

**PROJEKTI: “MBROJTJA E KULLAVE TE EKUILIBRIT NGA CARJA E
SHKEMBINJVE MBI TO”
“MBROJTJA DHE SISTEMIMI NGA RRESHQITJA E
KOLUVIONEVE NE HEC KOMAN”**

**SPECIFIKIME TEKNIKE
Projekt Zbatimi**



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MBROJTJA DHE STABILIZIMI I SKARPATAVE

Punimet e paraqitura perfshijne te gjitha, materialet, testet, pajisjet dhe sherbimet qe kerkohen per te mbrojtur, stabilizuar ose mbeshtetur masat shkembore ne rrezik te zbuluara gjate punimeve te germimit siperfaqesor dhe vrojtimeve, si dhe ankerimin ne shkemb ne siperfaqe ose ne thellesi.

Mbrojtja:

- Rrjete dopio torsion
- Barriere metalike me kapacitet 1000kJ -3000 kJ
- Ankerat
- Kavo celiku
- Sistem monitorimi

1. Ankerat

Të përgjithshme

Ankerat që do të përdoren në stabilizimin e masës shkëmbore në çarjen nr. 5 duhet të jenë të tillë që të mundësojnë zgjerim seksioni pas instalimit dhe fërkim përgjatë gjithë gjatësisë (tipi Swellex apo ekuivalentë). Këto ankerë kanë seksionin e një tubi të palosur (Figura 1) dhe, pas instalimit, seksioni zgjerohet nëpërmjet implementimit të një presioni të brendshëm të caktuar.



Figura 1: Seksioni tërthror i ankorave.

Përveç fërkimit në gjithë gjatësinë e tyre, këto ankerë ofrojnë dhe duktilitet të lartë.

Ankorat Pm24C

Për të arritur gjatësinë e kërkuar, nevojitet përdorimi i tipit të ankorave Pm24C ("connectable"), të cilët përveç aftësisë mbajtëse të kërkuar, mundësojnë dhe bashkimin e disa ankorave nëpërmjet filetitimit (Figura 2).



Figura 2: Ankorat Pm24C.

Këto ankerë duhet të kenë veshje plastike apo bitumi për mbrojtje ndaj korrodimit. Përsa i përket të dhënave teknike, ankerat duhet të kenë këto parametra:
Tabela 1 Të dhëna mbi ankorat.

Parametri	Vlera	Njësia
Emri	Pm24C	-
Aftësi mbajtëse në tërheqje	200	kN
Aftësi mbajtëse në këputje	240	kN
Zgjatimi minimal	10	%
Diametri i profilit	37	mm
Trashësia e materialit	3	mm
Diametri origjinal i tubit	54	mm
Diametri i shpimit	48-52	mm
Presioni i zgjerimit	300	bar

Fazat e instalimit

Instalimi i ankorave kalon në 6 faza (Figura 3).



Figura 3 Fazat e instalimit.

Këto faza mund të përmbliidhen në:

- Shpimi i vrimës.
- Instalimi i ankorit të parë dhe më pas i ankorit pasues.
- Instalimi i ankorit të fundit bashkë me pllakën e ankorimit.
- Lidhja me pompën dhe instalimi i gjithë gjatësisë.
- Fryrja e ankorave nëpërmjet presionit të brendshëm.
- Instalimi është i përfunduar.

Pllakat e ankorimit dhe pompa

Përsa i përket pllakave të ankorimit dhe pompës, ato mundësohen si paketë bashkë me ankorat. Kriteri i vetëm është që të arrihen parametrat e kërkuar aftësisë mbajtëse dhe të presionit.

Prova në tërheqje

Pas instalimit, nevojitet të kryhet prova në tërheqje e ankorave.

SWELLEX PM24C

Swellex connectable rock bolts

General information Swellex Pm24 connectables	
Minimum breaking load	240 kN
Minimum yielding load	200 kN
Minimum elongation	10%
Expansion pressure	300 bar

For further information, see also technical data page 7.
Minimum elongation "A": According to EN-ISO 6892-1 where applicable.



Swellex Pm24C connectable rock bolts

Size	Description	Length (m)		Weight (kg)	Product number
		Assembled	Overall		
SWX Pm24C	Blind segment	1.62	1.62	6.3	9899 7080 00
	Blind segment	1.92	1.92	7.8	9899 7080 01
	Blind segment	2.22	2.22	8.5	9899 7080 02
	Blind segment	2.52	2.52	9.7	9899 7080 03
	Blind segment	3.12	3.12	11.9	9899 7080 04
	Blind segment	4.12	4.12	15.9	9899 7080 05
	Middle segment	1.62	1.72	6.6	9899 7013 91
	Middle segment	1.92	2.02	7.9	9899 7013 85
	Middle segment	2.22	2.32	8.8	9899 7013 97
	Middle segment	2.52	2.62	10.0	9899 7013 31
	Middle segment	3.12	3.22	12.2	9899 7013 33
	Middle segment	4.12	4.22	16.1	9899 7013 94
	Injection segment	1.52	1.62	6.4	9899 7013 90
	Injection segment	1.82	1.92	7.4	9899 7013 87
	Injection segment	2.12	2.22	8.5	9899 7013 96
	Injection segment	2.42	2.52	9.7	9899 7013 32
	Injection segment	3.02	3.12	12.0	9899 7013 34
	Injection segment	4.02	4.12	15.9	9899 7013 93
	Swellex Plug-on retainer				
SWX Pm24C	Optional blind segment retainer			0.05	9899 7080 11

Custom lengths available upon request.
Cone installed bolts available upon request.
Refer to colour chart 7.

2. Rrjeta Dupio Torsion

➤ Te pergjithshme

Rrjeta eshte nje gjeekompozite e endur e perbere nga tela çeliku dhe kavo te mbledhura se bashku ne forme gjashtekendore per prodhimin e dyfishte te rrjetes se telit. Rrotullat e rrjetes kane nje gjatesi standarde prej 25-50 m dhe lartesi 3 m.

- Rrjete çeliku MO (mono orientuar). Kavo çeliku, me 8mm diameter, perdoren ne vend te telit konvencional dhe jane te endura ne gjatesi / distance prej 1,5 m.
- Rrjete çeliku BO (bi orientuar). Kavo, me diameter 8mm, perdoren ne vend te telit konvencional dhe jane te endura ne gjatesi / distance prej 1,5 m.
- (perveç Rrjetes BO 300 ku kavot e çelikut futen ne nje distance prej 3,0 m). Kavot e çelikut jane gjithashtu futur ne drejtimin kryq permes rrjetes ne distanca prej 300 - 200 - 150 cm
- (Rrjeta BO 300 -Rrjeta BO 200 - Rrjeta BO 150) dhe jane te fiksuara me ferrula per te formuar nje lak rreth kavove.



Rrjeta duhet te permbushë kerkesat e meposhtme:

✓ **Forca Elastike:**

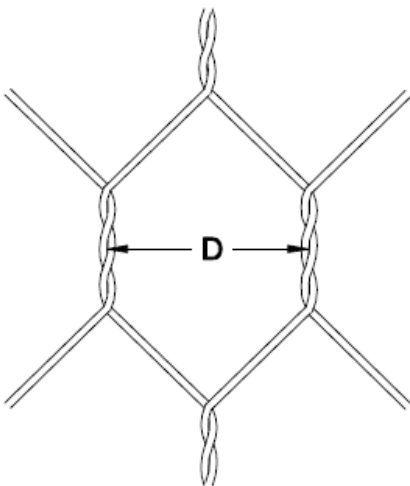
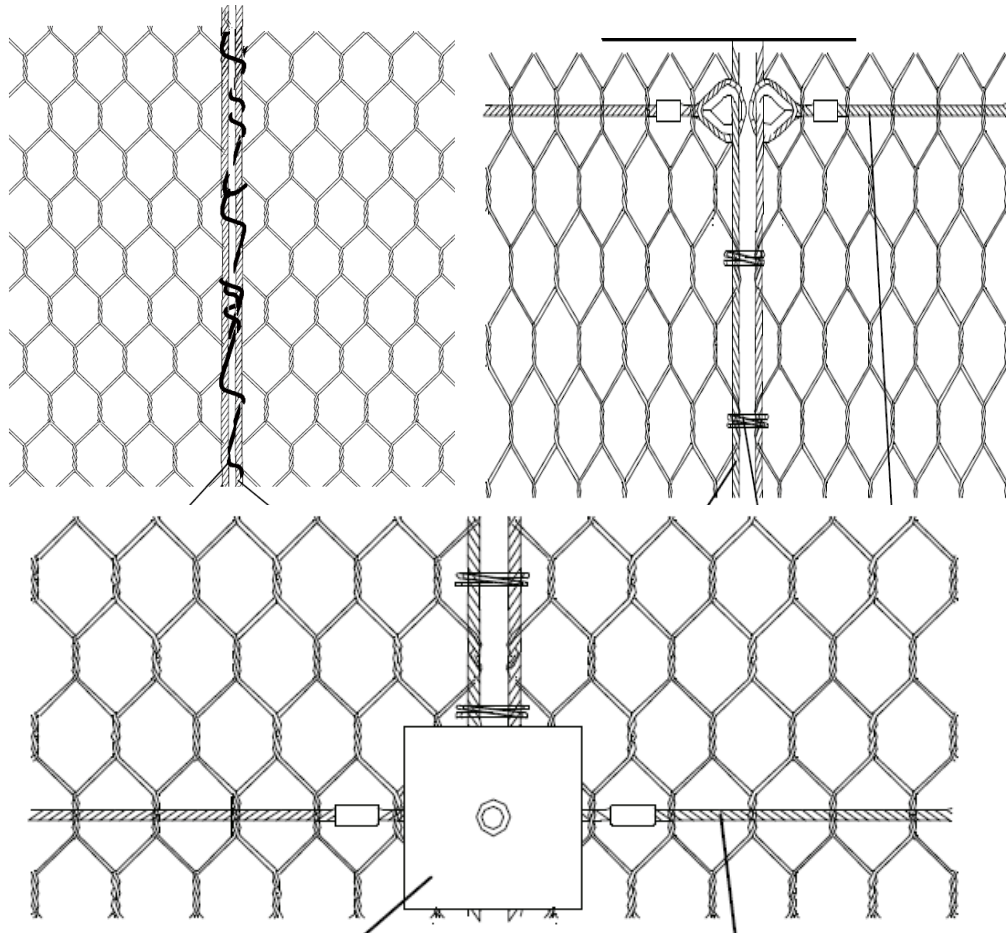
Rrjeta e perdorur per mbrojtje ne shkemb duhet te kete nje force terheqje prej 380-550N / mm² qe tejkalon kerkesat e EN10223-3, me qellim te rritjes se rezistences ne terheqje te produkteve te gatshme. Tolerancat e telave duhet te jene ne perputhje me EN10218 (Klasa1).

