

## Multi-beam, finger- and hand protection safety sensor

The multi-beam sensors are available in Category 2 (PL c) and Category 4 (PL e) with integrated muting function. The finger- and hand protection models are available in Category 2 (PL c) and Category 4 (PL e) with integrated safety control functions.

- Type 2/Type 4 sensor complying with EN 61496-1
- Family concept in wiring and mounting

Multi-beam models

- Sensing distance up to 50 m
- DIP-switch setup for muting, pre-reset, interlock function and optical coding
- Muting function and muting lamp integrated

Finger- and hand protection models

- Sensing distance up to 0.2 m...6 m (14 mm) and 0.2 m...14 m (35 mm)
- DIP-switch setup for blanking, interlock function, muting and optical coding
- Floating blanking and Fixed blanking supported

### Ordering information multi-beam safety sensor

#### Long-range active/active systems

##### F3S-TGR-CL2\_K\_ (Type 2)

| Number of optical axes | Sensing distance | Beam pitch | Feature set <sup>*1</sup> | Order code              |
|------------------------|------------------|------------|---------------------------|-------------------------|
| 2                      | 0.5 m ... 40 m   | 500        | Advanced                  | F3S-TGR-CL2A-K2-500     |
| 2                      | 0.5 m ... 40 m   | 500        | Basic                     | F3S-TGR-CL2B-K2-500     |
| 3                      | 0.5 m ... 40 m   | 400        | Advanced                  | F3S-TGR-CL2A-K3-800     |
| 3                      | 0.5 m ... 40 m   | 400        | Basic                     | F3S-TGR-CL2B-K3-800     |
| 4                      | 0.5 m ... 40 m   | 300        | Advanced                  | F3S-TGR-CL2A-K4-900     |
| 4                      | 0.5 m ... 40 m   | 300        | Basic                     | F3S-TGR-CL2B-K4-900     |
| 4                      | 0.5 m ... 40 m   | 400        | Advanced                  | F3S-TGR-CL2A-K4-1200    |
| 4                      | 0.5 m ... 40 m   | 400        | Basic                     | F3S-TGR-CL2B-K4-1200    |
| 2                      | 25 m ... 50 m    | 500        | Advanced                  | F3S-TGR-CL2A-K2-500-LD  |
| 2                      | 25 m ... 50 m    | 500        | Basic                     | F3S-TGR-CL2B-K2-500-LD  |
| 3                      | 25 m ... 50 m    | 400        | Advanced                  | F3S-TGR-CL2A-K3-800-LD  |
| 3                      | 25 m ... 50 m    | 400        | Basic                     | F3S-TGR-CL2B-K3-800-LD  |
| 4                      | 25 m ... 50 m    | 300        | Advanced                  | F3S-TGR-CL2A-K4-900-LD  |
| 4                      | 25 m ... 50 m    | 300        | Basic                     | F3S-TGR-CL2B-K4-900-LD  |
| 4                      | 25 m ... 50 m    | 400        | Advanced                  | F3S-TGR-CL2A-K4-1200-LD |
| 4                      | 25 m ... 50 m    | 400        | Basic                     | F3S-TGR-CL2B-K4-1200-LD |

