (available for KVM USB)	up to 10,000 m (33,000 ft) via 9/125 µm FO cable
Interfaces/Connections:	see section: “interfaces and connections: display unit”

2.2 Keyboard units

T-Ex*-KB-TB*	(type Keyboard Trackball Unit)
T-Ex*-KB-M*	(type Keyboard Mouse Unit)
T-Ex*-KB-P*	(type Keyboard Touchpad Unit)
T-Ex*-KB-J*	(type Keyboard Joystick Unit)

Housing type:	Steel/Aluminium
Surface foil:	polyester
Protection:	IP65/IP54 static/dynamic at the front, minimum IP20 at the back
Operating temperature range:	-30°C to +60°C (-22°F to 140°F) relative humidity: 10 to 90%, non-condensing
Storage temperature range:	-30°C to +70°C (-22°F to 158°F) relative humidity: 10 to 90%, non-condensing
Ex-Certificates:	Zone 0, Zone 20, EPL Ga, EPL Da see certificates
Dimensions:	581 mm x 186 mm x 50 mm (22.87” x 7.32” x 1.97”), see technical drawings in the manual
Weight:	3 kg typ. (6.6 lb), depending on version
Mounting type:	fixed mounting
Power supply	via USB interfaces
MTBF:	min. / typ. 50,000 h @ Ta 20°C (68°F) and intended use
Interfaces/connections:	see section: “interfaces and connections: keyboard unit”

2.3 Transmission units

T-Ex-KVM*-CAT7* (type for CAT7 cable)
T-Ex-KVM*-MM* (type for multi mode FO cable)
T-Ex-KVM*-SM* (type for single mode FO cable)

Housing type:	Desktop
Protection:	min. IP20

For transmission technology USB, DVI2 and IP:

Certification temperature:	-30°C to +60°C (-22°F to 140°F)
Cold start temperature:	-10°C to +50°C (-14°F to 122°F)
During operation:	-20°C to +50°C (-4°F to 122°F)
Short term temperature:	-30°C to +60°C (-22°F to 140°F)
Storage temperature:	-20°C to +70°C (-4°F to 158°F) 10 to 90% relative humidity @ 40°C (104°F), non-condensing

For transmission technology DVI1:

Certification temperature:	-30°C to +60°C (-22°F to 140°F)
Cold start temperature:	+5°C to +40°C (41°F to 104°F)
During operation:	+5°C to +40°C (41°F to 104°F)
Short term temperature:	+5°C to +40°C (41°F to 104°F)
Storage temperature:	-20°C to +70°C (-4°F to 158°F) 20 to 80% relative humidity @ 40°C (104°F), non-condensing

Ex-certificates:	Zone [0], Zone [20], EPL [Ga], EPL [Da], LWL versions only, see certificates
Dimensions KVM USB:	145 mm x 44.45 mm x 165 mm (5.71” x 1.75” x 6.5”) see technical drawings in the manual
Dimensions KVM DVI1:	210 mm x 44 mm x 210 mm (8.27” x 1.73” x 8.27”) see technical drawings in the manual
Dimensions KVM DVI2:	210 mm x 44.45 mm x 165 mm (8.27” x 1.75” x 6.5”) see technical drawings in the manual
Dimensions KVM IP:	198 mm x 44 mm x 120 mm (7.76” x 1.73” x 4.72”) see technical drawings in the manual
Weight:	1 kg typ., (2.2 lb), depending on version
Mounting type:	typ. corresponding equipment
Power supply:	100-240 VAC, 50-60 Hz, 5 W typ. / maximum 10 W (typ. 17 BTU / max. 34 BTU), recommended protection 1.0 AT
MTBF:	min. / typ. 50,000 h @ Ta 20°C (68°F) and intended use

Data cable length KVM USB CAT7:	up to 150 m (490 ft) via CAT7 installation cable AWG22
Data cable length KVM DVI CAT7:	up to 140 m (460 ft) via CAT7 installation cable AWG22
Data cable length FO multi mode: (available for KVM USB)	up to 500 m (1640 ft) via 50/125 µm FO cable up to 300 m (985 ft) via 62,5/125 µm FO cable
Data cable length FO single mode: (available for KVM USB)	up to 10,000 m (33,000 ft) via 9/125 µm FO cable
Interfaces/connections:	see section: “interfaces and connections: transmission unit”