✓ **Zgjatja:**

Zgjatimi nuk duhet te jete me i vogel se 10%, ne perputhje me EN10223 -3. Testimi duhet te realizohet ne nje moster minimum 25 cm te gjate.

Vlerat kryesore per materialin duhet te jene ne perputhje me EN 10245-5:

- **Dendesia / Pesha specifike:** $\leq 1,15\text{g} / \text{cm}^3$ ne perputhje me ISO1183.
- **Fortesia:** Maksimumi 82 nga metoda e proves ISO2039-2.
- **Forca elastike:** Minimum 30 MPa, ne perputhje me ISO527-2 / 1 / B / 5.
- **Zgjatja :** Jo me pak se 200%, ne perputhje me ISO5277-2 / 1 / B / 5.
- **Rezistenca ndaj rrezatimit UV:** Pas 4000 oresh te ekspozimit ndaj drites UV ne perputhje me ISO4892-2, forca elastike dhe zgjatja ne pushim nuk do te ndryshojne nga me shume se 25%.
- **Rezistenca kimike:** Rezistenca ndaj kimikateve ne perqendrime te cilat normalisht jane te pranishme ne toke dhe uje sipërfaqesor.
- **Aderimi i polimerit:** Aderimi i shtreses se polimerit ne tela çeliku duhet te jete ne perputhje me EN10245-5, ne perputhje me EN10245-5, ne perputhje me kerkesat minimale te Nivelit 1 deri ne 3 ne perputhje me EN10245-1.
- **Temperatura:** jo me e larte se -30°C ne perputhje me ASTM D7461.2.4



Toleranca ne hapjen e rjetes eshte distanca 'D' midis dy rotullimeve te njepasnjeshme, e specifikuar sipas EN 10223-3

Lloji I Rrjetes (Mesh Type)	D (mm)	∅ Wire (mm)
8x10	80	3.00
Rrjete teli	∅ mm	3.00
Toleranca e telit		0.07
Sasia minimale e galmac	gr/m ²	255
Kavo gjatesore dhe ferthore	∅ mm	8.00

Kavot e çelikut

- Veshje Galmac Klasa B EN 10264 - 2
- Diametri (mm) Ø = 8
- Konstruksioni 6x7 IWS EN 12385-2; EN 12385-4
- Klasa e celikut 1770 N/mm² EN 12385-4
- Ngarkesa minimale per keputjen e kavos 40,7 kN EN 12385-4

Procedura e lidhjes

Kjo mund te behet duke perdorur tela lidhese siç eshte specifikuar ne tabelen me poshte ose ne rast te perdorimit te unazave te çelikut, ato duhet te jene ne perputhje me ASTM A975. Hapesira e unazave duhet te jete ne perputhje me ASTM A975, Panel ne Panel, Rezistenca Terheqese.

Rrjeta duhet te permbushë vetite e meposhtme, siç tregohet ne tabelen me poshte:

Tabela 7

Kushtet e rrjetes			
Kushtet fizike	Z	PVC-Zink	Specifikimet
Diametri rrjetes mm	2.	2.	BSEN10218-2 BSEN10223-3
Pesha	2	35	
Pesha e veshjes se zinkut	24	24	BSEN10244-2ClassA
Trashesia e veshjes PVC mm	N/	0.	
Kushtet Mekanike			
Rezistenca ne terheqje	37		BSEN10223-3
Zgjatimi %	Zgjatja nuk duhet te jete me shume se 10%, ne perputhje me EN10223-3. Testet realizohen ne nje moster jo me pak se 25cm te gjate.		
Kushtet e veshies			
Rrjeta me veshje te zinkuar	E zinkuar sipas BSEN10244-2.		
Rrjeta me veshje te zinkuar PVC	E zinkuar sipas BSEN10244-2 me nje shtrese te jashtme ngjyre gri, me trashesi mesatare prej 0.5mm PVC		

3. Barriere me kapacitet te ulet 500 kJ

Barriera eshte e afte te perballoje ndikimin e nje blloku te shkembit me nivele te energjise jo me te madhe se 500 kJ.

Standardet dhe udhezimet e references:

ETAG 027 "Udhezues per Miratimin Teknik European per Mbrojtjen e Skarpatave" SPECIFIKIM SPECIAL ANAS "Grupi Teknik i Sigurise Rrugore" - Prill 2010

Standardi i materialeve:

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EN 10025-2 "Produkte te çelikut te punuara ne te nxehte - Pjesa 2: Kushtet teknike te shperndarjes per çeliqet konstruktive jo-aliazh" EN ISO 1461 "Veshje te galvanizuara me nxehtesi ne artikuj hekuri dhe çeliku te fabrikuara - Specifikimet dhe provat"

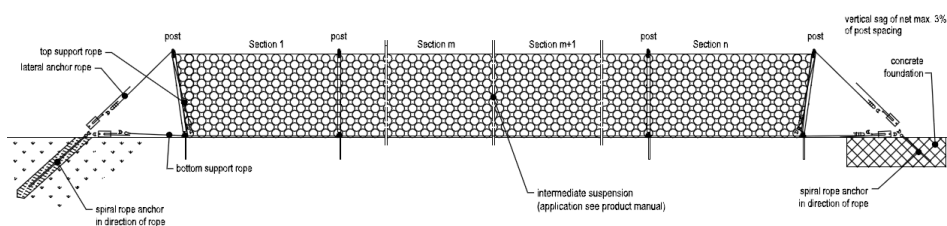
EN 12385 "Tela prej çeliku - Siguria

EN 10264-2 "Tela çeliku dhe produkte teli - Tela çeliku per kavo - Pjesa 2: Teli i çelikut jo i lidhur me fije te ftohte per kavo per perdorime te pergjithshme"

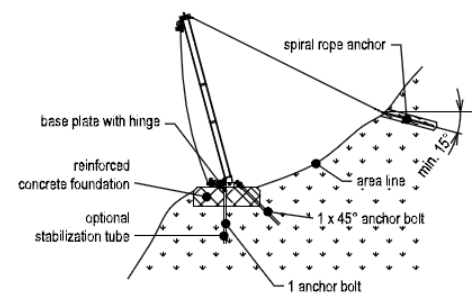
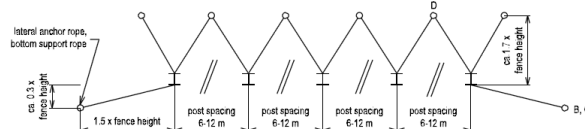
EN 10244-2 "Tela çeliku dhe produkte teli - Veshje metalike jo ngjyra metalike ne tela çeliku - Veshje prej zinku"

3.1 Teknologjia e sistemit

Paneli i mbajtjes se rrjetes vendoset ne anen zbritese te pengeses. Shtyllat veprojne ne menyre te pavarur nga rrjeta. Nese nje shtylle eshte goditur nga blloku, shtyllat e aferta marrin forcat shtese, duke siguruar qe performanca kapese e sistemit te mos rrezikohet. Shtresa mbajtese eshte bere nga panele te vazhdueshme çeliku. Gjate nje ndikimi, sistemi siguron qe energjia e shkembit ne renie te shperndahet dhe shkembimi nuk mund te levize me tej. Pajisjet e shperndarjes se energjise thithin energjine e aplikuar nga deformimi dhe jo nga ferkimi, duke garantuar nje performance me te mire dhe me te qendrueshme. Nuk kerkohej asnje kabell i forte. Barriera e shkembinjve ploteson standardin e certifikimit te cilesise UNI EN ISO 9001, ne çdo hap te projektimit, prodhimit dhe marketingut.



ayout of anchor points
(details see product manual RXE 500-LA)



- anchoring rock: 2 anchor bolts vertical

4. Barriere me kapacitet 1000 kJ

Barriera eshte e afte te perballoje ndikimin e nje blloku te shkembtit me nivele te energjise jo me te madhe se 1000 kJ.

Standardet dhe udhezimet e references:

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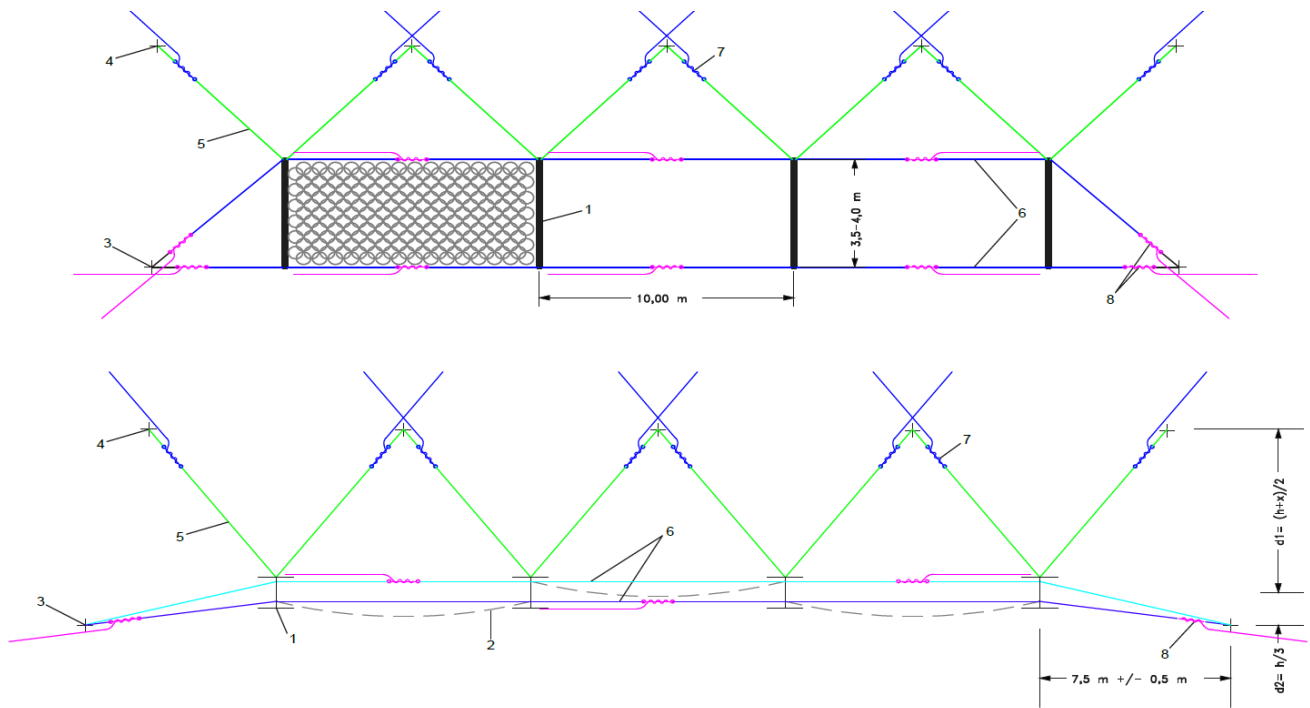
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4.2 Karakteristikat kryesore te barrierave

Barriera mund te instalohet ne çdo lloj dhe profil te shkembinjve dhe dheut. Per shkak te gjeometrise se sistemit dhe paraqitjes, kabllot e mbeshtjellesve kerkojne nje rezistence me te vogel te terheqjes, keshtu qe ne bazen e kabllave nevojitet gjatesia me e shkurter e ankorimit.