##### F3S-TGR-CL4\_K\_ (Type 4)

| Number of optical axes | Sensing distance | Beam pitch | Feature set <sup>*1</sup> | Order code              |
|------------------------|------------------|------------|---------------------------|-------------------------|
| 2                      | 0.5 m ... 40 m   | 500        | Advanced                  | F3S-TGR-CL4A-K2-500     |
| 2                      | 0.5 m ... 40 m   | 500        | Basic                     | F3S-TGR-CL4B-K2-500     |
| 3                      | 0.5 m ... 40 m   | 400        | Advanced                  | F3S-TGR-CL4A-K3-800     |
| 3                      | 0.5 m ... 40 m   | 400        | Basic                     | F3S-TGR-CL4B-K3-800     |
| 4                      | 0.5 m ... 40 m   | 300        | Advanced                  | F3S-TGR-CL4A-K4-900     |
| 4                      | 0.5 m ... 40 m   | 300        | Basic                     | F3S-TGR-CL4B-K4-900     |
| 4                      | 0.5 m ... 40 m   | 400        | Advanced                  | F3S-TGR-CL4A-K4-1200    |
| 4                      | 0.5 m ... 40 m   | 400        | Basic                     | F3S-TGR-CL4B-K4-1200    |
| 2                      | 25 m ... 50 m    | 500        | Advanced                  | F3S-TGR-CL4A-K2-500-LD  |
| 2                      | 25 m ... 50 m    | 500        | Basic                     | F3S-TGR-CL4B-K2-500-LD  |
| 3                      | 25 m ... 50 m    | 400        | Advanced                  | F3S-TGR-CL4A-K3-800-LD  |
| 3                      | 25 m ... 50 m    | 400        | Basic                     | F3S-TGR-CL4B-K3-800-LD  |
| 4                      | 25 m ... 50 m    | 300        | Advanced                  | F3S-TGR-CL4A-K4-900-LD  |
| 4                      | 25 m ... 50 m    | 300        | Basic                     | F3S-TGR-CL4B-K4-900-LD  |
| 4                      | 25 m ... 50 m    | 400        | Advanced                  | F3S-TGR-CL4A-K4-1200-LD |
| 4                      | 25 m ... 50 m    | 400        | Basic                     | F3S-TGR-CL4B-K4-1200-LD |

#### Short-range active/passive systems

##### F3S-TGR-CL2\_K\_C (Type 2)

| Number of optical axes | Sensing distance | Beam pitch | Feature set <sup>*1</sup> | Order code            |
|------------------------|------------------|------------|---------------------------|-----------------------|
| 2                      | 0.5 m ... 12 m   | 500        | Advanced                  | F3S-TGR-CL2A-K2C-500  |
| 2                      | 0.5 m ... 12 m   | 500        | Basic                     | F3S-TGR-CL2B-K2C-500  |
| 3                      | 0.5 m ... 8 m    | 400        | Advanced                  | F3S-TGR-CL2A-K3C-800  |
| 3                      | 0.5 m ... 8 m    | 400        | Basic                     | F3S-TGR-CL2B-K3C-800  |
| 4                      | 0.5 m ... 7 m    | 300        | Advanced                  | F3S-TGR-CL2A-K4C-900  |
| 4                      | 0.5 m ... 7 m    | 300        | Basic                     | F3S-TGR-CL2B-K4C-900  |
| 4                      | 0.5 m ... 7 m    | 400        | Advanced                  | F3S-TGR-CL2A-K4C-1200 |
| 4                      | 0.5 m ... 7 m    | 400        | Basic                     | F3S-TGR-CL2B-K4C-1200 |

\*1. Feature set: Basic: Manual/automatic restart, coding  
Advanced: Basic + Muting + Pre-reset

##### F3S-TGR-CL4\_K\_C (Type 4)

| Number of optical axes | Sensing distance | Beam pitch | Feature set <sup>*1</sup> | Order code            |
|------------------------|------------------|------------|---------------------------|-----------------------|
| 2                      | 0.5 m ... 12 m   | 500        | Advanced                  | F3S-TGR-CL4A-K2C-500  |
| 2                      | 0.5 m ... 12 m   | 500        | Basic                     | F3S-TGR-CL4B-K2C-500  |
| 3                      | 0.5 m ... 8 m    | 400        | Advanced                  | F3S-TGR-CL4A-K3C-800  |
| 3                      | 0.5 m ... 8 m    | 400        | Basic                     | F3S-TGR-CL4B-K3C-800  |
| 4                      | 0.5 m ... 7 m    | 300        | Advanced                  | F3S-TGR-CL4A-K4C-900  |
| 4                      | 0.5 m ... 7 m    | 300        | Basic                     | F3S-TGR-CL4B-K4C-900  |
| 4                      | 0.5 m ... 7 m    | 400        | Advanced                  | F3S-TGR-CL4A-K4C-1200 |
| 4                      | 0.5 m ... 7 m    | 400        | Basic                     | F3S-TGR-CL4B-K4C-1200 |