2.4 Enclosure

HSG-Txx-V2A-PME-W	desk enclosure, wall mounting
HSG-Txx-V2A-PME-F	desk enclosure, floor mounting
HSG-Txx-V2A-FXE-W	strut enclosure, wall mounting
HSG-Txx-V2A-FXE-F	strut enclosure, floor mounting
HSG-Txx-V2A-FXE-C	strut enclosure, ceiling mounting
HSG-Txx-V2A-CFR-W	cleanroom enclosure, front door, wall mounting
HSG-Txx-V2A-CFR-F	cleanroom enclosure, front door, floor mounting
HSG-Txx-V2A-CFR-C	cleanroom enclosure, front door, ceiling mounting

Protection:	Typ. IP65 when all assembly and mounting holes appropriate closed
Lock:	Typ. two way key bit
Material:	Typ. 1.4301 (DIN/EN), 304 (ASTM), 304 S 31 (BS)
Surface:	Typ. 240 grinding
Mounting pipe MPF, MPC, MPW:	Typ. 1.4301 (DIN/EN), 304 (ASTM), 304 S 31 (BS), 60.3 mm x 2 mm, min. 470 N/mm² (EN10217-7)
Operating temperature range	-30°C to +60°C (-22°F to 140°F) relative humidity: 10 to 90%, non-condensing
Storage temperature range:	-30 °C to +70°C (-22°F to 158°F) relative humidity: 10 to 90%, non-condensing
Dimensions:	750 mm x 665 mm x 243 mm (29.54” x 26.18” x 9.56”), see technical drawings in the manual
Weight:	19.5 up to 25 kg, (43 up to 55 lb), depending on version

2.5 Front panel resistance

This section contains information on the resistance of the operator interfaces to various environmental factors. These have an impact on the mechanical, thermal and chemical stability of the operator interfaces.

The resistance to chemicals was tested according to DIN 42115 Part 2, i.e. the stability over 24 hours without visible changes to the operator interfaces.

2.5.1 Materials

Application	Material
Front plate	Aluminum
Touch screen	Polyester
Housing	Stainless steel
Front panel seal	Polyurethane

2.5.2 Material properties

- ☞ The selection of chemicals listed here is not exhaustive.
- ☞ More comprehensive lists can be obtained for further information from R. STAHL HMI Systems GmbH.
- ☞ Because of the numerous chemical substances available on the market, these lists can only represent a selection.

2.5.3 Membrane top (Polyester)

Property	Chemical material class / group	Chemical substances	Test method
Chemical • Chemical resistance	Alcohols	1,3 Butanediol 1,4 Butanediol Cyclohexanol Diacetone alcohol Ethanol Glycol Glycerol Isopropyl alcohol Methanol Neopentyl glycol Octanol 1,2 Propylene glycol Triacetin Dowandol DRM/PM	DIN 42115 DIN 53 461 Oder ASTM-F-1598-95
	Aldehydes	Acetaldehyde Formaldehyde 37--42%	
	Amines	Ammonia < 2%	
	Esters	Amyl acetate Ethylacetate N-Butyl acetate	
	Ethers	1.1.1. Trichloroethane Ether Dioxane Diethyl ether 2-Methyltetrahydrofuran	

	(2-ME-THF)
Aromatic hydrocarbons	Benzene Toluene Xylene Paint thinner (white spirit)
Ketones	Acetone Methyl ethyl ketone Cyclohexanone Methyl isobutyl ketone (MIBK) Isophorone
Diluted acids	Formic acid <50% Acetic acid < 5% Phosphoric acid <30% Hydrochloric acid <10% Nitric acid <10% Trichloroacetic acid <50% Sulfuric acid <30%
Diluted alkaloids (bases)	Caustic soda <40%
Household chemicals	Ajax Ariel Domestos Downey Fantastic Formula 409 Gumption Jet Dry Lenor Persil Tenside Top Jop Vim Vortex Washing powder Fabric conditioner Whis Windex
Oils	Petrol Drilling muds Braking fluid Decon foam Diesel oil Varnish Keroflux Paraffin oil Castor oil Silicone oil Solvent naphta Mineral turpentine Kerosene
No specific material class	Acetonitrile Alkali carbonate Dichromates Potassium dichromate Caustic soda <20%