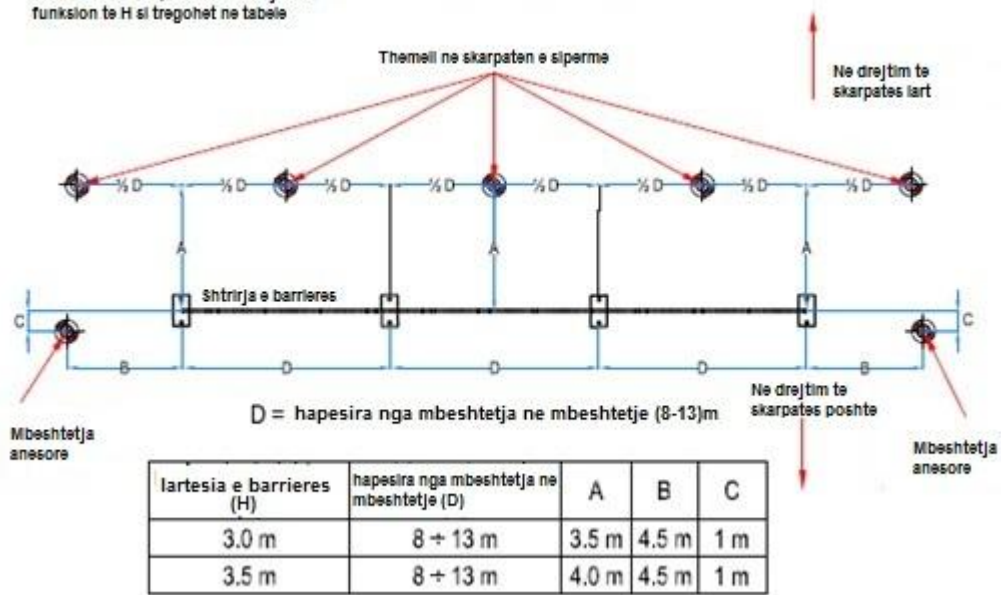
Pllakat e shtyllave kane vetem nje qellim per zbutjen e tokes. Forcat e aplikuara transferohen ne toke permes shufrave te çelikut ose mikrovaleve. Sistemi eshte i lehte per t'u instaluar, edhe ne kushte te renda mjedisore ; instalimi mund te perfundohet ne nje hapesire kohe te shkurter. Sistemi kerkon mirembajtje minimale. Struktura kryesore perbehet nga panele unazore çeliku..

4.3 Projektimi

Gjatesia maksimale e pengeses eshte midis 30 dhe 100 metra. Projektimi i themelit varet nga forcat qe veprojne ne baze dhe ne llojin e tokes. Nese gjeometria e pjerresise prodhon nje kompensim ne shtrirjen e barrierave, duke shkaktuar nje kend pjerresie qe mat me pak se 180° (p.sh. 160°), kerkohet nje anker poshte. Projektimi i themelit varet nga forcat qe veprojne ne bazen e shtyllave dhe ne kabllot, dhe lloji i tokes.

PLANI I THEMELIT

SHENIM: Vlerat A, B dhe C variojne ne funksion te H si tregohet ne tabela



4.4 Testi dhe te dhenat kryesore

Testi dinamik i goditjes ne nje moster te barrieres realizohet ne shkalle te plote prej 3 shtrirjeve, 10 metra largesi shtylle-ne -shtylle, dhe 3.5 metra lartesi. Programi i testimit u hartua dhe u zbatua duke ndjekur udhezimet e dhena ne dokumentin "ETAG 027 - Udhezues per Miratimin Teknik European per Mbrojtjen e Skarpatave ". Rezultatet e testit te MEL (Maximum Energy Level-niveli maksimal i energjise):

Energjia: 1166 kJ

Pengesa Lartesia nominale: 3.5 m

Zgjatimi maksimal i pengesave: 4.75 m

Lartesia e mbetur pengese > 70% e lartesisë nominale Kategoria A e ETAG 027

5. Barriere me kapacitet 2000 kJ



Barriera eshte e afte te perballoje ndikimin e nje blloku te shkembit me nivele te energjise me te madhe se 2000 kJ.

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Pllakat e shtyllave kane vetem nje qellim per zbutjen e tokes. Forcat e aplikuar transferohen ne toke permes shufrave te çelikut ose mikrovaleve. Sistemi eshte i lehte per t'u instaluar, edhe ne kushte te renda mjedisore; instalimi mund te perfundohet ne nje hapesire kohe te shkurter. Sistemi kerkon mirembajtje minimale. Struktura kryesore perbehet nga panele unazore çeliku..

5.3 Projektimi

Gjatesia maksimale e pengeses eshte midis 30 dhe 100 metra. Projektimi i themelit varet nga forcat qe veprojne ne baze dhe ne llojin e tokes. Nese gjeometria e pjerresise prodhon nje kompensim ne shtrirjen e barrierave, duke shkaktuar nje kend pjerresie qe mat me pak se 180 ° (p.sh. 160 °), kerkohet nje anker poshte. Projektimi i themelit varet nga forcat qe veprojne ne bazen e shtyllave dhe ne kabllot, dhe lloji i tokes.

5.4 Testi dhe te dhenat kryesore

Testi dinamik i goditjes ne nje moster te barrieres realizohet ne shkalle te plote prej 3 shtrirjeve, 10 metra largesi shtylle-ne -shtylle, dhe 4 metra lartesi. Programi i testimit u hartua dhe u zbatua duke ndjekur udhezimet e dhena ne dokumentin "ETAG 027 - Udhezues per Miratimin Teknik Europian per Mbrojtjen e Skarpatave ". Rezultatet e testit te MEL (Maximum Energy Level-niveli maksimal i energjise):

Energjia: 2083 kJ

Pengesa Lartesia nominale: 4.0 m

Zgjatimi maksimal i pengesave: 5.25 m

Lartesia e mbetur pengese > 70% e lartesisë nominale Kategorija A e ETAG 027



6. Barriere me kapacitet 3000 kJ

Barriera eshte e afte te perballoje ndikimin e nje blloku te shkembit me nivele te energjise me te madhe se 3000 kJ.

Standardet dhe udhezimet e references:

ETAG 027 "Udhezues per Miratimin Teknik European per Mbrojtjen e Skarpatave" SPECIFIKIM SPECIAL ANAS "Grupi Teknik i Sigurise Rrugore" - Prill 2010

Standardi i materialeve:

EN 10219 "Seksione strukturore te salduara te çelikut te ftohte te çeliqueve jo-aliazh"

EN 10025-2 "Produkte te çelikut te mbeshtjella me nxehtesi - Pjesa 2: Kushtet teknike te shperndarjes per çeliquet konstruktive jo-aliazh" EN ISO 1461 "Veshje te galvanizuara me nxehtesi ne artikuj hekuri dhe çeliku te fabrikuaara - Specifikimet dhe provat"

EN 12385 "Tela prej çeliku - Siguria

EN 10264-2 "Tela çeliku dhe produkte teli - Tela çeliku per kavo - Pjesa 2: Teli i çelikut jo i lidhur me fije te ftohte per kavo per perdorime te pergjithshme"

EN 10244-2 "Tela çeliku dhe produkte teli - Veshje metalike jo ngjyra metalike ne tela çeliku - Veshje prej zinku"

6.1 Teknologjia e sistemit

Paneli i mbajtjes se rrjetes vendoset ne anen zbritese te pengeses. Shtyllat veprojne ne menyre te pavarur nga rrjeta. Nese nje shtylle eshte goditur nga blloku, shtyllat e aferta marrin forcat shtese, duke siguruar qe performanca kapese e sistemit te mos rrezikohet. Shtresa mbajtese eshte bere nga panele te vazhdueshme çeliku. Gjate nje ndikimi, sistemi siguron qe energjia e shkembit ne renie te shperndahet dhe shkembi nuk mund te levize me tej. Pajisjet e shperndarjes se energjise thithin energjine e aplikuar nga deformimi dhe jo nga ferkimi, duke garantuar nje performance me te mire dhe me te qendrueshme. Nuk kerkohet asnje kabell i forte. Barriera e shkembinjve ploteson standardin e certifikimit te cilesise UNI EN ISO 9001, ne çdo hap te projektimit, prodhimit dhe marketingut..

6.2 Karakteristikat kryesore te barrierave

Barriera mund te instalohet ne çdo lloj dhe profil te shkembinjve dhe dheut. Per shkak te gjeometrise se sistemit dhe paraqitjes, kabllot e mbeshtjellesve kerkojne nje rezistence me te vogel te terheqjes, keshtu qe ne bazen e kabllave nevojitet gjatesia me e shkurter e ankorimit.

Pllakat e shtyllave kane vetem nje qellim per zbutjen e tokes. Forcat e aplikuaara transferohen ne toke permes shufrave te çelikut ose mikrovaleve. Sistemi eshte i lehte per t'u instaluar, edhe ne kushte te renda mjedisore; instalimi mund te perfundohet ne nje hapesire kohe te shkurter. Sistemi kerkon mirembajtje minimale. Struktura kryesore perbehet nga panele unazore çeliku.

6.3 Projektimi

Gjatesia pengeses eshte midis 30 dhe 100 metra. Projektimi i themelit varet nga forcat qe veprojne ne baze dhe ne llojin e tokes. Nese gjeometria e pjerresise prodhon nje kompensim ne shtrirjen e barrierave, duke shkaktuar nje kend pjerresie qe mat me pak se 180° (p.sh. 160°), kerkohet nje anker poshte. Projektimi i themelit varet nga forcat qe veprojne ne bazen e shtyllave dhe ne kabllot, dhe lloji i tokes.