### Ordering information finger- and hand protection safety sensor

| Safety category | Feature set <sup>*2</sup> | Resolution | Length           | Order code        |
|-----------------|---------------------------|------------|------------------|-------------------|
| 2               | Basic                     | 14 mm      | 150 mm...2400 mm | F3S-TGR-CL2B-014- |
|                 |                           | 35 mm      |                  | F3S-TGR-CL2B-035- |
|                 | Advanced                  | 14 mm      |                  | F3S-TGR-CL2A-014- |
|                 |                           | 35 mm      |                  | F3S-TGR-CL2A-035- |
| 4               | Basic                     | 14 mm      |                  | F3S-TGR-CL4B-014- |
|                 |                           | 35 mm      |                  | F3S-TGR-CL4B-035- |
|                 | Advanced                  | 14 mm      |                  | F3S-TGR-CL4A-014- |
|                 |                           | 35 mm      |                  | F3S-TGR-CL4A-035- |

\*2. Feature set: Basic: Manual/automatic restart, coding  
Advanced: Blanking functions + Muting + Pre-reset

## Specifications

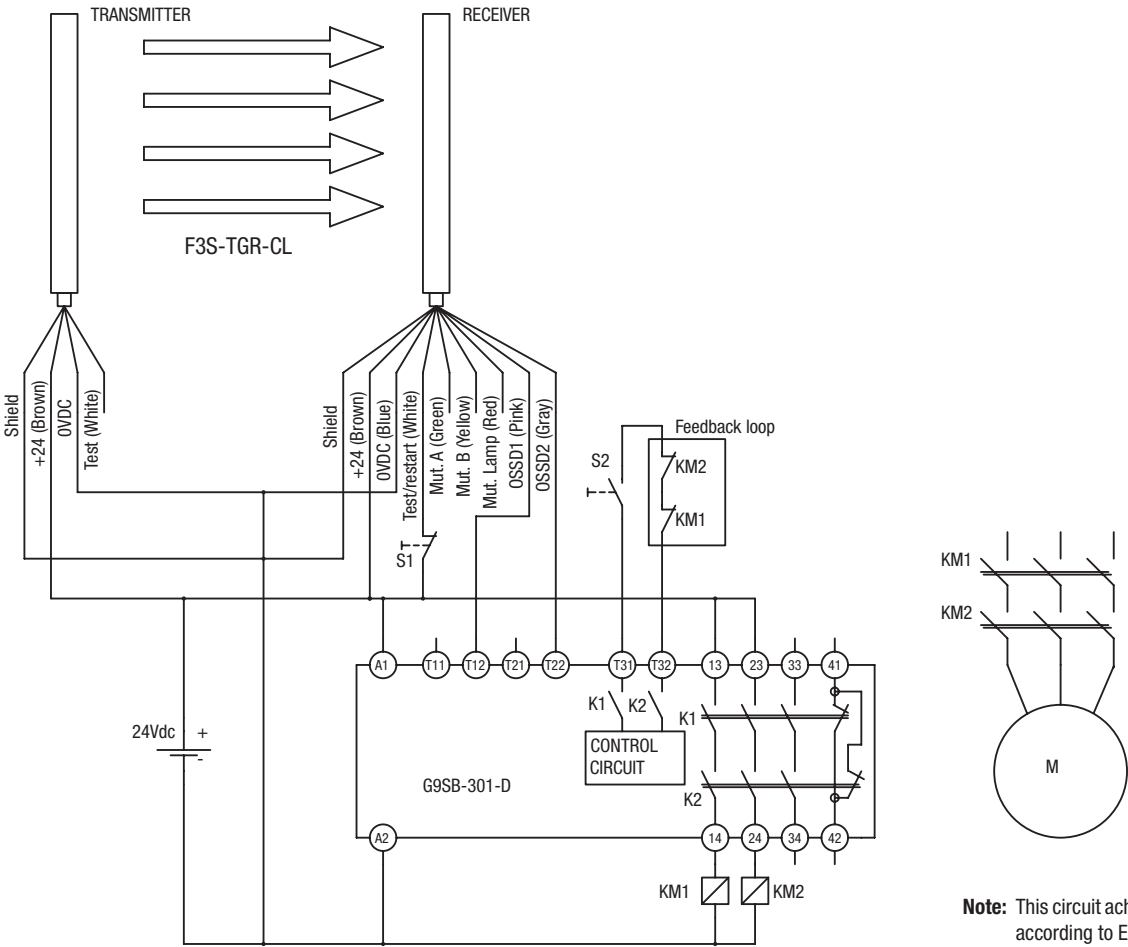
## Multi-beam safety sensor

| Item                                                               | F3S-TGR-CL2_-K_                                                                                                                                                               | F3S-TGR-CL4_-K_                        |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Sensor Type                                                        | Type 2                                                                                                                                                                        | Type 4                                 |
| Operating range                                                    | F3S-TGR-CL_-K_ 0.5 m ... 40 m<br>F3S-TGR-CL_-K_-LD 25 m ... 50 m<br>F3S-TGR-CL_-K2C-500 0.5 m ... 12 m<br>F3S-TGR-CL_-K3C-800 0.5 m ... 8 m<br>F3S-TGR-CL_-K4C- 0.5 m ... 7 m |                                        |
| Beam pitch                                                         | F3S-TGR-CL_-K2_-500: 2 beams, 500 mm<br>F3S-TGR-CL_-K3_-800: 3 beams, 400 mm<br>F3S-TGR-CL_-K4_-900: 4 beams, 300 mm<br>F3S-TGR-CL_-K4_-1200: 4 beams, 400 mm                 |                                        |
| Effective aperture angle acc. EN 61496-2 (2006) for distances <3 m | Within $\pm 5^\circ$                                                                                                                                                          | Within $\pm 2.5^\circ$                 |
| Light source                                                       | Infrared LED (880 nm), Power dissipation <3 mW, Class 1 per EN 60825-1                                                                                                        |                                        |
| Supply Voltage                                                     | 24 VDC $\pm$ 20%, according EN/IEC60204 able to cover a drop of voltage of at least 20 ms                                                                                     |                                        |