		Dibutyl phthalate Dioctyl phthalate Iron II chloride ($FeCl_2$) Iron II chloride ($FeCl_3$) Haloalkanes Potassium soap Potassium hydroxide <30% Sodium bisulfate Tetrachloroethylene Salt water Trichloroethylene Water Hydrogen peroxide >25%	
Property	**Resistance**		**Test method**
Mechanic (keyboard) • Service life after imprint • Operating force • MIT folding resistance	5 million touches max. 50 N >20000 folding operations		Autotype method ASTM D2176
Mechanic (touch screen) • point activation	1 million activations at any single point		3M method
Thermal • Dimensional • Dimension stability	Max. 0.2% at 120° longitudinal Typically 0.1%		Autotype method

3 Interfaces and connection details

3.1 Display

PWR (Power): **X10**, terminal 1-3, Ex e, increased safety:

terminal X10-1: L
terminal X10-2: N
terminal X10-3: Earth

0.2 – 2.5 mm² / 24 AWG - 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG - 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact

U_{typ} ≤ 20 V…240 VAC/DC, depending on type
I_{max} ≤ 5 A
P_{max} ≤ 150 W
U_m ≤ 250 V
I_k ≤ 1500 A

USB: **X13**, terminal 1-4, Ex e, increased safety:

terminal X13-1: +UB (typ. colour: red)
terminal X13-2: D- (typ. colour: white)
terminal X13-3: D+ (typ. colour: green)
terminal X13-4: GND (typ. colour: black)

0.2 – 2.5 mm² / 24 AWG - 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG - 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact
Recommended cable length max. 3 m (10 ft)

U_{typ} ≤ 5 V (±10%)
U_m ≤ 250 V

12 V: **X14**, terminal 1-2, Ex e, increased safety:

terminal X14-1: +12 V (typ. colour: red)
terminal X14-2: GND (typ. colour: black)

0.2 – 2.5 mm² / 24 AWG - 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG – 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact
Recommended cable length max. 3 m (10 ft)

U_{typ} ≤ 12 V (±10%)
$I_{max.}$ ≤ 400 mA
U_m ≤ 250 V

SER: **X97**, terminal 1-5, Ex e, increased safety:

terminal X97-1:	TXD / TXD-B	(typ. colour: white/blue)
terminal X97-2:	RXD / TXD-A	(typ. colour: blue)
terminal X97-3:	RTS / RXD-B	(typ. colour: white/orange)
terminal X97-4:	CTS / RXD-A	(typ. colour: orange)
terminal X97-5:	GND	(typ. colour: black)

0.2 – 2.5 mm² / 24 AWG - 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG - 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact

U_{typ} ≤ 15 V (±10%)
U_m ≤ 250 V

CAM: **X101**, terminal 1-2, Ex e, increased safety:

terminal X101-1:	FBAS	(typ. colour: white)
terminal X101-2:	GND	(typ. colour: black)

0.2 – 2.5 mm² / 24 AWG - 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG - 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact

U_{typ} ≤ 5 V (±10%)
U_m ≤ 250 V

AUD: **X105**, terminal 1-5, Ex e, increased safety:

terminal X97-1:	CH1	(typ. colour: red)
terminal X97-2:	CH2	(typ. colour: black)
terminal X97-3:	CH3	(typ. colour: red)
terminal X97-4:	CH4	(typ. colour: black)
terminal X97-5:	GND	(typ. colour: black)

0.2 – 2.5 mm² / 24 AWG - 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG - 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact

U_{typ} ≤ 100 V (±10%)
U_m ≤ 250 V

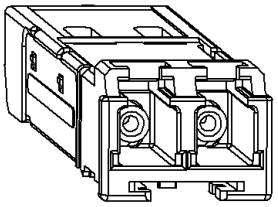
CAT7 1 (Data): **X16**, terminal 1-9, Ex e, increased safety:

terminal X16-1: TRD0+ (typ. colour: white/orange)
terminal X16-2: TRD0- (typ. colour: orange)
terminal X16-3: TRD1+ (typ. colour: white/green)
terminal X16-4: TRD1- (typ. colour: green)
terminal X16-5: TRD2+ (typ. colour: white/blue)
terminal X16-6: TRD2- (typ. colour: blue)
terminal X16-7: TRD3+ (typ. colour: white/brown)
terminal X16-8: TRD3- (typ. colour: brown)
terminal X16-9: SHLD (typ. colour: shield)

0.2 – 2.5 mm² / 24 AWG – 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG – 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max.1 cable per contact