6.4 Testi dhe te dhenat kryesore

Testi dinamik i goditjes ne nje moster te barrieres realizohet ne shkalle te plote prej 3 shtrirjeve, 10 metra largesi shtylle-ne -shtylle, dhe 5 metra lartesi. Programi i testimit u hartua dhe u zbatua duke ndjekur udhezimet e dhena ne dokumentin "ETAG 027 - Udhezues per Miratimin Teknik European per Mbrojtjen e Skarpatave". Rezultatet e testit te MEL (Maximum Energy Level-niveli maksimal i energjise):

Energjia: 3163 kJ

Pengesa Lartesia nominale: 5.0 m

Zgjatimi maksimal i pengesave: 6.05 m

Lartesia e mbetur pengese > 70% e lartesisse nominale Kategoria A e ETAG 027



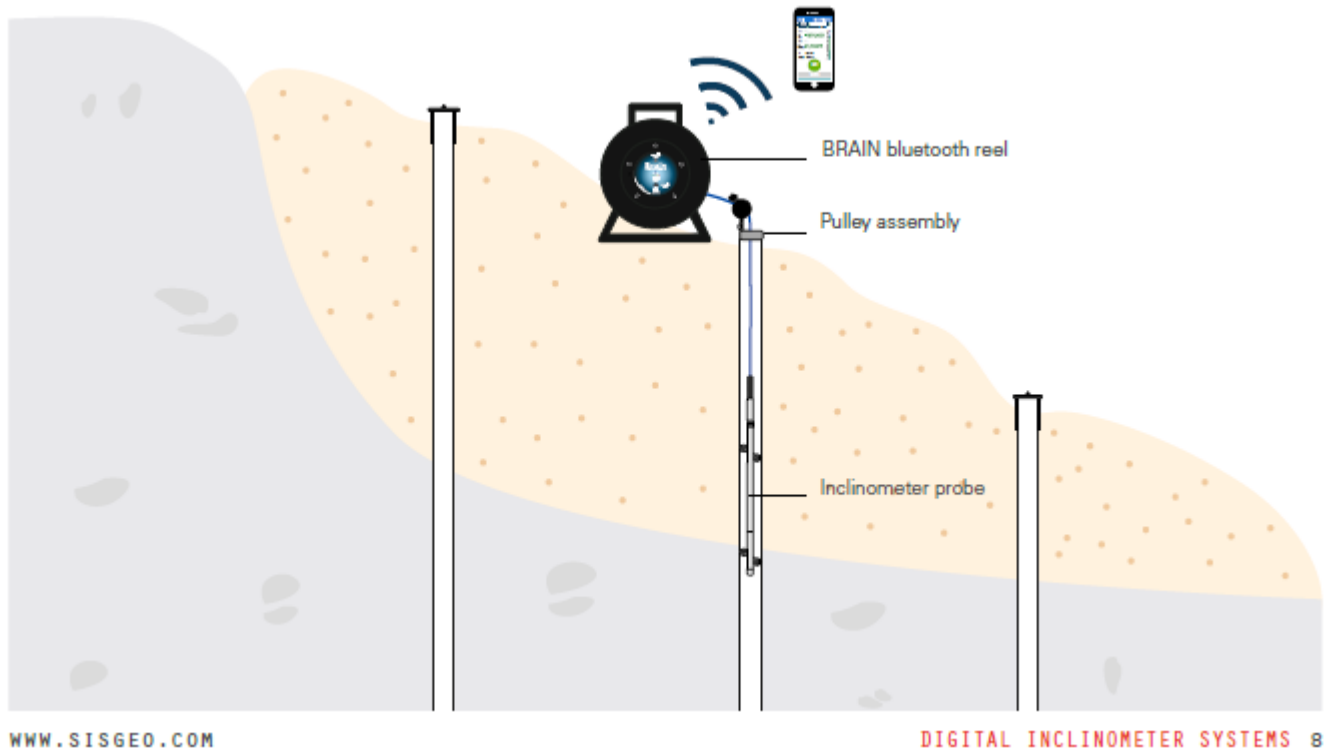
7. Sistemi i monitorimit

Specifikimet per nje tip sistemi monitorimi jepen si me poshte:

7.1 Inklinometer

Referuar standartit BS EN ISO 18674, jane vendosur piezometra me gjatesi 30m, me specifikimet teknike ne vijim.

Menyra e aplikimit ne nje skarpate me problematike rreshqitjesh :



Pjeset perberese jane si me poshte :



B.R.A.IN APP
(device not included)



BLUETOOTH REEL
WITH LIGHT CONTROL CABLE



INCLINOMETER PROBE

PRODUCT CODE	Description
OBRAIN03000	Vertical inclinometer system composed by biaxial MEMS probe (gauge length 500 mm), 30m light control cable mounted on B.R.A.IN bluetooth reel and B.R.A.IN APP.
OBRAIN06000	Vertical inclinometer system composed by biaxial MEMS probe (gauge length 500 mm), 60m light control cable mounted on B.R.A.IN bluetooth reel and B.R.A.IN APP.
OBRAIN10000	Vertical inclinometer system composed by biaxial MEMS probe (gauge length 500 mm), 100m light control cable mounted on B.R.A.IN bluetooth reel and B.R.A.IN APP.
OBRAIN100FT	Vertical inclinometer system composed by biaxial MEMS probe (gauge length 2 ft), 100 ft light control cable mounted on B.R.A.IN bluetooth reel and B.R.A.IN APP.
OBRAIN200FT	Vertical inclinometer system composed by biaxial MEMS probe (gauge length 2 ft), 200 ft light control cable mounted on B.R.A.IN bluetooth reel and B.R.A.IN APP.
OBRAIN300FT	Vertical inclinometer system composed by biaxial MEMS probe (gauge length 2 ft), 300 ft light control cable mounted on B.R.A.IN bluetooth reel and B.R.A.IN APP.

VERTICAL INCLINOMETER SYSTEM PERFORMANCE

	With 0S242DV3000 probe (500 mm gauge length)	With 0S242DV3010 probe (1000 mm gauge length)	With 0S242DV300F probe (2 ft gauge length)
Readout value	20000 sin alpha (K* sin alpha, degree or mm/m on request)	20000 sin alpha (K* sin alpha, degree or mm/m on request)	20000 sin alpha (K* sin alpha, degree, in/ft on request)
Resolution	0.011 mm / 500 mm	0.023 mm / 1000 mm	0.0005 in / 2 ft
Repeatability (precision) of a complete survey along a measuring line ⁽¹⁾	± 1.5 mm / 30 m (reading step every 500 mm)	± 2 mm / 30 m (reading step every 1000 mm)	± 0.079 in / 100 ft (reading step every 2 ft)

HORIZONTAL INCLINOMETER SYSTEM PERFORMANCE

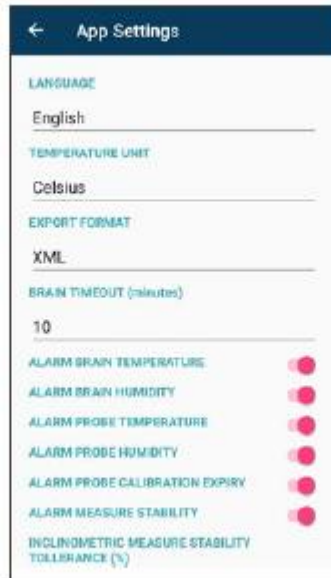
	With 0S241DH3000 probe (500 mm gauge length)	With 0S241DH3010 probe (1000 mm gauge length)
Readout value	20000 sin alpha (K* sin alpha, degree, mm/m on request)	20000 sin alpha (K* sin alpha, degree, mm/m on request)
Resolution	0.011 mm / 500 mm	0.023 mm / 1000 mm
Repeatability (precision) of a complete survey along a measuring line ⁽¹⁾	± 7 mm / 30 m	± 10 mm / 30 m

⁽¹⁾ As for ISO 18674-3, this is the "difference between the cumulated displacements of a measuring point relative to a reference point 30 m apart, when repeatedly carrying out the survey under repeatability conditions. (...) The values are specified for measurements in the A-axis. The B-axis measurements are commonly less accurate."

B.R.A.IN APP



The system information page allows you to have the entire system always under control (device, probe and reel).



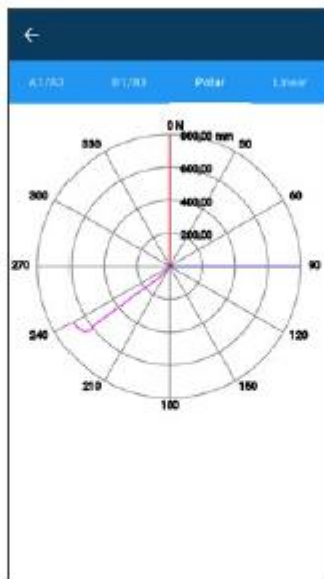
Various alarms can be settled in order to be always informed about the system health.



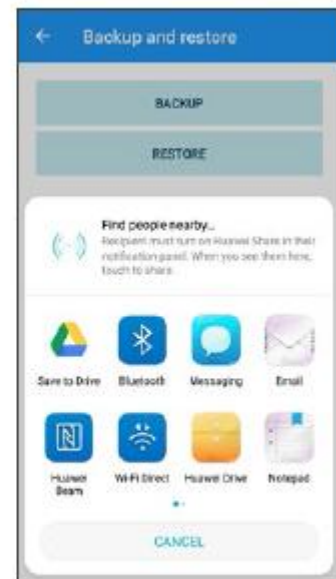
Reading page gives a lot of information such as actual position, data and checksums, probe internal temperature, etc.

#	A1	A3	ChkSum
-0,50	-710,17	809,57	99,40
-1,00	-818,35	819,73	1,38
-1,50	-568,19	581,94	13,75
-2,00	47,11	-41,75	5,35
-2,50	55,90	-49,34	6,55
-3,00	75,76	-71,07	4,69
-3,50	124,91	-114,63	10,28
-4,00	192,55	-184,29	8,26
-4,50	251,37	-236,45	14,92
-5,00	296,04	-293,05	2,99
-5,50	221,06	-211,90	9,16
-6,00	102,14	-97,25	4,89
-6,50	99,82	-90,51	9,31
-7,00	148,12	-141,97	6,15
-7,50	203,18	-198,87	4,31
-8,00	280,33	-269,78	10,55
-8,50	300,65	-294,47	6,18

Data tables are available during and after the surveys.




Polar graph and cumulative displacement graph can be shown after the survey.



Survey data can be immediately send through any sharing APP installed on your device such as Drive, Email, etc.