| OSSD                                                               | 2 PNP transistor outputs, load current 2x250 mA max                                                                                                                           |                                        |
| Test functions                                                     | Self test (after power ON and during operation)                                                                                                                               |                                        |
| Safety-related functions                                           | All versions: Auto reset/ interlock with manual reset, EDM (external device monitoring)<br>Advance version only: Muting and Pre-reset function                                |                                        |
| Response time                                                      | < 13 ms                                                                                                                                                                       |                                        |
| Ambient temperature                                                | Operating: -10°C...+55°C, Storage: -25°C...+70°C (no icing, no condensation)                                                                                                  |                                        |
| Degree of protection                                               | IP 65 (IEC 60529)                                                                                                                                                             |                                        |
| Materials                                                          | Case: Painted Aluminium, Front window: Acrylic Lexan, Cap: ABS, mounting brackets: cold rolled steel                                                                          |                                        |
| Size (cross section)                                               | 37x48 mm                                                                                                                                                                      |                                        |
| Suitable for safety control systems                                | Cat. 2 (EN954-1), PLc (EN ISO 13849-1)                                                                                                                                        | Cat. 4 (EN954-1), PLe (EN ISO 13849-1) |
| MTTFd, DC                                                          | MTTFd = 450 years, DC = high, MTTR = 8 hours                                                                                                                                  |                                        |
| PFH, Proof test interval                                           | PFHd = $2,5 \cdot 10^{-9}$ , Proof test interval: every 20 years                                                                                                              |                                        |