U_{typ} ≤ 5 V (±10%)
U_m ≤ 250 V

FO 1 (Data): **X18**, terminal TX-RX, Ex op is, inherent safe optical radiation:



LC Duplex connector

Multimode: preferred for 50/125 µm, max. 35 mW, 850 nm
Single-mode: preferred for 9/125 µm, max. 35 mW, 1310 nm

KBi (Keyboard): **X11**, terminal 1-4, Ex ia, intrinsically safe:

terminal X11-1: +UB (typ. colour: red)
terminal X11-2: D- (typ. colour: white)
terminal X11-3: D+ (typ. colour: green)
terminal X11-4: GND (typ. colour: black)

0.2 – 2.5 mm² / 24 AWG -16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG – 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact
Recommended cable length max. 3 m (10 ft)

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 3 A	I_o	= 309 mA
P_I	= 2 W	P_o	= 629 mW
C_I	= negligible	C_o	= 50 µF
L_I	= negligible	L_o	= 40 µH

Mi (Mouse): **X12**, terminal 1-4, Ex ia, intrinsically safe:

terminal X12-1: +UB (typ. colour: red)
terminal X12-2: D- (typ. colour: white)
terminal X12-3: D+ (typ. colour: green)
terminal X12-4: GND (typ. colour: black)

0.2 – 2.5 mm² / 24 AWG – 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG – 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact
Recommended cable length max. 3 m (10 ft)

U_I	= 5.5 V	U_o	= 5,5 V
I_I	= 3 A	I_o	= 309 mA
P_I	= 2 W	P_o	= 629 mW
C_I	= negligible	C_o	= 50 µF
L_I	= negligible	L_o	= 40 µH

USB1i: **X24**, terminal 1-4, Ex ia, intrinsically safe:

terminal X24-1: +UB (typ. colour: red)
terminal X24-2: D- (typ. colour: white)
terminal X24-3: D+ (typ. colour: green)
terminal X24-4: GND (typ. colour: black)

0.2 – 2.5 mm² / 24 AWG – 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG – 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact
Recommended cable length max. 3 m (10 ft)

U_I	= 5.5 V	U_o	= 5,5 V
I_I	= 3 A	I_o	= 309 mA
P_I	= 2 W	P_o	= 629 mW
C_I	= negligible	C_o	= 50 µF
L_I	= negligible	L_o	= 40 µH

USB2i: **X25**, terminal 1-4, Ex ia, intrinsically safe:

terminal X25-1:	+UB	(typ. colour: red)
terminal X25-2:	D-	(typ. colour: white)
terminal X25-3:	D+	(typ. colour: green)
terminal X25-4:	GND	(typ. colour: black)

0.2 – 2.5 mm² / 24 AWG – 16 AWG for flexible cable
0.2 – 4 mm² / 24 AWG – 14 AWG for rigid cable
Strip length 7 mm (0.28”)
Max. 1 cable per contact
Recommended cable length max. 3 m (10 ft)

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 3 A	I_o	= 309 mA
P_I	= 2 W	P_o	= 629 mW
C_I	= negligible	C_o	= 50 µF
L_I	= negligible	L_o	= 40 µH

Note: USB2i not available when touch option selected. Do not connect !

The cable glands of the connection box must be Ex e types or must be in accordance to the country specific regulations and have to be changed if necessary. The pre manufactured cable gland threads are M16x1.5 and M20x1.5. The wall thickness to mount the cable glands are min. 4 mm.

For pre-mounted ATEX-certified cable glands:

Cable gland M16 for round cable, outer diameter of cable: 5...9 mm (0.2“...0.35“).

Cable gland M20 for round cable, outer diameter of cable: 9...13 mm (0.35“...0.51“).

Only permanently laid cables may be entered. The end user must guarantee suitable clamping. In case of pre mounted ATEX certified cable glands possible changing of the ambient parameters e.g. like ambient temperature range must be observed.
The EC-Type examination certificate of respective cable glands (DMT 99 ATEX E 016 or KEMA 99 ATEX 6971X resp. IECEx KEM 07.00144X) will be send on request.