BLUETOOTH REEL SPECIFICATIONS

Bluetooth module	band: 2.4 GHz ISM Band (2402-2480 MHz) - power: 4dBm Max		
Communication with device	BLE (Bluetooth Low Energy) 4.2		
On-board sensors ⁽¹⁾	Resolution	Accuracy	Range
- Temperature	0.01°C	±1°C (-10°C to +85°C)	-40°C to +125°C
- Humidity	0.025% RH	±5% (0 to 95% RH)	0 to 100% RH
- Battery voltage	0.01 V	±5% FS	0 to 36 V
Operating Temperature	-40 to 80°C (batteries -20 to 65°C)		
Communication with probe	RS485 Modbus RTU Protocol ⁽²⁾		
IP class and material	IP65, unbreakable synthetic rubber		
Environmental condition certification	certified for extended environmental conditions: altitude above 2000m		
Power supply	4 x 1.2 V - 5 Ah - Ni-MH rechargeable batteries		
Operating time with NiMH batteries ⁽⁴⁾	≈ 96 h with inclinometer and spiral probe		
Charger for NiMH batteries			
- Input voltage	90-264 Vac		
	50-60 Hz		
- IP rate	IP41		
- Max output power	10 W		
- Temperature range	-20 +40 °C		
Led	Different colors for local notifications		
 Directive compliance	2014/53/EU (RED)		

(1) On-board sensors are installed on the internal electronic board to give information in the event of BRAIN reel malfunction. (2) Derated above 60°C

(3) RS485 not-optoisolated Modbus communication with RTU Protocol (4) Typical values



CONTROL CABLES

Control cables are used to move the probe incrementally and transmit readings from the probe to B.R.A.IN bluetooth reel and then to the B.R.A.IN APP. The Light and the HD (Heavy Duty) cables are supplied assembled on B.R.A.IN reel and include a factory-attached connector for the probe. Probe-end connectors are watertight to 20 bar.

B.R.A.IN LIGHT CABLE (STANDARD)

Light cable has a steel stress member. Blue cable jacket has aluminum depth marks.

B.R.A.IN HD CABLE (OPTION)

HD cable has a stainless steel core wire to control stretching and a stainless steel torsion braid to prevent twisting. Yellow cable jacket has copper depth marks.

MODEL	0S2RD6000B0	0S2RC6000B0
Cable lengths	30, 60, 100, 150, 200 m 100, 200, 300 ft	30,60,100,150 m
Conductors	2x0.50mm ² (AWG 21)+ 2x0.24mm ² (AWG 24)	6x0.50 mm ² (AWG 21)
Depth tactile marks	AL, every 500mm±0.5mm or 2ft±0.0016ft	Copper, every 500mm±0.5mm
Max strength	150 kg (330 lb)	370 kg (816 lb)
Outer jacket	blue, polyurethane	yellow, polyurethane
Cable diameter	6.5 mm (0.25 in)	10.4 mm (0.41 in)
Weight (cable+marks)	0.054 kg/m (0.036 lb/ft)	0,150 kg/m (0.30 lb/ft)
Operating temp. range	-30°C to 80 °C (-22°F to +176°F)	-30°C to 80 °C (-22°F to +176°F)
Total weight with 60m/200ft cable	6 kg (13.2 lb) with B.R.A.IN reel	14 kg (30.9 lb) with B.R.A.IN reel

PROBES TECHNICAL SPECIFICATIONS



MODELS	OS242DV3000 (500mm gauge length) OS242DV3010 (1000mm gauge length) OS242DV300F (2 ft gauge length)	OS241DH3000 (500mm gauge length) OS241DH3010 (1000mm gauge length)
Applications	vertical casings	horizontal casings
Measurement principle	biaxial MEMS inclinometers	uniaxial MEMS inclinometers
Measuring range	±30°	±30°
Signal output and protocol	RS485 Modbus RTU ⁽¹⁾	RS485 Modbus RTU ⁽¹⁾
AD converter	sigma-delta 32 bit, 38-KSPS	sigma-delta 32 bit, 38-KSPS
Sensor resolution (reading frequency 2 Hz)	0.00056°	0.00056°
Accuracy: Lin. MPE ⁽²⁾ Pol. MPE ⁽³⁾	±0.07% FS ±0.01% FS	±0.07% FS ±0.01% FS
Repeatability	±0.0009°	±0.0009°
Stability after 24 hours ⁽³⁾	±0.004°	±0.004°
Temp. operating range	-30°C to +70°C (-22°F to +158°F)	-30°C to +70°C (-22°F to +158°F)
MEMS shock resistance	20000 g	20000 g
Power supply	from 8 to 28 Vdc	from 8 to 28 Vdc
Max consumption	4 mA@24Vdc 8 mA@12Vdc	4 mA@24Vdc 8 mA@12Vdc
On-board temperature sensor ⁽⁴⁾ <ul style="list-style-type: none"> measuring range accuracy / resolution 	-40°C to +125°C ±1°C (-10°C to +85°C) / 0.01 °C	-40°C to +125°C ±1°C (-10°C to +85°C) / 0.01 °C
On-board humidity sensor ⁽⁴⁾ <ul style="list-style-type: none"> measuring range accuracy / resolution 	0 to 100% RH ±5% RH (0 to 95% RH) / 0.025% RH	0 to 100% RH ±5% RH (0 to 95% RH) / 0.025% RH
On-board supply voltage monitor ⁽⁴⁾ <ul style="list-style-type: none"> measuring range accuracy / resolution 	0 to 36 V ±5% FS / 0.01 V	0 to 36 V ±5% FS / 0.01 V
Material	stainless steel	stainless steel
Body diameter	28 mm (1.1 in)	28 mm (1.1 in)
Total length (without connector)	750 mm (with 500 mm gauge length) 1250 mm (with 1000 mm gauge length) 33.9 in (with 2ft gauge length)	810 mm (with 500 mm gauge length) 1310 mm (with 1000 mm gauge length)
Wheels carriage	pair of wheels (Ø 32 mm / 1.26 in) mounted on long-life sealed ball bearings	2 fixed wheels and 2 spring-loaded wheels mounted on long-life sealed ball bearings
Wheel diameter	32 mm (1.26 in)	32 mm (1.26 in)
IP class	IP68 up to 2.0 MPa	IP68 up to 2.0 MPa
Weight	2.0 kg (with 500mm gauge length) 4.0 kg (with 1000mm gauge length) 5.5 lb (with 2 ft gauge length)	2.0 kg (with 500mm gauge length) 4.0 kg (with 1000mm gauge length)
CE compliant directive	2014/30/EU (EMC)	2014/30/EU (EMC)

(1) RS485 not-optoisolated Modbus communication with RTU Protocol (2) MPE is the Maximum Permitted Error on the measuring range (FSR). In the Calibration Report, the accuracies of the gauge are calculated using both linear regression ($\leq \text{Lin. MPE}$) and polynomial correction ($\leq \text{Pol. MPE}$). (3) Difference after a 24 h period under repeatability conditions, constant temperature, probe powered continuously. (4) On-board sensors are installed on the internal electronic board to give information in the event of probe malfunction. For any further information not inserted in this datasheet please refer to ISO 18674-3 international standard.

ACCESSORIES AND SPARE PARTS

klion SOFTWARE OKLIONSWOOD

Klion software is designed for data elaboration of inclinometer and T-REX systems.
For more information refer to the relevant datasheet.

DUMMY PROBE OS21ST00000

Used to check the integrity of the inclinometer casings before measurements. Supplied with graduated steel wire on reel.
Available with 500 mm, 1000 mm or 2 feet probe.

PULLEY ASSEMBLY OS1CSU10000

Assists depth control and eliminates cable abrasion. It includes cable stop, pulley for guiding the cable and adaptors to fit different sizes of casing.



CALIBRATION FRAME OSOWCAL1000

The calibration frame consists of an anodized aluminium frame with a pivoting arm made by a length of epoxy painted inclinometer casing.
The pivoting arm permits probe check at -11° , -6° , zero, $+6^\circ$ and $+11^\circ$.
The frame is ready for wall mounting.
Overall dimensions: 350x800x127 mm (compatible with 500mm probe only)
Material: epoxy painted aluminium.

WHEELS FOR INCLINOMETER PROBE (SPARE) OS2SET04WHE

Spare set of four stainless steel wheels with screws for vertical/horizontal inclinometer probe.

BAG FOR INCLINOMETER PROBE (SPARE) OS2RDOBAG00

Spare shoulder bag for inclinometer probe. It allows to accommodate dummy probe too.

DIGITAL SPIRAL METER

The Spiral meter is used to measure twist in installed inclinometer casings (tubes). The measurements can be used for compensating readings taken from twisted casings. SISGEO recommends to take the spiral surveys at the same time as the initial inclinometer reading. The digital spiral probe is compatible with B.R.A.IN reel.

KLION software is required to process spiral data and applies compensations to inclinometer readings.



Spiral probe: twisting on the probe axis to measure the inclinometer casing torsion

Type of sensor	OS30PR12D00 rotary contactless potentiometer (magneto-resistive)
Measuring range (FS)	± 5 degrees over the wheel base (1 meter)
Resolution	0.001% FS
Repeatability	$\pm 0.01\%$ FS
Stability	$\pm 0.025\%$ FS
Accuracy	$< 0.5\%$ FS
Connector	watertight, 6 pins compatible with heavy-duty cable
Body diameter	28 mm (1.1 in)
Total length	1250 mm (49.2 in) without connector
Gauge length (distance between wheels)	1000 mm (39.4 in)

7.2 Ekstensometer



MEXID **MINIATURIZED MPBX**

The MEXID is a small-diameter Multi-Point Borehole Extensometer (MPBX) designed for 50mm (2") boreholes.

The MEXID is ready to monitor up to four points. The system incorporates steel anchors, fiberglass rods, dedicated grouting tubes, and vibrating wire or 4-20mA displacement transducers.

The stainless steel extensometer head installs flush with the surface, minimizing any obstruction of the work area.

APPLICATIONS

- Tunneling
- Deep excavations
- Dams
- Foundations
- Settlement monitoring
- Rock displacements

FEATURES

- Fits 50 mm (2") boreholes
- Monitors up to 4 points
- Installs flush with surface

TECHNICAL SPECIFICATIONS

VERSION	MEXID WITH POTENTIOMETER TRANSDUCERS		MEXID WITH VW TRANSDUCERS	
	50 mm	150mm	50 mm	150mm
Range	50 mm	150mm	50 mm	150mm
Product codes ⁽¹⁾ (points)	0D2MX01A050 (1 point) 0D2MX02A050 (2 points) 0D2MX03A050 (3 points) 0D2MX04A050 (4 points)	0D2MX01A150 (1 point) 0D2MX02A150 (2 points) 0D2MX03A150 (3 points) 0D2MX04A150 (4 points)	0D2MX01W050 (1 point) 0D2MX02W050 (2 points) 0D2MX03W050 (3 points) 0D2MX04W050 (4 points)	0D2MX01W150 (1 point) 0D2MX02W150 (2 points) 0D2MX03W150 (3 points) 0D2MX04W150 (4 points)
INSTRUMENT HEAD				
Diameter / length	48.3 mm / 476 mm (1.9"/19")	48.3 mm / 816 mm (1.9"/32")	48.3 mm / 476 mm (1.9"/19")	48.3 mm / 816 mm (1.9"/32")
Material	stainless steel		stainless steel	
DISPLACEMENT TRANSDUCERS ⁽²⁾				
Output signal	4-20mA (displacement), Ohm (temperature)		frequency (displacement), Ohm (temperature)	
Accuracy Pol. MPE ⁽³⁾	±0.20% FS	±0.15% FS	±0.30% FS	±0.30% FS
Typical frequency range ⁽⁴⁾	-		2250 - 3000 Hz	
Operating temperature	-20°C to +80°C		-20°C to +80°C	
ANCHORS ⁽⁵⁾				
Diameter / Length	OD 16 mm / 400 mm (5/8" / 16")		OD 16 mm / 400 mm (5/8" / 16")	
Material	galvanized steel rebar		galvanized steel rebar	
RODS AND SLEEVES				
Product code	0D221BMFG00		0D221BMFG00	
Rods diameter / material	OD 7 mm / fiberglass		OD 7 mm / fiberglass	
Rods length	specify depth for each anchor		specify depth for each anchor	
Sleeves diameter / material	OD 12 mm / nylon 11 (rihsan)		OD 12 mm / nylon 11 (rihsan)	
CABLE				
Product code ⁽⁶⁾	0WE1160LSZH		0WE1160LSZH	
Max. cable length to logger ⁽⁷⁾	1000 m (3280') for more information see FAQ#77		1000 m (3280') for more information see FAQ#77	

(1) Product code includes instrument head, displacement transducers, and anchors. Cable and rods are attached at factory, but specified with separate product codes.