## Finger- and hand safety protection sensor

| Item                                                                | F3S-TGR-CL2_-0_                                                                                                                                          | F3S-TGR-CL4_-0_                        |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Sensor Type                                                         | Type 2                                                                                                                                                   | Type 4                                 |
| Operating range: short setting                                      | F3S-TGR-CL_-014: 0.2 m... 3 m; F3S-TGR-CL_-035: 0.2 m... 8 m                                                                                             |                                        |
| Operating range: long setting                                       | F3S-TGR-CL_-014: 3 m... 6 m; F3S-TGR-CL_-035: 7 m... 14 m                                                                                                |                                        |
| Beam pitch (center)                                                 | 14 mm resolution: 7.5 mm<br>35 mm resolution: 18 mm                                                                                                      |                                        |
| Detection capability                                                | 14 mm resolution: 14 mm non-transparent<br>35 mm resolution: 35 mm non-transparent                                                                       |                                        |
| Effective aperture angle acc. EN 61496-2 (2006) for distances < 3 m | Within $\pm 5^\circ$                                                                                                                                     | Within $\pm 2.5^\circ$                 |
| Light source                                                        | Infrared LED (880 nm), Power dissipation <3 mW, Class 1 per EN 60825-1                                                                                   |                                        |
| Supply Voltage                                                      | 24 VDC $\pm$ 20%, according EN/IEC60204 able to cover a drop of voltage of at least 20 ms                                                                |                                        |
| OSSD                                                                | 2 PNP transistor outputs, load current 2x250 mA max                                                                                                      |                                        |
| Test functions                                                      | Self test (after power ON and during operation)                                                                                                          |                                        |
| Safety-related functions                                            | All versions: Auto reset/ interlock with manual reset, EDM (external device monitoring)<br>Advance version only: Blanking, Muting and Pre-reset function |                                        |
| Response time                                                       | ON to OFF: 14 ms...103 ms                                                                                                                                |                                        |
| Ambient temperature                                                 | Operating: -10°C...+55°C, Storage: -25°C...+70°C (no icing, no condensation)                                                                             |                                        |
| Degree of protection                                                | IP 65 (IEC 60529)                                                                                                                                        |                                        |
| Materials                                                           | Case: Painted Aluminium, Front window: Acrylic Lexan, Cap: ABS, mounting brackets: cold rolled steel                                                     |                                        |
| Size (cross section)                                                | 37x48 mm                                                                                                                                                 |                                        |
| Suitable for safety control systems                                 | Cat. 2 (EN954-1), PLc (EN ISO 13849-1)                                                                                                                   | Cat. 4 (EN954-1), PLe (EN ISO 13849-1) |
| MTTFd, DC                                                           | MTTFd = 450 years, DC = high, MTTR = 8 hours                                                                                                             |                                        |
| PFH, Proof test interval                                            | PFHd = $2,5 \cdot 10^{-9}$ , Proof test interval: every 20 years                                                                                         |                                        |

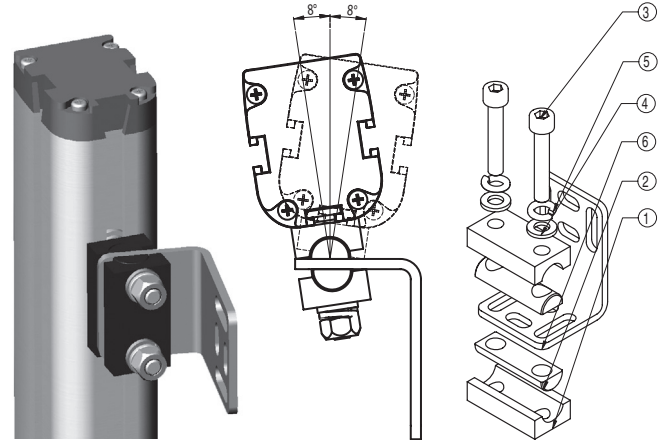
F3S-TGR-CL and GSB-301-D in manual reset



Standard cables

| Receiver Cables (M12-8pin, shielded, flying leads)    |                                |
|-------------------------------------------------------|--------------------------------|
| F39-TGR-CVL-B-2-R                                     | Receiver Cable, 2 m length     |
| F39-TGR-CVL-B-5-R                                     | Receiver Cable, 5 m length     |
| F39-TGR-CVL-B-10-R                                    | Receiver Cable, 10 m length    |
| F39-TGR-CVL-B-15-R                                    | Receiver Cable, 15 m length    |
| F39-TGR-CVL-B-25-R                                    | Receiver Cable, 25 m length    |
| Transmitter Cables (M12-4pin, shielded, flying leads) |                                |
| F39-TGR-CVL-B-2-E                                     | Transmitter Cable, 2 m length  |
| F39-TGR-CVL-B-5-E                                     | Transmitter Cable, 5 m length  |
| F39-TGR-CVL-B-10-E                                    | Transmitter Cable, 10 m length |
| F39-TGR-CVL-B-15-E                                    | Transmitter Cable, 15 m length |
| F39-TGR-CVL-B-25-E                                    | Transmitter Cable, 25 m length |