For information on general installation refer to document:
HM_RemoteHMI_T-Ex_en_V_1_01_01.pdf

3.2 Keyboard trackball unit

KBi (Keyboard): **X72**, pre-mounted cable, Ex ia, intrinsically safe:

wire X72-1 (typ. colour: red):	+UB
wire X72-2 (typ. colour: white):	D-
wire X72-3 (typ. colour: green):	D+
wire X72-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

Mi (Mouse): **X73**, pre-mounted cable 1-4, Ex ia, intrinsically safe:

wire X73-1 (typ. colour: red):	+UB
wire X73-2 (typ. colour: white):	D-
wire X73-3 (typ. colour: green):	D+
wire X73-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

3.3 Keyboard mouse unit

KBi (Keyboard): **X72**, pre-mounted cable, Ex ia, intrinsically safe:

wire X72-1 (typ. colour: red):	+UB
wire X72-2 (typ. colour: white):	D-
wire X72-3 (typ. colour: green):	D+
wire X72-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

Mi (Mouse): **X94**, pre-mounted cable 1-4, Ex ia, intrinsically safe:

wire X94-1 (typ. colour: red):	+UB
wire X94-2 (typ. colour: white):	D-
wire X94-3 (typ. colour: green):	D+
wire X94-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

3.4 Keyboard pad unit

KBi (Keyboard): **X72**, pre-mounted cable, Ex ia, intrinsically safe:

wire X72-1 (typ. colour: red):	+UB
wire X72-2 (typ. colour: white):	D-
wire X72-3 (typ. colour: green):	D+
wire X72-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

Pi (Pad): **X95**, pre-mounted cable 1-4, Ex ia, intrinsically safe:

wire X95-1 (typ. colour: red):	+UB
wire X95-2 (typ. colour: white):	D-
wire X95-3 (typ. colour: green):	D+
wire X95-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

3.5 Keyboard joystick unit

KBi (Keyboard): **X72**, pre-mounted cable, Ex ia, intrinsically safe:

wire X72-1 (typ. colour: red):	+UB
wire X72-2 (typ. colour: white):	D-
wire X72-3 (typ. colour: green):	D+
wire X72-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 20 µF	C_o	= 30 µF
L_I	= negligible	L_o	= 5 µH

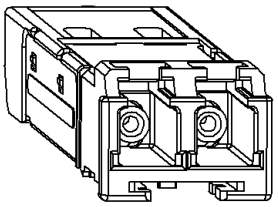
Ji (Joystick): **X96**, pre-mounted cable 1-4, Ex ia, intrinsically safe:

wire X96-1 (typ. colour: red):	+UB
wire X96-2 (typ. colour: white):	D-
wire X96-3 (typ. colour: green):	D+
wire X96-4 (typ. colour: black):	GND

U_I	= 5.5 V	U_o	= 5.5 V
I_I	= 0.8 A	I_o	= I_I
P_I	= 650 mW	P_o	= P_I
C_I	= 40 µF	C_o	= 10 µF
L_I	= negligible	L_o	= 5 µH

3.6 Transmission unit

FO 1 (Data): **X70**, terminal TX-RX, Ex op is, inherently safe optical radiation:

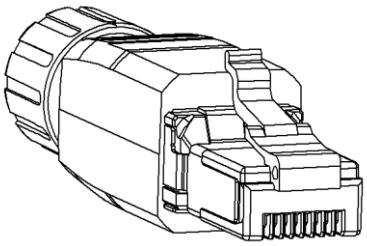


TX RX

LC Duplex connector

Multimode: preferred for 50/125 µm, max. 35 mW, 850 nm
Single-mode: preferred for 9/125 µm, max. 35 mW, 1310 nm

CAT7 (Data): **X0**, terminal 1-8, RJ45 Data interface:



1 8

terminal X0-1:	TRD0+	(typ. colour: white/orange)
terminal X0-2:	TRD0-	(typ. colour: orange)
terminal X0-3:	TRD1+	(typ. colour: white/green)
terminal X0-4:	TRD2+	(typ. colour: blue)
terminal X0-5:	TRD2-	(typ. colour: white/blue)
terminal X0-6:	TRD1-	(typ. colour: green)
terminal X0-7:	TRD3+	(typ. colour: white/brown)
terminal X0-8:	TRD3-	(typ. colour: brown)
terminal X0-SHLD:	SHLD	(typ. colour: shield)

Recommended connector: Phoenix Contact VS-08-RJ45-5-Q/IP20
0.14 – 0.36 mm² / 26 AWG – 22 AWG for flexible cable
0.13 – 0.32 mm² / 26 AWG – 22 AWG for rigid cable
Connection method: IDC/insulation displacement contacts in acc. with IEC 60352-4
Connection in acc. with TIA-568 B