(2) Displacement transducers are set midrange at factory. Specify different setting, if required.

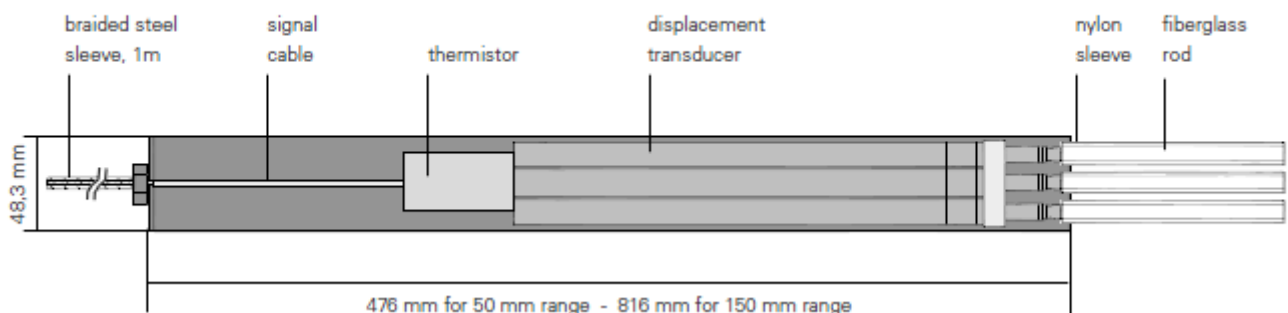
(3) Pol. MPE is the polynomial Maximum Permitted Error on the measuring range (FSR).

(4) Frequency range may vary ±10%.

(5) Anchors will be assembled at site screwing them to the end of the rods

(6) Cable attached at factory. Specify length from MEXID head to readout station (or logger). (7) Refer to FAQ section of Siggeo website: www.siggeo.com/it/assistenza/faq.html

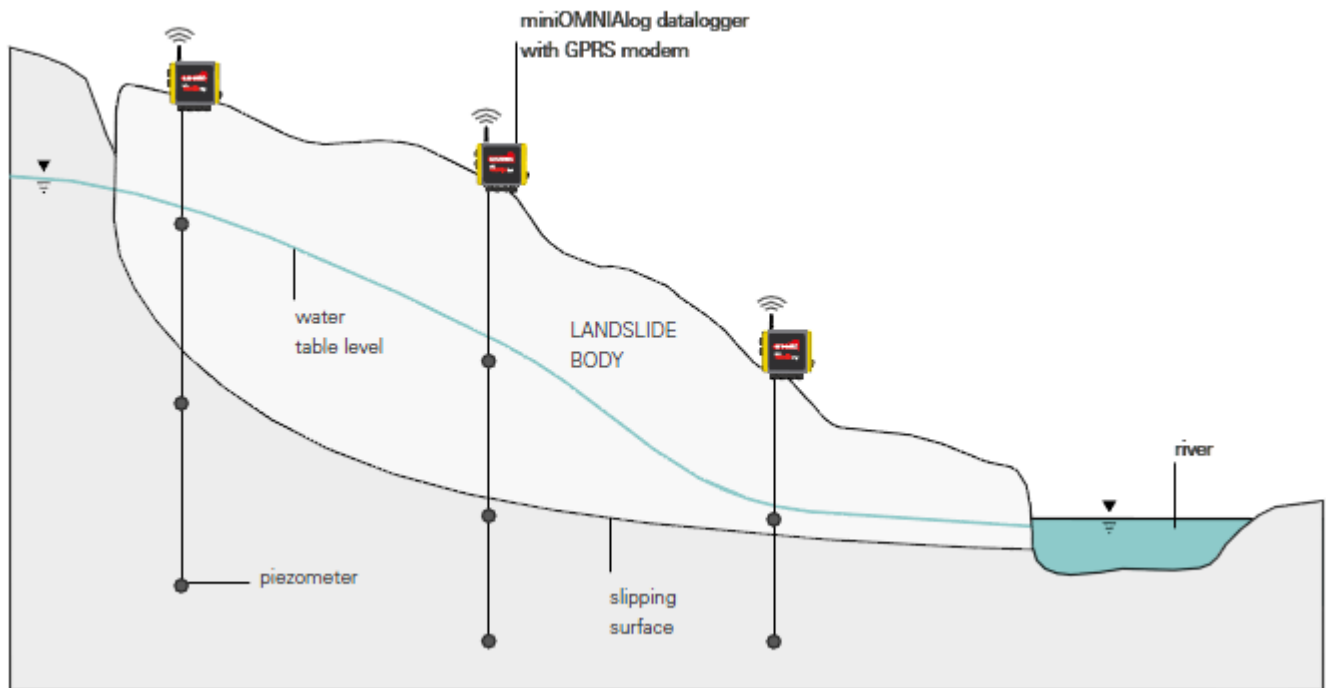
PHYSICAL FEATURES

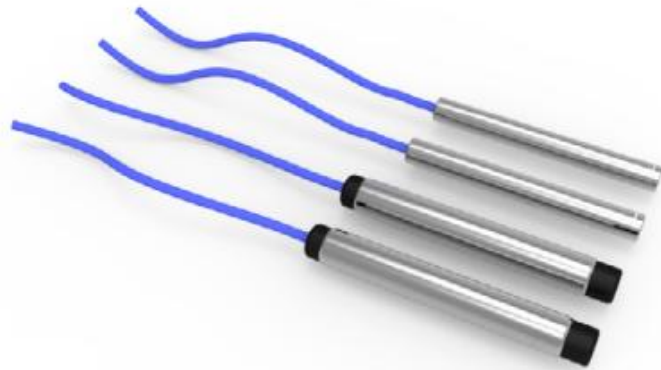


7.3 Piezometer

Referuar standartit BS EN ISO 22475-1, BS EN ISO 22476, jane vendosur piezometra me gjatesi 20m.

Menyra e aplikimit ne nje skarpate me problematike rreshqitjesh :





VIBRATING WIRE PIEZOMETERS

Vibrating wire piezometers are used to monitor pore-water pressure in soils. They are typically sealed in boreholes but can also be embedded in fills, or suspended in a well.

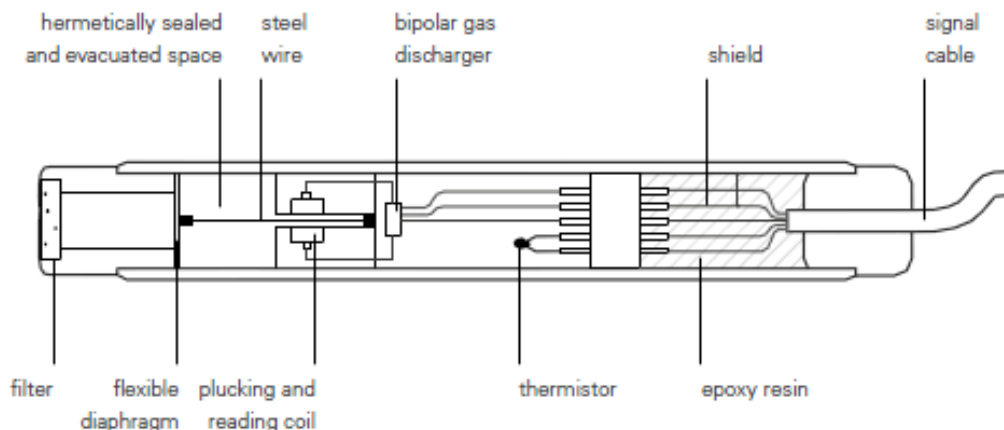
Typical applications include evaluating slope stability, dewatering and drainage schemes, overpressure in silt and clay soils, permeability and hydraulic gradients in dams, and also ground water levels. They can also be used to monitor up-lift pressures in gravity dams.

APPLICATIONS

- Dams and fill embankments
- Measurement of ground water
- Dewatering activities
- Landslides monitoring
- Natural or cut slope sites
- Monitoring of up-lift pressure

FEATURES

- Long-term stability
- Cable length does not affect reading
- Long working life and reliability
- Built-in surge protection (overvoltage)
- Built-in temperature sensor
- Hermetically sealed