Mounting bracket F39-TGR-ST-ADJ



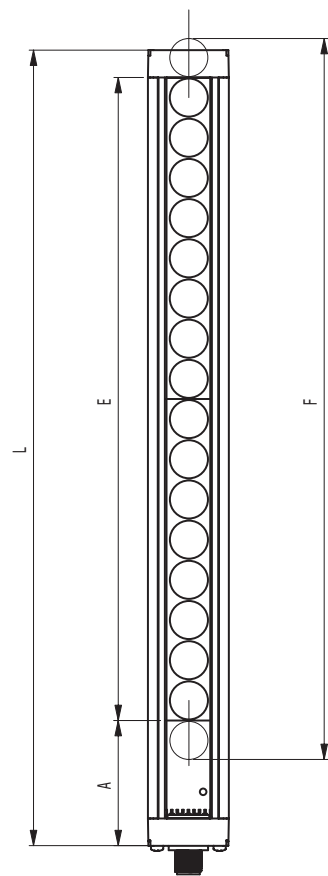
Wiring accessories (connectors and Y-connector cables)

| Type                |                                                    |
|---------------------|----------------------------------------------------|
| F39-TGR-CT-B-R      | Connector M12, 8-pin, female for wiring            |
| F39-TGR-CT-B-E      | Connector M12, 4-pin, female for wiring            |
| F39-TGR-CT-W-R      | Connector M12, 8-pin, male for wiring              |
| F39-TGR-CT-W-E      | Connector M12, 4-pin, male for wiring              |
| F39-TGR-CVL-D-B-5-R | Cable for Sensor system and muting lamp connection |

Safety relay units

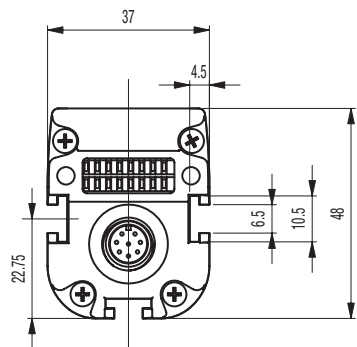
| Family            | Type Name           | Configuration                           |
|-------------------|---------------------|-----------------------------------------|
| G9SB              | G9SB-200-D          | DPST-NO                                 |
|                   | G9SB-301-D          | 3PST-NO                                 |
|                   | G9SA-301            | 3PST-NO                                 |
|                   | G9SA-501            | 5PST-NO                                 |
| G9SX              | G9SA-321-T075       | 3PST-NO, Time del. 7.5 s                |
|                   | G9SA-321-T15        | 3PST-NO, Time del. 15 s                 |
|                   | G9SA-321-T30        | 3PST-NO, Time del. 30 s                 |
|                   | G9SX-BC202-RT       | 2 Safe Outputs                          |
|                   | G9SX-BC202-RC       | 2 Safe Outputs                          |
|                   | G9SX-AD322-T15-RT   | 3 Safe Outputs, Time del. 15 s          |
|                   | G9SX-AD322-T15-RC   | 3 Safe Outputs, Time del. 15 s          |
|                   | G9SX-AD322-T150-RT  | 3 Safe Outputs, Time del. 150 s         |
|                   | G9SX-AD322-T150-RC  | 3 Safe Outputs, Time del. 150 s         |
|                   | G9SX-ADA222-T15-RT  | 2 Safe Outputs, Time del. 15 s          |
|                   | G9SX-ADA222-T15-RC  | 2 Safe Outputs, Time del. 15 s          |
|                   | G9SX-ADA222-T150-RT | 2 Safe Outputs, Time del. 150 s         |
| DeviceNet Safety  | G9SX-ADA222-T150-RC | 2 Safe Outputs, Time del. 150 s         |
|                   | NE1A-SCPU01         | 16 In, 8 Out, Safety Master             |
| Safety Controller | NE1A-SCPU02         | 40 In, 8 Out, Safety Master             |
|                   | NE1A-SCPU01L        | 16 In, 8 Out                            |
|                   | NE1A-SCPU02L        | 40 In, 8 Out                            |
| Relay interface   | F39-TGR-SB-R        | Relay interface for Semiconductor OSSDs |

## Dimensions



- L: Total length of the F3S-TGR-CL system
- F: Protective height where an object equal or greater the resolution is detected
- E: Detection zone
- A: Dead zone without detection capability