4 Safety instructions

4.1 General safety instructions

- All the relevant accident prevention regulations and the regulations for electrical installations must be observed during installation, maintenance work and operation. All persons involved in the installation, commissioning, operation, maintenance and servicing of this devices and its accessories must be qualified and familiar with this manual and associated documents.
- In case of non-observance and non-compliance, the warranty of the specified explosion protection and the warranty claim expire.
- The national safety regulations and accident prevention regulations are to be observed.
- The device may only be used for its intended purpose.
- Modifications and changes of the equipment are not permitted. The housing of the devices is only to be opened by R. STAHL HMI Systems GmbH.
- The first four digits of the serial number on the nameplate provide the year of manufacture.

4.2 Cautionary note

Caution:

This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4.3 Installation – safety instructions

- The national assembly and installation instructions and technical standards are to be observed. Equipment and accessories must be connected and operated according to the standards, regulations and installations instructions. Installation is to be carried out by qualified or trained staff members only.
- Use only appropriate tools for installation.
- The screws of the cover from the Ex e connection box must be fixed with a torque of 1 N.
- The cable glands of the connection box must comply with the country-specific standards and if necessary, must be adjusted. Any changes in environment parameters, e.g. ambient temperature, must be observed. The outer diameter of the cables must comply with the specifications of the cable glands. Tighten the cable glands according to the instructions. Unused cable glands must be sealed with a suitable dummy plug. In case of pre mounted ATEX cable glands only permanently laid cables may be entered.
- Ex e and Ex i circuits must be complete de-energized when connecting the device. Isolate supply and all Ex e and Ex i circuits and wait 7 minutes before opening the Ex e connection box. Do not open the connection box when the device is powered and live. Ensure the power supply is isolated. The cable diameter has to comply to the specification of the terminals. The Ex e connection box must be seal locked.
- Equipment must be earthed with a core cross section of at least 4 mm² or regarding the according standards. Always ensure equipotential bonding between the electrical equipment.
- Shielded cables are recommended for this device. Interconnections of the data cable can influent the performance. Cables for intrinsically safe wiring have to pass a test voltage of AC 500 V / DC 750 V. Use the values 200 pF/m and 1 µH/m at unknown cable properties.

- The terminal X16 exist at each display type of T-Ex-##-MM*, T-Ex-##-MM*-R2 or T-Ex-##-SM*, T-Ex-##-SM*-R2, but will not be used.
- The cable shields of the cables in Ex e connection box area must be clamped to the according metallic cable bracket in front of each terminal to ensure proper earth connection and to prevent unattended cable loosening.
- At the place of installation, a maximum voltage of 250 V and a short circuit current of 1.500 A must not be exceeded.
- The type of power supply (AC/DC) is marked near at the terminal X10. If the power supply type 24 VDC is used, the following cable diameter should be used, dependend of the length of the power supply cable:

Cable length in meter (ft)	Cable diameter in mm² (AWG)
max. 55 m (180 ft)	1.5 mm² (AWG 16)
max. 90 m (295 ft)	2.5 mm² (AWG 14)
max. 150 m (492 ft)	4 mm² (AWG 12)
max. 225 m (738 ft)	6 mm² (AWG 10)
max. 375 m (1230 ft)	10 mm² (AWG 8)
max. 600 m (1968 ft)	16 mm² (AWG 6)

  If the cable diameter exceeds the diameter size of the terminals, this cable diameter had to be resized according the valid rules (maybe by using of an Ex e terminal junction box), before insertion into the connection box of the display.

- When the interface of intrinsically safe devices/partial intrinsically safe devices was or is connected to not intrinsically safe interfaces, the license will become void and it must be operated as a not intrinsically safe device. If the device was operated on an intrinsically safe interface with a lower level of international protection (e.g. a Ex ia device on a Ex ib interface), it must not be operated afterwards in applications for a higher level of international protection (e.g. Ex ia).
- If the device in a dust atmosphere is to be replaced, the device and/or the housing, in which the device is installed, is to be de-energized first and if necessary cooled according to the regulations. Before opening the device and/or housing and during period in which the device and/or the housing is open, the environment of the device and/or housing has to be kept dust-free to such an extent that no dust can enter the interior of the housing. When installing new components observe that all seals are in a flawless condition and function properly.
- Before initial operation, make sure that equipment has been properly installed, and ensure that the wiring is not damaged.