TECHNICAL SPECIFICATIONS

	STANDARD PIEZOMETERS		HD PIEZOMETERS AND PRESSURE TRANSDUCERS		
APPLICATION	Suitable for most applications. Small diameter is convenient for installation in boreholes, standpipes, and observations wells.		Heavy Duty HD piezo are recommended for installation in fills and dam embankments and usually supplied with armored cable for good survivability during construction.		3-port pipe union with M10x1 threaded head
MODEL	PK20S	PK20A	PK45S	PK45A	PK45H
Description	Standard piezo with LAE filter	Standard piezo with HAE filter	HD piezo with LAE filter	HD piezo with HAE filter	pressure transducer
Full scales (FS)	0-170 kPa up to 0-5.0 MPa 0-25 psi up to 0-725 psi		0-170 kPa up to 0-5.0 MPa 0-25 psi up to 0-725 psi		0-350 kPa up to 0-30 MPa 0-50 psi up to 0-4350 psi
Overload	2 x Full Scale		2 x Full Scale		
Sensitivity	0.025% FS		0.025% FS		
Linearity ⁽¹⁾	< ±0.4% FS		< ±0.4% FS		
Total Accuracy ⁽²⁾	< ±0.25% FS (< ±0.1% FS on request, leaving out 170 kPa FS)		< ±0.25% FS (< ±0.1% FS on request, leaving out 170 kPa FS)		
Typical frequency range ⁽³⁾	2250 - 3000 Hz		2250 - 3000 Hz		
Thermic zero shift	0.01 ÷ 0.03 % FS /°C		0.01 ÷ 0.03 % FS /°C		
Electric insulation	< 50 MΩ		< 50 MΩ		
Temp. operating range	-20 to +80 °C		-20 to +80 °C		
Temperature sensor	built-in thermistor		built-in thermistor		
Material	stainless steel		stainless steel		
Diameter and weight	Ø 20 mm (0.8"), 0.4 kg (0.9 lb)		Ø 27 mm (1.1"), 0.5 kg (1.1 lb)		
FILTER UNIT					
Type	LAE filter	HAE filter	LAE filter	HAE filter	-
Material	stainless steel or Vyon®	ceramic	stainless steel or Vyon®	ceramic	-
Pore size	40-50 µm	0.25 µm	40-50 µm	0.25 µm	-
CABLE					
Signal cable	0WE104K00ZH (standard LSZH cable) 0WE104K00PV (standard PVC cable)		0WE104X20ZH (armoured LSZH cable) 0WE104X20PV (armoured PVC cable) 0WE104K00ZH (standard LSZH cable) 0WE104K00PV (standard PVC cable)		
Max cable length to logger ⁽⁴⁾	1000 m (for more information see FAQ#77)		1000 m (for more information see FAQ#77)		

(1) including hysteresis (2) including linearity, hysteresis and repeatability, calculated with 3rd degree polynomial (3) The expressed frequency range may vary +/- 10%
(4) refer to FAQ section of Sigeo website: www.sigeo.com/faq

ACCESSORIES AND SPARE PARTS

PROTECTIVE PIEZOMETER CAP OP100CH1000

Protective cap for standpipe piezometers with data plate and survey pin.



CABLE SPLICING KIT OEGSMOK0000

Splice kit for lengthening or repairing cable.

PK20 HAE CERAMIC FIL. OPF20D16000

Spare HAE ceramic filter for PK20 piezometers, pore size 0.25 µm.

BAROMETER OMEPR106000

Piezoelectric barometer for atmospheric pressure compensation. Range 880-1200 mBar, 4-20 mA output.

PK20 LAE VYON® / STEEL FILTER OPF20D20000

Spare LAE Vyon® (polyethylene) or sintered steel filter for PK20 piezometers, pore size 40/50 µm.

FILTER SATURATION DEVICE OPF01SAT000

Stainless steel pump for saturating HAE ceramic filters. Includes pump, 10 bar pressure gauge, and a threaded connection for the filters.



PK45 HAE CERAMIC FIL. OPF01D16000

Spare HAE ceramic filter for PK45 piezometers, pore size 0.25 µm.

PK45 LAE STEEL FILTER OPF40D20000

Spare LAE sintered steel filter for PK45 piezometers, pore size 40/50 µm.

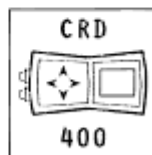
BENTONITE PELLETS 1000BE20025K

10 mm bentonite pellets supplied in 25 kg bag.

PK45 LAE VYON® FILTER OPF40D2000P

Spare LAE Vyon® (polyethylene) filter for PK45 piezometers, pore size 40/50 µm.

READABLE BY



Refer to separate datasheets for further information.

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7.4 Datalogger



OMNIALOG DATALOGGER

The OMNIAlog has been designed "in house" by Sisgeo and is the result of over 25 years experience using different dataloggers in geotechnical field.

OMNIAlog is a versatile, cost effective and low powered datalogger supporting vibrating wire and all major geotechnical sensors.

OMNIAlog has a mini web server on board, 8 or 24 local analog channels, expandable to 408 channels through multiplexers and 2 digital opto-isolated input ports. It can be managed by any Internet browser and also includes a USB flash drive support.

APPLICATIONS

- Tunnelling
- Dam surveillance
- Structural monitoring
- Mining exploration
- Deep excavation
- Landslide safety implementation
- Retaining walls
- Geotechnical investigation campaign

FEATURES

- No software required
- LAN Ethernet, USB and RS232 Comm ports
- High performances
(resolution, accuracy, environment: 30°C +70°C)
- 2GB internal memory
- Stand alone or part of network
- Vibrating wire built-in interface
- Digital sensors support
- Compatible with all major geotechnical sensors

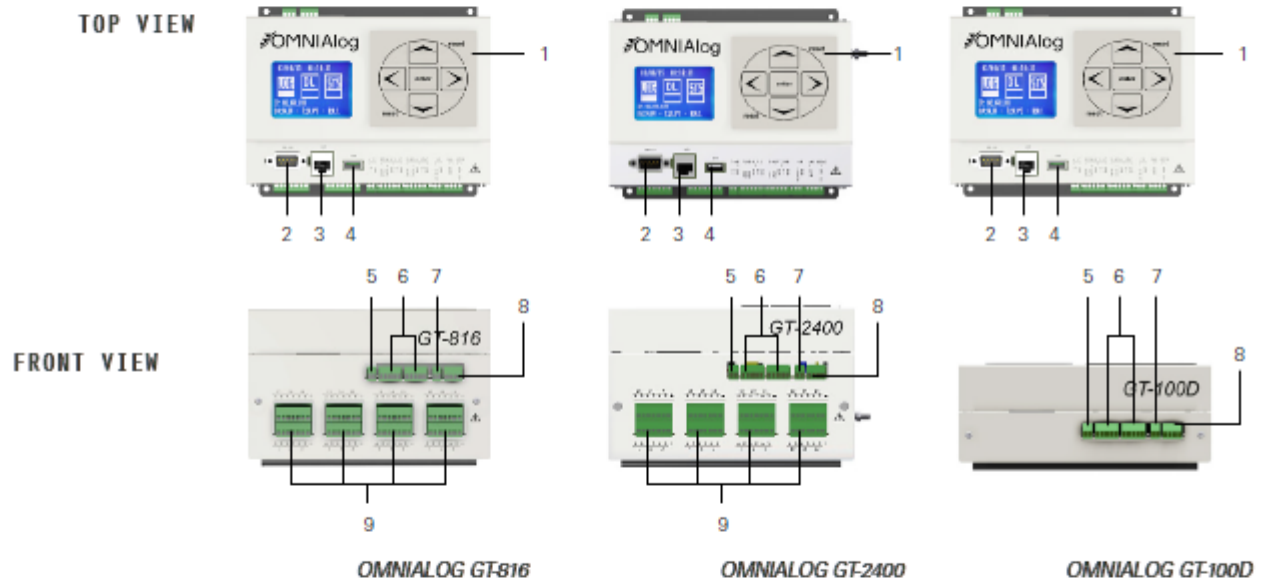
TECHNICAL SPECIFICATIONS

	OMNIALOG GT-816	OMNIALOG GT-2400	OMNIALOG GT-100D
CPU AND MEMORY			
Processor	ARM Cortex-M3 MCU with 1 MB Flash, 120 MHz CPU, ART Accelerator, Ethernet		
RAM Memory	1 Mbyte RAM with backup		
Mass storage	SD CARD 2 GB (*) for data (about 5Mega data points) and WEB pages		
Clock accuracy	High precision RTC (real time clock with battery back-up) self compensated in temperature (3ppm @ 25°C, 10ppm @ -30 +70°C)		
On-board sensors	Temperature measured on the electronic board (accuracy ±1%)		
INPUT			
Analog differential inputs	8 differentials, individually configured. Channel expansion provided by SISGEO multiplexers	24 differentials individually configured. Channel expansion provided by SISGEO multiplexers	-
Digital inputs	Two opto-isolated digital inputs individually selectable for switch closure, high frequency pulse and trigger. Independent 32-bit counters for each input. Max Input Voltage: 24V (Max Current: 10mA) Min Input Voltage: 5V (Max Current: 2mA)		
INTERFACES			
Display & Keyboard	Small backlight graphic LCD 128x64 dpi with membrane keyboard for the minimal local management without the PC. Keyboard for start a uniscan, sequential display of the last memorized readings for each channel (sensor ID, converted unit reading, UMI), device status, data download and FW/web pages update by USB pen drive, safe mode (back-up/format/restore internal SD card)		
LAN ethernet isolated	10/100 Mbps, RJ45		
RS232	9-pin, DE9: DCE port for GSM/GPRS modem connection Baud Rates: selectable from 9600 bps to 115.2 kbps (default setting) Default Format: 8 data bits; 1 stop bits; no parity		
USB	USB 2.0 flash drive only (FAT 32), 5 V 200 mA		
RS485#1 opto-isolated	5 screw clamp: DCE port for max. No.250 SISGEO digital sensors Communication interface: RS485 Communication protocol: MODBUS RTU (SISGEO Protocol) The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (1 A) Power supply management (always on or energy safe)		
RS485#2 opto-isolated	5 screw clamp: DCE port for max. 16 SISGEO multiplexer boards connection. Communication interface: RS485 Communication protocol: MODBUS RTU (SISGEO Protocol) The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (1 A) Every channel of each multiplexer board is completely independent.		
SWITCHED OUTPUT POWER SUPPLY	The voltage 'V OUT' is switched on and off under program control. V OUT is the unregulated input power supply 'V IN' (2 A)		

ANALOG MEASUREMENTS	OMNIALOG GT-816	OMNIALOG GT-2400	OMNIALOG GT-100D
Measurement rate (MR)	<p>High precision measurement (low speed, 5 sps): Init. analog (with auto-calibration): 27.80 sec Instrument warm-up: depending on sensor configuration Measurement: 5.41 sec</p> <p>Standard measurement (20 sps): Init. analog (with auto-calibration): 7.1 sec Instrument warm-up: depending on sensor configuration Measurement: 1.57 sec</p> <p>Fast measurement (High speed 40 sps): Init. analog (no auto-calibration): 2.65 sec Instrument warm-up: depending on sensor configuration Measurement: 0.45 sec</p> <p>Note1: times indicated not valid for vibrating wire measures Note2: init. analog phase is made only one time before the measurement cycle</p>		-
Type of measurements	mA, mV, V, mV/V, °C, Hz (µsec, digit)		-
ADC	<p>24-bit (22 true bit) differential Analog-to-Digital Converters, 5SPS, 0-24 Average Function, auto-calibration and auto-range</p>		-
Range and power supply	<p>Current loop (2 wires): range 0÷25 mA Power supply (selectable by the software, up to 100 mA): 24V DC, 10V DC, external</p> <p>Transmitter (3-4 wires): range 0÷25mA Power supply (selectable by the software, up to 100 mA): 24V DC, 10V DC, external</p> <p>Voltage (4 wires): range ±10mV, ±100mV, ±1V, ±10V Power supply (selectable by the software, up to 100 mA): 24V DC, 20V DC, 10V DC, 5 V DC ,external</p> <p>Servo inclinometer: range ±5V Power supply (selectable by the software): ±12V DC (dual), external</p> <p>Wheatstone bridge (6 wires, with sensing): range ±10mV/V Power supply (selectable by the software, up to 80 mA): 10 V DC , 5 V DC, external (max 10 Vdc) Maximum bridge resistance: 10 kΩ Minimum bridge resistance: 200 Ω</p> <p>Platinum RTD (Pt100): range -150°C to +150°C Power supply: 1.2 mA</p> <p>Potentiometer: range ±2.5V Power supply (selectable by the software): 10V DC, 5V DC</p> <p>Thermistor (NTC): range -50°C to +150°C Power supply: 0.05mA / 0.1mA / 1.2mA</p> <p>Vibrating Wire: range 400Hz to 6000Hz Excitation sine wave signal (adaptive): ±10 V</p>		-
Reading resolution	<p>1 µA at range 20 mA - 1 µV at range ±10 mV 10 µV at range ±100 mV - 100 µV at range ±1 V 1 mV at range ±10 V - 0.1 °C for Pt100 - 0.1 °C for NTC 0.1 Hz at range 6000 Hz - 0.001 mV/V at range ±10 mV/V</p>		-
Measurement accuracy	<p>0.01% F.S. (0.1% F.S. for Pt100 and NTC) with Standard Measurement. Calibration in Sisgeo laboratories recommended every 2 years.</p>		-