Alternate T-slot mounting



### F3S-TGR-CL system data with 14 mm resolution

|             | 150 mm  | 300 mm  | 450 mm  | 600 mm  | 750 mm  | 900 mm  | 1050 mm | 1200 mm | 1350 mm | 1500 mm | 1650 mm | 1800 mm | 1950 mm | 2100 mm | 2250 mm | 2400 mm |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| L [mm]      | 217     | 364     | 511     | 658     | 805     | 952     | 1099    | 1246    | 1393    | 1540    | 1687    | 1834    | 1981    | 2128    | 2275    | 2422    |
| F [mm]      | 161     | 308     | 455     | 602     | 749     | 896     | 1043    | 1190    | 1337    | 1484    | 1631    | 1778    | 1925    | 2072    | 2219    | 2366    |
| E [mm]      | 147     | 294     | 441     | 588     | 735     | 882     | 1029    | 1176    | 1323    | 1470    | 1617    | 1764    | 1911    | 2058    | 2205    | 2352    |
| A [mm]      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      |
| Weight [kg] | 0.83 kg | 1.39 kg | 1.95 kg | 2.51 kg | 3.07 kg | 3.63 kg | 4.19 kg | 4.75 kg | 5.31 kg | 5.87 kg | 6.43 kg | 7 kg    | 7.55 kg | 8.11 kg | 8.67 kg | 9.24 kg |

### F3S-TGR-CL system data with 35 mm resolution

|             | 150 mm  | 300 mm  | 450 mm  | 600 mm  | 750 mm  | 900 mm  | 1050 mm | 1200 mm | 1350 mm | 1500 mm | 1650 mm | 1800 mm | 1950 mm | 2100 mm | 2250 mm | 2400 mm |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| L [mm]      | 217     | 364     | 511     | 658     | 805     | 952     | 1099    | 1246    | 1393    | 1540    | 1687    | 1834    | 1981    | 2128    | 2275    | 2422    |
| F [mm]      | 182     | 329     | 476     | 623     | 770     | 917     | 1064    | 1211    | 1358    | 1505    | 1652    | 1799    | 1946    | 2093    | 2240    | 2387    |
| E [mm]      | 147     | 294     | 441     | 588     | 735     | 882     | 1029    | 1176    | 1323    | 1470    | 1617    | 1764    | 1911    | 2058    | 2205    | 2352    |
| A [mm]      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      | 59      |
| Weight [kg] | 0.83 kg | 1.39 kg | 1.95 kg | 2.51 kg | 3.07 kg | 3.63 kg | 4.19 kg | 4.75 kg | 5.31 kg | 5.87 kg | 6.43 kg | 7 kg    | 7.55 kg | 8.11 kg | 8.67 kg | 9.24 kg |

### F3S-TGR-CL-K system data

| Model number           | Weight | Dimensions |        |        |        |
|------------------------|--------|------------|--------|--------|--------|
|                        |        | F [mm]     | L [mm] | E [mm] | A [mm] |
| F3S-TGR-CL_-K2C-500    | 2.3 kg | 518        | 682    | 500    | 59     |
| F3S-TGR-CL_-K3C-800    | 3.2 kg | 818        | 982    | 400    | 59     |
| F3S-TGR-CL_-K4C-900    | 4.1 kg | 918        | 1082   | 300    | 59     |
| F3S-TGR-CL_-K4C-1200   | 4.9 kg | 1218       | 1382   | 400    | 59     |
| F3S-TGR-CL_-K2-500     | 2.3 kg | 518        | 682    | 500    | 59     |
| F3S-TGR-CL_-K3-800     | 3.2 kg | 818        | 982    | 400    | 59     |
| F3S-TGR-CL_-K4-900     | 4.1 kg | 918        | 1082   | 300    | 59     |
| F3S-TGR-CL_-K4-1200    | 4.9 kg | 1218       | 1382   | 400    | 59     |
| F3S-TGR-CL_-K2-500-LD  | 2.3 kg | 518        | 682    | 500    | 59     |
| F3S-TGR-CL_-K3-800-LD  | 3.2 kg | 818        | 982    | 400    | 59     |
| F3S-TGR-CL_-K4-900-LD  | 4.1 kg | 918        | 1082   | 300    | 59     |
| F3S-TGR-CL_-K4-1200-LD | 4.9 kg | 1218       | 1382   | 400    | 59     |