4.4 Operating instructions

- Equipment must be operated in undamaged, clean condition only. Do not touch damaged equipment, this can cause a risk of injury. In case of any damage that might affect the IP protection (e.g. cracks, holes, or broken components), the equipment must be taken out of service immediately. Before putting the equipment into operation again, all damaged components must be replaced.
- For use respective category 1D/2D/3D or EPL Da/Db/Dc dust layers > 5 mm have to be removed and high energy load mechanism at the operating surface of the unit respectively equipment (for example pneumatic particle transport) have to be excluded. Do not use the device in areas where propagating brush discharges are to expect.
- General and especially during opening or closing of the enclosure pay attention that no injury of the operator e.g. clamping occur.
- In the event of non-observance & non-compliance the stipulated explosion protection cannot be guaranteed and/or the guarantee will become void !

5 General instruction

Please read this manual before installation ! In case of doubt (in regards to the translation), the German version of the manual will prevail. We do not assume any liability for any misprints or errors in this manual.

Should you have any questions or suggestions, please contact R. STAHL HMI Systems.

5.1 Technology advances

Any changes and modifications shall require the written approval of R. STAHL HMI Systems GmbH. The producer reserves the right to adapt technical data to technological advances without prior notice.

6 Maintenance

Because the transmission of the devices remains reliable and stable over long periods of time, regular adjustments are not required.

Keep the devices clean so that the enclosure locks and the screws remain accessible. Some maintenance work on the enclosure seal may be required

System maintenance should focus on the following:

a. Seal wear
b. Display damage
c. All screws are tightened fast
d. All cables and lines are properly connected and undamaged

7 Troubleshooting

Devices operated in hazardous areas must not be modified. Repairs may only be carried out by qualified, authorized staff specially trained for this purpose.

☞ Repairs may only be carried out by specially trained staff who are familiar with all basic conditions of the applicable user regulations and – if requested – have been authorized by the manufacturer.

7.1 Repair/hazardous materials

Equipment to be repaired by and shipped to R. STAHL HMI Systems GmbH must include a detailed error description.

Before shipping of the equipment, any adhering materials must be removed, in particular seal channels and gaps. Please do not return any equipment if hazardous substances cannot be removed completely. Should disposal of equipment become necessary, the proprietor of the equipment will be charged with any costs arising from insufficient cleaning or personal injuries (e.g. chemical cauterization).

8 Disposal

Disposal of packaging and used parts is subject to regulations valid in whichever country the device has been installed.
The disposal of devices sold after August 13th, 2005, and installed in countries under the jurisdiction of the EU is governed by directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Under this directive, operator interfaces are listed in category 9 (monitoring and control instruments).

We shall take back our devices according to our General Terms and Conditions.

8.1.1 ROHS directive 2002/95/EC

The prohibition of hazardous substances as detailed in directive 2002/95/EC (ROHS) does not apply to electronic equipment of categories 8 and 9, and is therefore not applicable to the equipment described in these operating instructions.

9 Use of trademarks

All trademarks (product names, logos) in this text are the property of the respective owners and are considered protected.

10 Declaration of EC conformity

EG-Konformitätserklärung
EC-Declaration of Conformity
Déclaration de Conformité CE

R. STAHL HMI Systems GmbH • Im Gewerbegebiet Pesch 14 • 50767 Köln, Germany
erklärt in alleiniger Verantwortung, *declares in its sole responsibility, déclare sous sa seule responsabilité,*

dass das Produkt *that the product* *que le produit*	T-Ex *T-Ex* *T-Ex*
Typ, *type, type:*	Display Unit T-EX-##*-CAT7* Display Unit T-EX-##*-MM* Display Unit T-EX-##*-SM* Keyboard Trackball Unit T-EX*-KB-TB* Keyboard Mouse Unit T-EX*-KB-M* Keyboard Pad Unit T-EX*-KB-P* Keyboard Joystick Unit T-EX*-KB-J* Transmission Unit T-EX-KVM*-CAT7* Transmission Unit T-EX-KVM*-MM* Transmission Unit T-EX-KVM*-SM* *=any alphanumeric or symbolic character, without relevance for explosion protection #=one numeric character, without relevance for explosion protection
Kennzeichnung, *marking, marquage:*	For Display Unit: II 2(1) G Ex e q [ia op is Ga] IIC T4 Gb II 2(1) D Ex tb IIIC [ia op is Da] IP64 T110°C Db For Keyboard Trackball Unit, for Keyboard Mouse Unit, for Keyboard Pad Unit, for Keyboard Joystick Unit: II 1 G Ex ia IIC T4 Ga II 1 D Ex ia IIIB T110°C Da For Transmission Unit: II (1) G [Ex op is Ga] IIC II (1) D [Ex op is Da] IIIB
mit der EG-Baumusterprüfbescheinigung, ***ausgestellt durch Benannte Stelle:*** *under EC-Type Examination Certificate,* *issued by notified body:* *avec Attestation d'examen CE de type,* *exposé par organisme notifié:*	BVS 11 ATEX E102 X DEKRA EXAM GmbH Dinnendahlstraße 9, 44809 Bochum