	OMNIALOG GT-816	OMNIALOG GT-2400	OMNIALOG GT-100D
Temperature drift	< 10 ppm / °C, range -30°C to +70°C		-
Input noise voltage	5,42 µVpp		-
Input limits	±12V		-
Sustained input voltage w/o damage	±50V DC max		-
CM common mode rejection	>105dB		-
Differential mode rejection	>90dB		-
Input impedance	20 MΩ typical		-
OUTPUT			
Digital output	One relay output (for alarm, etc.): volt-free closure (low voltage 30V, 2A)		
DIGITAL INPUTS			
Measurement rate (IMR)	Max frequency 1kHz		
Accuracy	0.1 Hz		
PROTECTIONS			
	<p>Electro-mechanical relays for each measuring channel: Electrical endurance: min. 2x10⁵ operations, Mechanical endurance: 10x10⁶ operations. Circuit protection: Gas Discharge Tubes (GDT): DC Breakdown Voltage 75V (± 20%@100V/µs) Impulse Breakdown Voltage 250V (@100V/µs) typical Overvoltage and reverse polarity protection on power supply input. Short circuit protection on every outputs of sensor power supply.</p>		
SYSTEM POWER REQUIREMENTS			
Voltage (external power supply)	10 to 30 V DC (reverse polarity protected), max 5 A		
External rechargeable batteries	12V DC nominal		
Typical current drain @12Vdc, external power supply	<p>Sleep mode: 100 µA ON: 62 mA - ON with ethernet connected: 87 mA - ON with display ON: 115 mA ON with display ON and ethernet connected: 142 mA Analog initialisation: 115 mA Measurement: 123 mA (with 12 mA @ 24 V sensor consumption)</p>		
ENVIRONMENTAL CONDITIONS			
Operating temperature	-30 to +70°C (display -20 to +70°C)		
Storage temperature	-40 to +85°C (display -30 to +80°C)		
Humidity	80%		
Overvoltage category	II		
Pollution degree	2		
Sound levels	< 74dBA		
Maximum height of use	3000m		

	OMNIALOG GT-816	OMNIALOG GT-2400	OMNIALOG GT-100D
SOFTWARE & FIRMWARE	Web server on board (independent OS platform). Live update (firmware and web pages). FTP client to send data/alarms on a FTP server (SFTP not supported) MAIL to sent data/alarms to max 5 email address (SMTPS / SSL not supported) SMS to sent alarms to max 5 telephone numbers Data download (readings, logs) in .csv file (compatible with Microsoft Excel) Virtual channels management (max No.80 channels) Languages: Italian, English and French		
PHYSICAL CHARACTERISTICS			
Dimensions (L x W x H)	183 x 144 x 118 mm		183 x 144 x 76 mm
Weight	1500 grams		1000 grams
Material	Plastic and metal		Plastic and metal
Wiring	Removable connector		Removable connector



- | | | |
|---------------------|-----------|---------------------|
| 1 Membrane keyboard | 4 USB | 7 "V" IN |
| 2 RS-232 | 5 "V" OUT | 8 PWR input |
| 3 LAN | 6 RS-485 | 9 Analogical inputs |

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TECHNICAL ASSISTANCE

SISGEO offers customers e-mail and phone assistance to ensure proper use of instruments and readout and to maximize performance of the system.

For more information, email us: assistance@sisgeo.com

8. Punimet Elektrike

8.1 Qellimi

Ky seksion mbulon dhenien e te gjitha specifikimeve per punimet elektrike qe perfshihen ne projekt. Cdo lloj ndryshimi i kerkuar nga Kontraktori ne lidhje me keto punime do te duhet te paraqitet per miratim tek Supervizori duke prezantuar te gjithe materialin e nevojshem si vizatime, specifikime etj. Publikimet e listuara me poshte formojne nje pjese te ketij specifikimi ne formatin e zgjatur te referencave. Publikimet jane referuar ne tekst vetem si perkufizime.

8.2 Standartet dhe Normat Europiane:

IEC 60364	Zhvillimi i instalimeve ne tension te ulet
EN 14281	Sistemet e tubacioneve plastike per kanalet nentokesore (PVCu)
EN 61000	Perputhshmeria elektromagnetike (EMC)
EN 61238	Kompresimi dhe lidhjet mekanike per kabllot e fuqise

Keto jane Norma dhe ligje te aplikueshme edhe ne Shqiperi

KERKESAT E PERGJITHSHME: normat ne reference do te zbatohen per kete seksion me shtesat dhe ndryshimet e specifikuara ketu.

Verifikimi i dimensioneve: Kontraktori do te behet i njohur me detaje mbi punen, verifikon dimensionet ne fushe dhe do te keshilloje mbikeqyresit apo perfaqesuesin e tij te ndonje mosperputhjeje para se te kryeje çdo pune.

8.3 Miratimet

Zerat ne listat e meposhtme do te miratohen nga Mbikeqyresi ose perfaqesuesi i tij.

Katalogu i te dhenave te prodhuesit:

- a. Kanalet e kablllove ne polietilen
- b. Shirit izolues
- c. Xhuntot e kablllove ne tension te larte
- d. Shirit rezistent ndaj zjarrit
- e. Strukturat elektrike
- f. Kornizat e pusetave dhe kapaket
- g. Lubrifikante kabllosh
- h. Kabllo te tensionit te ulet

- i. Kuti me bashkues per tension te ulet
- j. Kuti me kapikorda per tension te ulet
- k. Pllake tokezimi

Raportet e testeve:

- a Testi i rezistences se izolimit per kablllo te tensionit te larte dhe tension te ulet
- b Testi i vazhdueshmerise
- c Testi i potencialit i larte

Certifikatat:

Materialet dhe pajisjet: Sigurimi i nje deklarate te prodhuesit qe verteton se produkti i furnizuar permbush ose tejkalon kerkesat e kontrates.

Kompetencat e punetorit: Per te kryer punen elektrike ne vend duhet te jete nje punetor profesional.

8.4 Produktet

Miratimi i nje produkti te ofruar jepet nga Mbikeqyresi ose perfaqesuesi i tij pas paraqitjes se nje mostre te pranueshme te secilit lloj.

MATERIALET DHE PAJISJET:

Materialet dhe pajisjet duhet te perputhen me specifikimet dhe standardet perkatese dhe te specifikimeve ketu. Te dhenat elektrike duhet te jene sic tregohet ne etiketen bashkangjitur. Materialet dhe pajisjet do te jene nje produkt standard i nje prodhuesi te angazhuar rregullisht ne prodhimin e e artikullit dhe ne thelb do te kopjoje artikuj qe kane qene ne perdorim te kenaqshem per te pakten 2 vitet e meparshme para hapjes se tenderit.

Tubat:

Tubat plastike dhe aksesoret duhet te jene polietilen dhe te permbushin standartet DIN ose CEI.

Kabllot:

Madhesia e kablllove percjelles: Madhesia e kablllove percaktohet nga seksioni i tyre nominal dhe diametri i jashtem, i dhene ne mm². Madhesite e tyre jane te dhena per percues bakri.

Sistemi i shperndarjes se kablllove ne tension te ulet do te jete ne perputhje me normat CEI. Percjellesit per instalime ne tuba polietilene duhet te jene izolim me gome ne perputhje me normat e aplikuara. Lloji i izolimit duhet te jete kunder lageshtires dhe nxehtesise, i afte te duroje nje temperature 90 grade celsius gjate punes.

Kabllo e tokezimit: Kabllot e izoluar duhet te jene te veshur me perberes elektrometrik me termoplastik poshte veshjes, verdhe/jeshil dhe do te izolohet per ti ngjare percjellesve te fazes, pervec nese kabllot vleresohen jo me shume se 750 volt. Alumini nuk eshte i pranueshem.

Bashkimet dhe kapikordat e kablllove sekondare 600 volt duhet te sigurohen mekanikisht. Bashkimet do te mbulohen. Te vidhosen ose te kompresohen me aliazh metalik sipas miratimeve per perdorimin e percuesit te bakrit..

Bashkimet: Te behen bashkime kabllosh ne vende qe jane te aksesueshme me vone. Ne cdo vend tjeter nuk lejohet.

Elektrodat e tokes: Shufra eshte tip kryq e galvanizuar dhe ka nje prifil 50x50x5mm dhe nje gjatesi 1,5m.

Kabllo do te jete ne nje dell pa bashkime midis lidhjeve me perjashtim ku distanca kalon gjatesine ne te cilat kablllo eshte i lirshem.

Kthesat e kablllove duhet te jene jo me pak se ato te specifikuara nga prodhuesi per llojin e kabllit te specifikuar.

Aty ku kablli eshte nxjerre te lihet nje shtese e konsiderueshme per te bere nje lidhje te mevonshme.

Tensioni i kablllove te terhequr nuk duhet te kaloje maksimumin e percaktuar nga fabrika.

Kapikordat e kablllove: Mbroni kapikordat e percjellesave te kablllove te fuqise se izoluar nga kontaktet aksidentale, perkeqesimi i mbuleses, dhe lageshtira. Vendosni kapikorda duke perdorur materialet dhe metodat e treguara ose specifikuara ketu apo siç percaktohet me udhezim me shkrim te prodhuesit te kablllove dhe prodhuesit te kapikordave.

Tokezimi: Pjeset metalike se bashku me te gjitha pjeset elektrike duhet te tokezohen.