auf das sich diese Erklärung bezieht, mit den folgenden Normen oder normativen Dokumenten übereinstimmt
which is the subject of this declaration, is in conformity with the following standards or normative documents
auquel cette déclaration se rapporte, est conforme aux normes ou aux documents normatifs suivants

Bestimmungen der Richtlinie *Terms of the directive* *Prescription de la directive*	Nummer sowie Ausgabedatum der Norm *Number and date of issue of the standard* *Numéro ainsi que date d'émission de la norme*
94/9/EG: ATEX-Richtlinie *94/9/EC: ATEX Directive* *94/9/CE: Directive ATEX*	EN 60079-0: 2009 EN 60079-5: 2007 EN 60079-7: 2007 EN 60079-11: 2007 EN 60079-26: 2007 EN 60079-28: 2004 EN 60079-31: 2009 EN 61241-11: 2006

Datei: CE_T-Ex_20110701.docx Vorlage: F058_EG-Konformitätserklärung-HMI_20110325.docx

EG-Konformitätserklärung
EC-Declaration of Conformity
Déclaration de Conformité CE

2004/108/EG:	**EMV-Richtlinie**	EN 61000-6-2: 2006
2004/108/EC:	*EMC Directive*	EN 61000-6-4: 2007
2004/108/CE:	*Directive CEM*	

Köln, 01.07.2011

Ort und Datum	***J. Düren***	**W. Bertges**
Place and date	*Technical Director*	*Quality Manager*
Lieu et date		

Datei: CE_T-Ex_20110701.docx Vorlage: F058_EG-Konformitätserklärung-HMI_20110325.docx

11 Release notes

The chapter entitled "Release Notes" contains all the changes made in every version of the operating instructions.

Version 1.00.00

- First version
- Inclusion disclamer
- Inclusion of assuming legal succession of SCREEN-TEC GmbH

Version 1.01.00

- Splitting of documentation in operation instruction, manual and certificates
- Inclusion of hardware revision
- Reduction of the operating instruction to "old" chapter 5 to 9 and declaration of EC conformity
- Changing from the names of the devices to new definition
- Text corrections
- Correction of the dimensions from the display unit and keyboard
- Including of declaration of conformity

Version 1.02.00

- Changing of technical data display units
- Changing of interfaces and connection details display, power supply PWR
- Inclusion of interfaces and connection details display, serial SER, camera CAM and audio AUD
- Inclusion of installation - safety instructions locking torque of cover screws
- Inclusion of installation - safety instructions cable screen
- Inclusion display types R2
- Inclusion data cable length DVI2 and IP
- Inclusion transmission unit T-Ex-KVM*-CAT7*
- Inclusion dimensions KVM DVI2 and IP
- Inclusion of installation - safety instructions with "connection X16 at R2 types"
- Inclusion of installation - safety instructions with "cable length for 24 VDC type"
- Layout and text corrections

Version 1.02.01

- Addition of data for front panel resistance

Version 1.02.02

- Notes on troubleshooting, disposal and banned substances included

Version 1.02.03

- Addition of resolution 1920 x 1200 pixel
- Addition of limitation of DVI2 resolution
- Inclusion of CFR encliosure
- Inclusion of section maintenance

Version 1.02.04

- Note on EMC class added.

R. STAHL HMI Systems GmbH
Im Gewerbegebiet Pesch 14
D-50767 Köln

Phone:	(switchboard)	+49/(0)221/ 5 98 08	- 200
	(hotline)		- 59
Fax:			- 260
E-mail:	(switchboard)	office@stahl-hmi.de	
	(hotline)	support@stahl-hmi.de	

www.stahl.de
www.stahl-hmi.de